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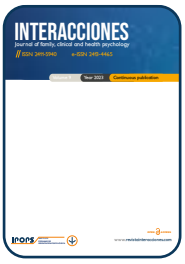

ORIGINAL ARTICLE

Dissociative Experiences Scale: Psychometric Analysis in Puerto Rico and Contributions to the Discussion of the Factor Structure

Escala de Experiencias Disociativas: Análisis Psicométrico en Puerto Rico y Aportaciones a la Discusión sobre la Estructura Factorial

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ABSTRACT

Introduction: The Dissociative Experiences Scale (DES-II) is a widely used psychometric tool to assess dissociative symptoms. Over the years, it has been the subject of numerous studies and research in various fields of psychology and psychiatry. Numerous studies have supported the validity and reliability of the DES-II as a reliable measure of dissociative experiences. The most problematic aspect of the DES-II is the inconsistency in its factor structure. **Objective:** This research aimed to examine the psychometric properties of the DES-II in a clinical and non-clinical sample from Puerto Rico. **Method:** This research had an instrumental design. An availability sampling of 341 adult participants was used. Several competing models of the DES-II were analyzed, including a bifactor model. **Result**: Psychometric analyses concluded that the scale has a unidimensional structure, strong reliability, and construct validity. All 28 items met adequate discrimination values. Participants with dissociative disorders obtained higher means on the DES-II than the other diagnostic groups. Furthermore, the more adverse experiences in childhood, the more dissociative experiences in adulthood. **Conclusion**: The DES-II should be treated and interpreted as a unidimensional dissociation index rather than a multidimensional instrument. This study will advance further research on dissociation and dissociative disorders in Puerto Rico and Latin America.

Keywords: Dissociation, Dissociative Experiences Scale, Assessment, Psychometric Properties, Confirmatory Factor Analysis.

RESUMEN

Introducción: La Escala de Experiencias Disociativas (DES-II) es una herramienta psicométrica ampliamente utilizada para evaluar síntomas disociativos. A lo largo de los años, ha sido objeto de numerosos estudios e investigaciones en diversos campos de la psicología y la psiquiatría. Numerosos estudios han respaldado la validez y la fiabilidad de la DES-II como una medida confiable de las experiencias disociativas. El aspecto más problemático del DES-II es la inconsistencia de su estructura factorial. **Objetivo:** Esta investigación tuvo como objetivo examinar las propiedades psicométricas de la DES-II en una muestra clínica y no clínica de Puerto Rico. **Método:** Esta investigación tuvo un diseño instrumental. Se

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utilizó un muestreo por disponibilidad compuesto por 341 participantes adultos. Se analizaron varios modelos competitivos de la DES-II, incluyendo un modelo bifactorial. **Resultados:** Los análisis psicométricos concluyeron que la escala posee una estructura unidimensional y una sólida confiabilidad y validez de constructo. Los 28 ítems cumplieron con valores adecuados de discriminación. Los participantes con trastornos disociativos obtuvieron medias más altas en la DES-II que los otros grupos diagnósticos. Además, a mayores experiencias adversas en la infancia, mayores experiencias disociativas en la adultez. **Conclusión:** La DES-II debería tratarse e interpretarse como un índice unidimensional de disociación y no como un instrumento multidimensional. Este estudio permitirá el avance de nuevas investigaciones sobre disociación y trastornos disociativos en Puerto Rico y América Latina.

Palabras claves: Disociación, Escala de Experiencias Disociativas, Evaluación, Propiedades Psicométricas, Análisis Factorial Confirmatorio.

BACKGROUND

Contemporary psychopathology understands dissociation as a series of altered processes spanning several dimensions, each of which may be involved to a greater or lesser extent (Cardena & Carlson, 2011). Thus, dissociative phenomena can be distinguished according to the areas of functioning affected (American Psychiatric Association, 2022): (1) perception of self and environment, resulting in symptoms such as depersonalization and derealization; (2) physical sensations, resulting in analgesia and anesthesia; (3) personal memory, whose fragmentation leads to dissociative amnesia; and (4) personal identity, whose dissociation can result in dissociative identity, formerly called multiple personalities.

In recent decades, several instruments have been developed and proposed to measure dissociation: Structured Clinical Interview for DSM Dissociative Disorders (Steinberg, 2000), Dissociative Disorders Interview Schedule (Ross et al., 1989), Multidimensional Inventory of Dissociation (Dell, 2006), Dissociation Questionnaire (DIS-Q; Vanderlinden et al., 1993), Somatoform Dissociation Questionnaire (SDQ-20; Nijenhuis et al., 1996), among others. However, the Dissociative Experiences Scale (DES-II) is the most widely used instrument for clinical and research purposes. The DES-II is a widely used psychometric tool to assess dissociative experiences differing in degree and intensity. The original version was developed by Bernstein and Putnam (1986), while the DES-II was adapted by Carlson and Putnam (1993).

Numerous studies throughout the world have supported the validity and reliability of the DES-II as a reliable measure of dissociative experiences. Versions have been adapted in Germany (Spitzer et al., 1998), Spain (Icarán et al., 1996), Finland (Lipsanen et al., 2003), France (Larøi et al., 2013); Israel (Somer et al., 2001), Italy (Garofalo et al., 2015), Mexico (Robles-García et al., 2006) Portugal (Espírito & Abreu, 2009), Puerto Rico (Martinez-Taboas, 1995), and Sweden (Körlin et al., 2007). These studies have shown that the DES-II has good internal consistency and adequate validity indicators. However, there is no absolute agreement on the internal structure of the DES-II.

The main criticism of the DES-II by academics is the large number of studies reporting different factorial models underlying the 28 items of the instrument. The primary and most widely accepted factorial proposal is that of Bernstein and Putman (1986), who reported an internal structure of three fundamental factors: absorption, depersonalization/realization, and amnesia. Several subsequent psychometric studies have endorsed the three-factor proposal, although these factors sometimes collect different items (Mazzotti et al., 2016; Ruiz et al., 2008; Stockdale et al., 2002). Other studies have reported two-factor (Garofalo et al., 2015; Larøi et al., 2013), four-factor (Espírito & Abreu, 2009; Ray & Faith, 1995), and seven-factor (Ray et al., 1992) internal structures, while others argue that this is a unidimensional measure of dissociation (Holtgraves & Stockdale, 1997; Saggino et al., 2020). It should be noted that many of these studies have been conducted with exploratory factor analyses and with very varied samples.

The inconsistent variability of factor structures across psychometric studies and the large amount of shared variance among factors in the multidimensional models of the DES-II could be an indicator of unidimensionality; that is, the DES-II measures the dissociation construct in a general way (Holtgraves & Stockdale, 1997; Saggino et al., 2020). Clarifying this issue is of utmost importance as clinicians and researchers may risk making erroneous inferences from the results obtained by factors or dimensions.

Adverse Childhood Experiences and Dissociation

Adverse Childhood Experiences (ACEs) refer to traumatic or stressful events that a child may experience during childhood, such as abuse, neglect, domestic violence, and parental divorce, among others. The relationship between ACEs and dissociation is that ACEs may increase the risk of developing dissociation in adulthood (Chiu et al., 2017; Fung et al., 2019). Children who experience trauma in childhood often develop coping strategies, such as dissociation, to cope with the pain and anxiety they experience (Fung et al., 2019).

It is important to note that not everyone who experiences ACEs will develop dissociation, as the response to trauma can vary widely by person and situation. However, there is a recognized correlation between exposure to ACEs and an increased risk of mental health problems in later life, including dissociation in some cases. For this reason, I will use the ACEs Questionnaire as a validity measure, expecting I will find a positive relationship between ACEs and DES-II. Similarly, people with dissociative disorders are expected to obtain higher scores on the DES-II (Lyssenko et al., 2018).

This research aimed to examine the psychometric properties of the Dissociative Experiences Scale (DES-II) and analyze the internal structure of the DES-II using confirmatory factor analysis (CFA) to determine the best-fitting competing model in Puerto Rico and to identify the dimensions underlying the 28 items.

METHOD

Design

In this research, I used a non-experimental, cross-sectional, instrumental design (Ato et al., 2013).

Participants

A sample of 341 Puerto Rican adults was recruited by distributing a paid advertisement on Facebook and Instagram social networks. The mean age of the sample was 43.99 (SD = 13.77). In terms of mental health, 32% (n = 109) receive individual psychotherapy services, 29.9% (n = 109) receive psychiatric services, and 40.8% (n = 139) have a professionally diagnosed mental health disorder. Table 1 presents the general characteristics of the sample.

Instruments

Dissociative Experiences Scale (DES-II). This scale consists of 28 self-report items measuring dissociative experiences and phenomena. DES-I and DES-II only differ in the format of responding to their items: the first version uses a 100 mm visual analog scale, and the second version uses a Likert-type scale with 11 response options ranging in 10% increments from 0% (never) to 100% (always). The total score is obtained by calculating the mean of the scores of the 28 items and can range from 0 to 100, where scores of 30 or more indicate high levels of dissociation (Putnam et al., 1996). For the present study, I revised the 28 items of the Martinez-Taboas (1995) version to ensure that it is understandable and applicable to the current population. None of the items were altered in idea or content. In the sample used in this study, my version obtained excellent internal consistency (α = .95; ω = .96).

Adverse Childhood Experiences Questionnaire (ACEs). The ACEs assess experiences of physical, emotional, and sexual maltreatment, lack of physical and emotional care, or dysfunctional family problems. In this study, I used the Spanish version of the California Surgeon General's Clinical Advisory Committee (available at https://www.acesaware.org/), which contains ten items that are answered by dichotomous responses (yes = 1, no = 0), indicating the occurrence of adverse experiences during the first 18 years of life. The scale's total score is obtained by summing the number of "yes" answers given by the person. Minimum scores range from 0 to 10. In this study, the ACEs obtained an acceptable internal consistency (α = .68; ω = .67) according to Streiner's criteria (2003).

Procedure

Data were collected using an online questionnaire on the PsychData platform. For this, I disseminated a promoted advertisement on Facebook and Instagram that provided general information about the study and a link directing people to the online

Table 1. Sociodemographic information of the sample (n = 341).

Variables	f	%
Sex		
Female	314	92,1
Male	25	7,3
Intersex	2	0,6
Gender		
Female	310	90,9
Male	24	7,0
Transgender	1	0,3
Non-binary Gender	6	1,8
Academic Preparation		
High school or less	17	5,0
Associate's/technical degree	70	20,5
Bachelor's degree	122	35,8
Master's degree	85	24,9
Doctorate	45	13,2
Other	2	0,6
Annual income (dollars)		
$0 - $20,000	124	36,4
$21,000 - $30,000	76	22,3
$31,000 - $40,000	53	15,5
$41,000 - $50,000	32	9,4
$51,000 - $60,000	20	5,9
$61,000 or more	32	9,4
Other	4	1,2

survey. I employed an informed consent sheet to notify people about the purpose of the study, its voluntary nature, potential risks, and their right to withdraw at any time. I was also informed about the duration of their participation and their right to access the study results.

Statistical analysis

Once the data collection was completed, I downloaded them into the IBM SPSS Statistics version 29 program template. I carried out descriptive analyses, data distribution analysis, correlation, discrimination, and reliability analyses in this database. I used the STATA version 15.1 program to evaluate the multivariate normality of the data using the Doornik-Hansen (2008) statistical test. In STATA, I performed several CFAs using the maximum likelihood estimation method and the corrections of Satorra and Bentler (2001). To evaluate the CFAs, I considered the Chi-Square (χ2), Root Mean Squared Error of Approximation (RMSEA; values should be less than .08 to indicate a good fit), Tucker-Lewis Index (TLI), the Comparative Fit Index (CFI), and the Akaike Information Criterion (AIC). For the model to be considered well-fitted, the CFI and TLI values must exceed .95 (Byrne, 2010). I used the AIC to examine parsimony and compare models, where the model with the lower index would reflect a lower fit (Schumacker & Lomax, r2010). To calculate whether the sample size is sufficient to calculate the CFI and RMSEA, I used the Sample size calculator from Arifin (2023).

Following the recommendations of Fornell and Larcker (1981), I examined the convergent and discriminant validity of the DES-II using the Average Variance Extracted (AVE). To support convergent validity, the AVE must be equal to or greater than .50 (Bagozzi & Yi, 1988; Fornell & Bookstein, 1982). Although values lower than .50 can be considered adequate in certain circumstances: many items, standardized factor loadings greater than .50, and McDonald's Omega and Hancock and Müeller's H coefficients greater than .70 (Moral de la Rubia, 2019). In turn, to determine the discriminant validity of each DES-II factor, the Maximum Shared Variance (MSV) and the Average Shared Variance (ASV) must be lower than the value obtained from the individual AVE of each factor. The correlation between the DES-II factors was calculated using Spearman's rho coefficient. To interpret the correlations, I used Schober's classifications (Schober et al., 2018).

Given that the correlations between the factors in the multidimensional model with the highest fit were between large and unitary, I decided to assess the possible presence of a general factor (GF) using a bifactor model (Reise, 2012). Given that the commonly accepted and used goodness-of-fit indices tend to favor bifactor models (Gignac, 2016), I followed the recommendations of Dominguez-Lara and Rodriguez (2017) and calculated other statistical indicators to examine the robustness of the GF, these are the hierarchical omega (ωh; Zinbarg et al., 2006), the explained common variance by the GF (ECV; Berge & Sočan, 2004), the percentage of uncontaminated correlations (PUC; Reise et al., 2013) and the H of Hancock and Müeller (2001) coefficient. To conclude, in favor of unidimensionality, the ω_h should be ≥ .70, the ECV ≥ .60, the PUC ≥ .70, and the H > .70 (Dominguez-Lara & Rodríguez, 2017).

Next, I conducted an item discrimination analysis using the item-total correlation (r_{bis}), whose values must be > .30 (Kline, 2005). In turn, I calculated the reliability of the DES-II using Cronbach's Alpha and McDonald's Omega coefficient, which must be greater than .70 (DeVellis, 2016). To measure the discriminative power of the instrument as a whole, I calculated Ferguson's delta index (δ), which must be greater than .90 (Hankins, 2008). Finally, I calculated the mean scores obtained on the DES-II according to the diagnostic group and the average number of dissociative experiences according to the number of adverse childhood experiences reported by the sample. Differences between means were calculated using the Kruskal-Walli's test.

Ethics Aspects

The Institutional Review Board (IRB) of the Ponce Health Sciences University in Ponce, Puerto Rico approved the research. The participants could answer the questionnaire after accepting the information under their consent. Informed consent was elaborated which included the objective of the study and the ethical principles of confidentiality, beneficence and non-maleficence, data protection, among others (American Psychological Association [APA], 2017).

RESULTADOS

Descriptive Analyses of the DES-II Items

The means of the DES-II items ranged from 4.34 to 44.55, with standard deviations ranging from 12.623 to 35.652. The results of the Kolmogorov-Smirnov and Shapiro-Wilk tests indicate that the item scores do not exhibit a normal distribution (see Table 2). I also calculated the mean and standard deviation of the sum of the 28 DES-II items (M = 21.50, DE = 7.22). The Shapiro-Wilk test (with Lilliefors correction) indicates that the data do not follow a normal distribution, $W(341) = 0.858$, $p < .001$. Similarly, the Doornik-Hansen statistical test shows no evidence of multivariate normality in the scale, $\chi^2(2) = 231.135$, $p < .001$. Due to the lack of normality in the data, I chose to apply the corrections proposed by Satorra and Bentler (2001) for estimating the fit of structural equation models since the lack of normality in the data can affect estimation errors and overall model adequacy.

DES-II Competitive Models

Since the sample size was adequate to calculate the CFI and RMSEA (Arifin, 2023), I analyzed five competitive models using CFA: (M1) traditional unidimensional model (28 items in one factor); (M2) two-dimensional model; (M3) three-dimensional model; and (M4) four-dimensional model. These factor models were obtained in previous psychometric studies (Armour et al., 2014). Table 2 shows the distribution of items in each competitive model evaluated. Models M1, M2, and M3 did not demonstrate an adequate fit to the data (see Table 3). Model M4 was the only model that showed adequate fit indices without eliminating items. This model includes four dimensions or factors: absorption, amnesia, depersonalization/realization, and distractibility.

I used the AVE to identify the variance explained by each fac-

tor in the items. The higher the AVE value, the lower the error variance. The AVEs of the four dimensions of the M4 fluctuated between .44 and .56 (see Table 4), so they can be considered adequate and evidence convergent validity (Moral de la Rubia, 2019). However, all MSVs and ASVs drastically exceeded the AVEs, indicating an absence of divergent validity in the scale and suggesting that the variance not explained by the latent variables is high compared to the total variance in the data. The high correlations between the latent variables in the M4 model (between .76 and .95) point to the presence of a possible GF that I can label as dissociation or dissociative experiences and that explains more variance in the items than the four specific factors (SF) (see Table 4). To analyze this GF, I used a bifactor or direct hierarchical modeling (BM), as suggested by Dominguez-Lara and Rodriguez (2017). The BM presented more acceptable fit indices than the M4 (CFI_{sb} = .93; TLI_{sb} = .91; $RMSEA_{sb}$ = .05). Statistical indicators examining the robustness of the GF conclude in favor of the unidimensionality of the DES-II (ω_h = .93; ECV = .81; PUC = .78; H = .96).

Discrimination and Reliability Analysis

The discrimination indices (rbis) of the M4 and the BM ranged between .53 and .81, so all items obtained discrimination indices greater than .30 (see Table 2). Regarding reliability, the DES-II achieved excellent internal consistency values (α = .95; ω = .96). Then, I calculated Ferguson's delta (δ) to measure the discriminative power of the DES-II total score. The results indicated Ferguson's delta of .992, exceeding the minimum value recommended by Hankins (2008).

Table 2. Descriptive statistics and item distribution according to the competitive models

											BM
Item	M	SD	Skew	Kurt	KS	SW	M1	M2	M3	M4	r_{bis}
1	33,75	29,42	0,69	-0,65	0,16	0,89	D	AB	AB	DST	0,61
2	44,55	29,73	0,26	-1,08	0,12	0,94	D	AB	AB	DST	0,68
3	13,11	22,47	1,96	3,21	0,33	0,65	D	AMN	AMN	AMN	0,63
4	4,34	12,62	3,91	17,75	0,46	0,39	D	AMN	AMN	AMN	0,56
5	12,43	24,17	2,23	4,09	0,34	0,58	D	AMN	AMN	AMN	0,59
6	14,05	23,19	2,15	4,32	0,27	0,65	D	AMN	AMN	AMN	0,53
7	13,61	26,98	2,15	3,40	0,35	0,56	D	AMN	DEP	DEP	0,75
8	7,24	18,46	3,21	10,29	0,42	0,45	D	AMN	AMN	AMN	0,56
9	25,37	31,48	1,15	-0,00	0,25	0,77	D	AMN	AMN	AMN	0,62
10	18,56	26,91	1,59	1,56	0,27	0,72	D	AB	AB	DEP	0,67
11	12,46	26,12	2,26	4,06	0,39	0,54	D	AMN	DEP	DEP	0,63
12	13,26	25,23	2,12	3,56	0,35	0,59	D	AMN	DEP	DEP	0,67
13	12,87	26,46	2,17	3,55	0,39	0,55	D	AMN	DEP	DEP	0,70
14	33,58	33,06	0,76	-0,77	0,19	0,85	D	AB	AB	AB	0,60
15	26,92	30,12	1,14	0,15	0,22	0,81	D	AB	AB	DST	0,77
16	15,34	24,89	1,87	2,56	0,31	0,66	D	AB	AB	DEP	0,72
17	25,34	30,24	1,14	0,11	0,23	0,80	D	AB	AB	AB	0,64
18	22,20	30,31	1,39	0,76	0,26	0,74	D	AB	AB	AB	0,70
19	28,15	31,57	1,05	-0,09	0,20	0,82	D	AB	AB	AB	0,54
20	32,96	32,98	0,81	-0,68	0,20	0,84	D	AB	AB	AB	0,74
21	39,71	35,65	0,50	-1,22	0,17	0,86	D	AB	AB	DST	0,53
22	25,63	31,00	1,00	-0,30	0,24	0,79	D	AB	AB	AB	0,69
23	32,84	32,66	0,63	-0,91	0,17	0,86	D	AB	AB	AB	0,59
24	33,02	31,22	0,75	-0,63	0,16	0,87	D	AB	AB	DST	0,67
25	19,74	27,62	1,42	0,90	0,27	0,74	D	AB	AB	DST	0,68
26	14,02	25,52	1,98	2,86	0,33	0,61	D	AB	AB	DST	0,63
27	14,66	28,56	2,03	2,82	0,36	0,57	D	AMN	DEP	DEP	0,65
28	12,55	25,36	2,16	3,67	0,39	0,56	D	AMN	DEP	DEP	0,71

Note. M = Mean; SD = Standard deviation; Skew = Skewness; Kurtosis = Kurtosis; Standard error of skewness = .132; Standard error of kurtosis = .263. KS = Kolmogorov-Smirnov; SW = Shapiro-Wilk; Kolmogorov-Smirnov and Shapiro-Wilk degrees of freedom = 341, all p-values < .001; M1 = one-dimensional model; M2 = two-dimensional model; M3 = three-dimensional model; M4 = four-factor model; D = dissociation, AB = absorption, AMN = amnesia, DEP = depersonalization/realization, DST = distractibility; BM = bifactor model; r_{bis} = discrimination indices.

Dissociative Experiences, ACEs, and Psychiatric Disorders

I analyzed the correlation between ACEs and DES-II total scores. The analysis showed a moderate correlation (rho = .30, p < .001) and statistically significant differences in the ACEs score means, $\chi^2(3, N = 297) = 18.63$, p < .001. The higher the ACEs, the greater the dissociative experiences. Finally, I calculated the prevalence of dissociative experiences by the diagnostic group. The principles dissociative disorders obtained statistically higher means, $\chi^2(12, N = 341) = 57.361$, p < .001; which is an indicator of criterion validity (see Table 5).

DISCUSSION

The purpose of the present study was to analyze the psychometric properties of the DES-II and, specifically, to examine its internal structure to determine the competitive model (unidimensional or multidimensional) that best fits Puerto Rico. In total, five models with CFA were evaluated: a unidimensional oblique model where all 28 items are loaded on one factor, a two-dimensional model, a three-dimensional model, a four-dimensional model, and a bifactor model. The CFAs showed that the DES-II does not reproduce the three-dimensional structure advocated by the creators of the instrument (Bernstein & Putnam, 1986; Carlson & Putnam, 1993) nor the factorial distributions found in other research in international contexts (Espírito & Abreu, 2009; Garofalo et al., 2015; Larøi et al., 2013; Mazzotti et al., 2016; Ray & Faith, 1995; Ray et al., 1992; Ruiz et al., 2008; Stockdale et al., 2002). This suggests two possible hypotheses: that the internal structure of the DES-II fluctuates according to the sociocultural context in which it is administered or that most of the studies conducted so far have yet to use adequate advanced statistics. For example, many instrumental studies conducted with the DES-II are exploratory rather than confirmatory, except for a few. In addition, very little research has evaluated hierarchical bifactor models (Stockdale et al., 2002) or used the Rasch model to examine the psychometric properties of the DES-II (Saggino et al., 2020). Both methodologies go beyond traditional instrument validation techniques and provide additional information not obtained from the CFA.

The CFA of all the multidimensional models reflected two interesting findings: (1) very high correlations between the dimensions, and (2) the MSVs and ASVs dramatically exceeded the AVEs. When this occurs, one must assume the existence of a general factor (Dominguez-Lara & Rodriguez, 2017; Reise, 2012) and that the variables in the multidimensional model have a significant common variance. In this case, I can hypothesize that the most significant proportion of variance of the 28 DES-II items is explained by a single general factor called dissociation or dissociative symptoms. All statistical indices of unidimensionality adequately assessed the robustness of the general factor. That is, assessing dissociation with the sum of the 28 items of the DES-II is good enough, and it would not be necessary to calculate the scores of the specific dimensions. This finding is congruent with the study of Saggino et al. (2020), who, using the Rasch model, concluded that the DES-II should be treated as a unidimensional dissociation index.

Theoretically, I can understand why most research accepts multidimensional models as the most appropriate; conceptually, absorption, amnesia, or depersonalization are different. Absorption refers to experiences such as becoming lost or self-absorbed in one's thoughts or daydreaming. Dissociative amnesia refers to momentary forgetfulness of events or periods. Moreover, depersonalization involves a feeling of unreality concerning oneself and one's body. Although conceptually distinct experiences, they are complicated to distinguish empirically using the 28 items of the DES-II since a large part of the variance in the observed data is not explained by the latent variables or specific components. This usually happens for two reasons: the measurement model needs to be completed, or the underlying phenomenon (dissociative experiences) might be more complex than initially thought. Now, if we understand dissociation conceptually as a continuum ranging from normal to pathological dissociative experiences (Putnam, 2000), the DES-II can be conceptualized as a comprehensive indicator that reflects the degree of dissociative experiences manifested by an individual, thus denoting a specific rating within a continuous variable. The findings of this study validate this premise, in that continuous line of dissociation, at one extreme are people without mental health diagnoses who obtained a mean of 15.75 on the DES-II, while at the other extreme are people with chronic and pathological dissociative experiences with a mean of 54.80. This same behaviour of the DES-II was reported in the meta-analysis conducted by Lyssenko et al. (2018), who found that scale means increased as they approached dissociative disorders.

The unidimensional findings of this study suggest two possible hypotheses: that the internal structure of the DES-II fluctuates depending on the sociocultural context in which it is administered or that most studies to date have not yet used adequate advanced statistics. For example, many instrumental studies

Table 3. Fit indices of the DES-II competitive models analyzed

Model	χ^2	χ^2_{sb}	DF	RMSEA	$RMSEA_{sb}$	CFI	CFI_{sb}	TLI	TLI_{sb}	AIC
M1	1344,271	832,069	350	0,09	0,06	0,82	0,85	0,81	0,84	85.687,8
M2	1190,432	740,283	349	0,08	0,06	0,85	0,88	0,84	0,87	85.535,9
M3	1108,856	689,711	347	0,08	0,05	0,86	0,9	0,85	0,89	85.458,4
M4	1067,674	661,25	344	0,08	0,05	0,87	0,9	0,86	0,9	85.423,2
BM*	911,036	566,672	322	0,07	0,05	0,89	0,93	0,88	0,91	85.310,6

Note. * = adequate adjustment; sb = Satorra–Bentler adjustments; χ^2 = Chi-square test; χ^2_{sb}= Corrected Chi square test; DF = degrees of freedom; RMSEA = root mean square error of approximation; $RMSEA_{sb}$ = corrected RMSEA; CFI = Comparative Fit Index; CFI_{sb} = Corrected CFI; TLI = Tucker–Lewis Index; TLI_{sb} = Corrected TLI; AIC = Akaike Information Criterion; BM = bifactor model; All statistics χ^2 and χ^2_{sb} are significant, p < 0.001.

Table 4. Comparison of the Four-Factor Oblique Model (M4) and the Bifactor Model of the DES-II

	Four-Factor Oblique Model (M4)				Bifactor Model				
	AB	AMN	DEP	DST	GF-D	AB	AMN	DEP	DST
Item 1	-	-	-	0,65	0,61	-	-	-	0,34
Item 2	-	-	-	0,73	0,68	-	-	-	0,63
Item 3	-	0,70	-	-	0,63	-	0,18	-	-
Item 4	-	0,66	-	-	0,56	-	0,31	-	-
Item 5	-	0,65	-	-	0,60	-	0,23	-	-
Item 6	-	0,65	-	-	0,53	-	0,58	-	-
Item 7	-	-	0,81	-	0,74	-	-	0,28	-
Item 8	-	0,65	-	-	0,55	-	0,41	-	-
Item 9	-	0,66	-	-	0,63	-	0,16	-	-
Item 10	-	-	0,67	-	0,68	-	-	0,06	-
Item 11	-	-	0,70	-	0,62	-	-	0,31	-
Item 12	-	-	0,76	-	0,66	-	-	0,43	-
Item 13	-	-	0,81	-	0,70	-	-	0,45	-
Item 14	0,65	-	-	-	0,59	0,35	-	-	-
Item 15	-	-	-	0,78	0,80	-	-	-	0,02
Item 16	-	-	0,74	-	0,73	-	-	0,17	-
Item 17	0,66	-	-	-	0,66	0,05	-	-	-
Item 18	0,73	-	-	-	0,72	0,03	-	-	-
Item 19	0,61	-	-	-	0,52	0,48	-	-	-
Item 20	0,79	-	-	-	0,73	0,33	-	-	-
Item 21	-	-	-	0,57	0,55	-	-	-	0,02
Item 22	0,75	-	-	-	0,68	0,29	-	-	-
Item 23	0,65	-	-	-	0,59	0,34	-	-	-
Item 24	-	-	-	0,72	0,69	-	-	-	0,18
Item 25	-	-	-	0,72	0,72	-	-	-	0,00
Item 26	-	-	-	0,66	0,66	-	-	-	-0,03
Item 27	-	-	0,67	-	0,68	-	-	0,12	-
Item 28	-	-	0,80	-	0,69	-	-	0,50	-
Variance									
AVE	0,48	0,44	0,56	0,48	0,44				
MSV	0,86	0,76	0,76	0,86	-				
ASV	0,72	0,73	0,73	0,78	-				
Latent correlation between dimensions									
AB	-	0,76	0,84	0,93	-				
AMN	0,60	-	0,87	0,85	-				
DEP	0,74	0,57	-	0,86	-				
DST	0,77	0,66	0,72	-	-				
Internal consistency coefficients									
α	0,87	0,80	0,91	0,86	0,95				
ω	0,87	0,81	0,91	0,86	0,96				
ω_h	-	-	-	-	0,93				
ω_{hs}	-	-	-	-	-	0,13	0,18	0,14	0,05
Bifactor model indicators									
ECV	-	-	-	-	0,81				
PUC					0,78				
H					0,96				

Note. AB = absorption, AMN = amnesia, DEP = depersonalization/realization, DST = distractibility; GF-D = general dissociation factor; AVE = average variance extracted; MSV = maximum shared variance; ASV = average shared variance; α = Cronbach's alpha; w = McDonald's Omega coefficient; ω_h = hierarchical omega; ECV = explained common variance by GF-D; PUC = percentage of uncontaminated correlations; H = Hancock and Müeller's H coefficient; ω_{hs} = hierarchical omega by dimension. Values above the diagonal represent correlations between latent factors, while values below the diagonal represent correlations of direct scores.

conducted with the DES-II are exploratory (EFA) rather than confirmatory, except for a few. In addition, very little research has evaluated hierarchical bifactor models (Stockdale et al., 2002) or used the Rasch model to examine the psychometric properties of the DES-II (Saggino et al., 2020). Both methodologies go beyond traditional instrument validation techniques and provide additional information not obtained with EFAs or multidimensional CFAs. In summary, our findings support the clinical and research use of the DES-II to identify the presence of dissociative symptoms. However, it should not be used to discriminate or differentiate between factors in multidimensional models (absorption, amnesia, or depersonalization), at least until there is more psychometric evidence to support this role.

Regarding the internal consistency of the DES-II, as in previous studies, our results reflected acceptable reliability values, all above what is suggested by the literature (DeVellis, 2016). The correlations of each item with the total score manifest remarkable internal consistency, and the results provide empirical support for the discriminative power of the scale calculated with Ferguson's delta index. Also, the findings support the convergent validity of the instrument, given that the AVE and the standardized factor loadings of the items exceeded the minimum recommended by the literature (Bagozzi & Yi, 1988; Fornell & Larcker, 1981). Likewise, the moderate correlation between the DES-II and ACEs questionnaire and the statistically significant differences in scale scores by number of ACEs and diagnostic category provide additional evidence for the instrument's validity.

Limitations

Like all research, this study has limitations. First, the sample was collected incidentally and was not random. This makes the generalizability of the results limited. Second, the procedure for collecting the data needed to be revised, which may affect the study means and increase the standard error of measurement. Third, the number of women drastically exceeds the participation of men. On the other hand, following the findings of this study, I recommend administering the DES-II to another sample of participants with more male representation to perform the cross-validation process and test the factorial invariance of the instrument, as well as to evaluate the concurrent validity of the instrument using other scales that measure dissociation. For example, the DIS-Q (Vanderlinden et al., 1993) and the SDQ-20 (Nijenhuis et al., 1996) could be used for the validity process. I also recommend examining the properties of the DES-II in a strictly clinical sample, with a more representation of people with dissociative disorders.

Conclusion

In this study, the CFA with structural equations and the bifactor or direct hierarchical modelling strategy allowed me to contribute new insights into the unidimensional structure of the DES-II and its use in research and clinical settings. Finally, I propose that the 28 items of the DES-II be administered and treated in Puerto Rico as a unidimensional index of dissociation.

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Table 5. Prevalence of dissociative experiences in the sample by ACEs and Diagnostic Group

ACEs score	*f*	%	Mean DES-II	Diagnostic Group	*f*	%	Mean DES-II
0	13	3,8	9,26	*Dissociative identity disorder*	7	2,1	54,8
1	26	7,6	13,7	*Dissociative disorders*	8	2,4	51,83
2	21	6,2	19,4	*Somatic symptom disorder*	2	0,6	39,29
3	50	14,7	16,94	*Borderline personality disorder*	7	2,1	36,73
≥ 4	200	58,7	25,36	*Bipolar and related disorders*	8	2,3	31,61
ACE categories				*Obsessive-compulsive disorder*	10	2,9	29,11
Physical neglect	78	22,9	15,94	*Acute Stress Disorder*	3	0,9	27,5
Parental separation/divorce	136	39,9	16,17	*Non-epileptic psychogenic seizures*	2	0,6	26,07
Household mental illness	136	39,9	18,35	*Posttraumatic stress disorder*	18	5,3	24,94
Household substance abuse	147	43,1	14,64	*Depressive disorders*	76	22,29	24,52
Witnessing Domestic Violence	142	41,6	16,95	*Schizophrenia*	2	0,6	22,86
Incarcerated household	31	9,1	13,83	*Anxiety disorders*	22	6,4	17,81
Emotional abuse	231	67,7	16,53	*No mental health disorder*	176	51,61	15,75
Physical abuse	206	60,4	14,71				
Emotional neglect	172	50,4	19,18				
Sexual abuse	122	35,8	15,25				

Note. ACEs = adverse childhood experiences, f = frequency. Diagnostic groups are sorted in descending order of Dissociative Experiences Scale (DES-II) mean score.

AUTHORS' CONTRIBUTION

Juan Aníbal González-Rivera: conceptualization, methodology, formal analysis, investigation, writing - original draft, visualization.

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CONFLICTO DE INTERESES

The author declares that there were no conflicts of interest.

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DATA AVAILABILITY STATEMENT

It will be available to any researcher upon request.

STATEMENT ON THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE

No artificial intelligence-generated tools were used in the creation of the manuscript.

DISCLAIMER

The authors are responsible for all statements made in this article.

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