Current Psychology
https://doi.org/10.1007/s12144-023-05420-4

Differentiation of self in adolescents: measurement invariance analysis across six Spanish-speaking countries

Ana Gallego[1,2] · Maria L. Schweer-Collins[3,4] · Alfonso Osorio[5,6] · Martiño Rodríguez-González[5,6]

Accepted: 3 November 2023

Abstract

This article examines the measurement equivalence of the Spanish Differentiation of Self Inventory for Adolescents (S-DSI-A) in adolescent populations across Spanish-speaking countries ($N = 5{,}552$), including Argentina, Chile, Ecuador, Mexico, Peru, and Spain. Within the Bowen family system theory, Differentiation of self is one of the most recognized constructs to systemic researchers and couple and family therapy practitioners, with implications in relationship adjustment or mental and physical health. The study uses multigroup confirmatory factor analysis (MGCFA) to test for configural, metric, and scalar invariance of the S-DSI-A across the six samples. The results indicate that the S-DSI-A demonstrates configural and metric invariance, but scalar invariance is not achieved. These findings have implications for cross-cultural research on differentiation of self and highlight the importance of considering measurement equivalence when comparing results across different populations. Specifically, our results suggest that the S-DSI-A reliably assesses the latent variables of Emotional Reactivity (ER) and Emotional Cutoff (EC) uniformly across Spanish-speaking nations, but the mean scores for the ER and EC lack cross-sample comparability.

Keywords Differentiation of self · Bowen family systems theory · Measurement invariance · Cross-cultural study · Cultural differences

Differentiation of self (DoS) is a pivotal construct of the Bowen Family Systems Theory (BFST) that elucidates the interplay between DoS and the growth and preservation of intimate partnerships (Kerr & Bowen, 1988). Bowen (1978) defined DoS as the degree to which individuals are able to balance emotional and rational functioning as well as intimacy and independence in relationships. Skowron and Friedlander (1998) further refined this definition, conceptualizing DoS as the ability to strike a balance between achieving an independent sense of self and maintaining close ties with significant others, particularly those within the nuclear family. The development of DoS is a continuous process that begins in infancy and progresses throughout childhood and adolescence until it reaches a fundamental level in early adulthood (e.g., Bowen, 1978; Lampis et al., 2017). However, it is possible for individuals to increase their level of DoS to a certain extent over their lifespan (Bowen, 1978; Knauth & Skowron, 2004). During childhood and adolescence, DoS takes shape and is influenced by the level of DoS exhibited by parents (Peleg et al., 2023). Individuals with high levels of DoS are better equipped to adhere to their feelings, thoughts, and needs, and effectively manage stressful situations and social pressures. Conversely, those with low levels of DoS may experience greater difficulty in regulating their emotions, behaving authentically, and coping with stress and crises (Bowen, 1978; Peleg et al., 2023). Furthermore, research has demonstrated a significant association between low levels of DoS and various negative outcomes

✉ Alfonso Osorio
aosorio@unav.es

1 Department of Psychology, Faculty of Education and Psychology, University of Jyväskylä, Jyväskylä, Finland

2 School of Wellbeing, JYU.Well Multi-Faculty Community of Wellbeing Experts at the University of Jyväskylä, Jyväskylä, Finland

3 Prevention Science Institute, University of Oregon, University of Oregon, Eugene, OR, USA

4 HEDCO Institute for Evidence-Based Educational Practice, University of Oregon, Eugene, OR, USA

5 Institute for Culture and Society, Universidad de Navarra, Pamplona, Spain

6 School of Education and Psychology, Universidad de Navarra, 31009 Pamplona, Spain

Published online: 28 November 2023

among adolescents, including high levels of anxiety (Peleg et al., 2015), depression (Choi & Murdock, 2017), eating disorders (Peleg et al., 2022), problematic coping styles, and physical health problems (Hooper & Doehler, 2011).

The Differentiation of Self Inventory (DSI) is a self-report instrument developed by Skowron and Friedlander (1998) to operationalize Bowen's concept of DoS. The original version of the DSI consisted of 43 items and encompassed four subscales that captured the intrapersonal dimension and interpersonal dimension of the differentiation of self construct: Emotional Reactivity (ER), which assesses the inclination to react to tension with irrational, passionate flooding; taking an I-position (IP), which measures one's ability to assert oneself and fulfill personal desires (intrapersonal dimension); Emotional Cutoff (EC), which explores the tendency to detach and sever relationships as a coping mechanism for symbiotic dynamics; and Fusion with Others (FO), which evaluates the inclination to form dependent and symbiotic relationships with significant others (interpersonal dimension). Various studies provided evidence in support of its construct validity (Skowron, 2000; Skowron & Friedlander, 1998). However, concerns have been raised about the internal consistency and construct validity of the FO subscale, and the questionnaire was revised by Skowron and Schmitt (2003) to enhance its FO subscale, resulting in a 46-item revised version (DSI-R).

With these revisions and since 2003, the international use of the DSI-R has proliferated. For example, the DSI-R and its adaptations are now the most widely used measures to assess DoS (Calatrava et al., 2022). The DSI-R has been validated in several other languages beyond English, including Portuguese (Major et al., 2014), Chinese (Lam & Chan-So, 2015), Turkish (Işık & Bulduk, 2015), Italian (Lampis et al., 2017), and Filipino (Antazo, 2020). We selected the DSI-R in this study because of its widespread use in research on BFST, particularly in cross-cultural research, as is the focus of the current study.

Specifically, in the current study we examine the use of an adapted version of the DSI-R for Spanish-speaking adolescents to better understand the cross-cultural application of the measure for research on BFST and DoS. In 2015, Rodríguez-González and colleagues developed a Spanish language adaptation of the DSI-R specifically tailored for the Spanish adult population. The results revealed the presence of two distinct subscales, characterized as ER and EC, both comprising 13 items each. These subscales exhibited good internal consistency. It is noteworthy to highlight that two other dimensions of DoS, namely the ability to take an "I" position in relationships and the extent of fusion with others, did not emerge as distinct dimensions in the Spanish sample. These particular dimensions exhibited less cross-cultural stability, suggesting that their manifestation and conceptualization may vary across different cultural contexts. As noted by Rodríguez-González et al. (2015), this finding aligns with previous research conducted on diverse populations, including Russian, Chinese, Portuguese, and Filipino samples, samples for which the IP and FO subscales reported less cross-cultural stability compared to the ER and EC subscales. This underscores the significance of considering cultural factors when examining and interpreting DoS. Moreover, the confirmatory factor analyses conducted in the initial S-DSI validation study further supported and verified that the ER and EC subscales are indeed empirically distinct dimensions of DoS in the Spanish sample. Further research using this adaptation provided additional evidence for the validity and reliability of EC and ER subscales in measuring DoS within a Spanish sample (e.g., Rodríguez-González et al., 2016). These findings align with previous research by Jankowski and Hooper (2012), which also emphasized that the EC and ER subscales can provide a more comprehensive assessment of DoS and guide treatment modalities. Overall, there has been a growing trend in utilizing a two-factor scale to assess DoS throughout the years (Calatrava et al., 2022). Thus, in the current study, we also use a two-factor scale to assess DoS.

In 2004, Knauth and Skowron adapted the DSI for implementation with adolescents, specifically targeting a sample of Americans aged 14 to 19 years. The scale exhibited strong reliability and satisfactory internal consistency. Following this adaptation of the DSI for adolescents as well as the Spanish validation of the DSI-R (Rodríguez-González et al., 2015), Duch-Ceballos et al. (2022) validated the Spanish DSI for dolescents (S-DSI-A). The S-DSI-A consisted of 20 items grouped into two subscales: ER and EC. The original four-factor structure of the DSI was not confirmed in the exploratory factor analysis, leading to a bidimensional structure similar to the validation of the DSI for Spanish adults.

The pursuit of comprehending human psychology and behavior beyond traditionally examined cultures, primarily Western populations, has garnered heightened attention (D'amico et al., 2014; Henrich et al., 2010), mainly through cross-cultural research (Jeong & Lee, 2019; Segall et al., 1998). Nonetheless, the initial crucial step towards conducting cross-cultural research is to establish the adequacy of a questionnaire in producing similar results (i.e., measurement invariance) across distinct countries, languages, or cohorts. The concept of measurement invariance refers to the ability of an assessment to accurately measure a construct across different populations, which is a critical component of construct validity (Putnick & Bornstein, 2016). The assessment of measurement invariance involves determining whether the same construct is being measured in a consistent manner across diverse groups (Van Doren et al., 2021). The establishment of measurement invariance is crucial because it enables researchers to confidently attribute any observed cultural differences in the construct to genuine

group differences, rather than to differences in how individuals from different cultures respond to particular items in the assessment (Dimitrov, 2017). Therefore, the validity of intergroup comparisons of findings can only be deemed legitimate when measurement invariance is achieved. Failure to ensure measurement equivalence could result in prejudiced conclusions concerning potential cross-cultural distinctions (Spector et al., 2015). Accordingly, this study aimed to establish the measurement equivalence of the S-DSI-A among adolescents from Spanish-speaking countries, including Argentina, Chile, Ecuador, Mexico, Peru, and Spain, by using measurement invariance techniques. This study represents the first examination of invariance for the S-DSI-A, concurrently serving as the pioneering examination of invariance for the adolescent version of the DSI (Knauth & Skowron, 2004) in any language.

Method

Participants

A total of 5,786 participants were recruited within the Your Life project in high schools in Argentina, Chile, Ecuador, Mexico, Peru, and Spain. Those participants presenting missing values in age or sex, or with ages out of the specified range (12–19) were removed ($n = 234$). A final sample of 5,552 participants was analyzed. The study used a convenience sample method, wherein schools were extended invitation to partake, and only a subset chose to do so. Additionally, within each participating school, students' involvement was voluntary. The sample was large, exceeding the requirements for the analyses detailed in this manuscript, as it is part of a more-extensive, multi-faceted project. For certain analyses within this overarching project, a large sample is imperative.

Measures

The differentiation of self inventory

Differentiation of self was assessed through the Spanish Differentiation of Self Inventory for Adolescents (S-DSI-A), a 20-item self-report inventory (Duch-Ceballos et al., 2022). Participants responded to the items on a 6-point Likert-type scale, from (1) not true at all, to (6) completely true. The scale contains two subscales: emotional cutoff (EC) and emotional reactivity (ER). Some examples of items are: "People often tell me that I am too emotional" (ER), "When someone close to me disappoints me, I withdraw from him/her for a while" (EC). To generate the final scores, items were reversed and the sum of the scores for each dimension was calculated. Higher scores indicate higher levels of differentiation of self in each dimension. The scale has already been validated in a sample of Spanish adolescents obtaining a good model fit: $\chi 2 = 403.059$, df = 141, $\chi 2/df = 2.859$, RMSEA = 0.036 (90%CI = 0.032-0.040), SRMR = 0.031, CFI = 0.963, and TLI = 0.950.

Sociodemographic variables

The questionnaire also included questions to collect sociodemographic information such as sex (male/female), age (years), country, religious affiliation, and type of school (public/private/mixed).

Procedure

The research team invited high schools to participate in the study from May 2019 to September 2022. All data were gathered through an online, self-administered, anonymous questionnaire during class time. Schools were provided with all the documentation required to obtain parents' permission. Each school handled parents' permission according to their own policies. Teachers and students were informed about the anonymity and confidentiality of the study. Students could leave the survey at any time. They were also told that clicking the "Start" button would imply their consent to participate. Ethical approval was obtained from the Ethics Committee of the Universidad de Navarra.

Data analyses

In pursuit of our study´s central aim -to establish the measurement equivalence of the S-DSI-A- we employed multigroup confirmatory factor analysis (MGCFA) to assess measurement invariance among adolescents across six distinct samples, drawn from Spanish-speaking countries including Argentina, Chile, Ecuador, Mexico, Peru, and Spain. MGCFA procedures followed in this study were guided by Byrne (2008). All analyses were conducted in R (R Core Team, 2022) using the Lavaan package (Rosseel, 2012).

Using MGCFA, we tested the equivalence of models across the six samples by imposing a series of between-group constraints to test configural, metric, and scalar invariance, in that order. Configural invariance establishes that participants across the six groups attribute the same meanings to the latent constructs of ER and EC, as demonstrated by each sample having the same number of factors and similar pattern loadings. Metric invariance establishes that factor loadings are similar across groups. We tested metric invariance by constraining factor loadings across the six groups. In scalar invariance, tests establish whether participants in the six groups have similar item intercepts of ER and EC.

Scalar invariance is established by constraining item intercepts across the six groups.

Model fit was assessed using Hu and Bentler's (1999) criteria for good model fit, including the comparative fit index (CFI), root mean square error of approximation (RMSEA) and its 90% confidence interval, and chi-square (X^2). CFI ≥ 0.95 and RMSEA < 0.05 are evidence for a good fitting model (Hu & Bentler, 1999) and CFI = 0.92-0.94 and RMSEA = 0.05-0.08 are evidence for an adequate fitting model (Byrne, 2008). As subsequent models that were examined in comparison to the baseline model can be seen as being nested under one another, we followed recommendations from Cheung and Rensvold (1999) to reject measurement invariance if model fit did not degrade based on cutoff values of ΔCFI ≥ -0.01 and when ΔRMSEA ≤ 0.015. Missing data were assessed and handled through Full information maximum likelihood (FIML) estimation methods in the Lavaan package.

Results

Preliminary analyses

Sample demographics for the six Spanish-speaking samples are presented in Table 1. There were statistical differences on age, gender, religion and education center among the six samples. Means, standard deviations, and correlations for the ER, EC, and DoS Total scores were examined separately for each sample (Table 2).

The rages of missing values for the 20 items of the S-DSI-A showed variations across the samples: Argentina: 9.32% to 14.34%; Chile: 4.74% to 11.64%; Ecuador: 5.31% to 11.54%; Mexico: 4.49% to 10.82%; Peru: 3.11% to 9.51%; Spain: 4.49% to 10.82%. Missingness analysis showed there were no significant differences in missing data by gender. However, there were significant differences in terms of age-younger students had more missing data than older participants. Full information maximum likelihood (FIML) estimation was used in all subsequent analyses to handle missing data.

Table 2 also presents the correlation matrix, means, and standard deviations for the two S-DSI-A subscales and total score. As expected, the correlations between the two S-DSI-A subscales were strong and positive, ranging between $r = 0.78$—0.90 across the six samples. Correlations between the S-DSI total scores and subscales were also positive and strong, ranging from $r = 0.94$—0.98.

Main analyses

Configural invariance

We first specified a MGCFA model that specified configural invariance, which means the same factor structure (same pattern of fixed and free factor loadings) was estimated simultaneously on all six groups with no other between-groups constraints. Results presented in Table 3 suggest a model that fits the data well, with CFI = 0.906, RMSEA = 0.052, 90% CI [0.050, 0.054], $\chi^2(996) = 3390.929$ $p = 0.001$. These results supported the presence of a two-factor S-DSI model containing ER and EC subscales across the six samples. The factor loadings of each of the items are presented in (Table 4).

Table 1 Participants' sociodemographic characteristics by country

Variable	All $n = 5552$	Argentina $n = 558$	Chile $n = 1263$	Ecuador $n = 546$	Spain $n = 2148$	Mexico $n = 490$	Peru $n = 547$
Age M (SD)	14.91 (1.9)	17.05 (2.04)	14.64 (1.59)	14.58 (1.95)	14.77 (1.71)	14.5 (2.04)	14.59 (1.57)
Gender							
Female	2909 (52.4%)	316 (57%)	475 (38%)	282 (52%)	1284 (60%)	308 (63%)	244 (45%)
Male	2643 (47.6%)	242 (43%)	788 (62%)	264 (48%)	864 (40%)	182 (37%)	303 (55%)
Type of education center							
Public	589 (11%)	0 (0%)	1 (0.1%)	243 (45%)	195 (9%)	0 (0%)	150 (27%)
Private	2444 (44%)	369 (66%)	743 (58.8%)	303 (55%)	284 (13%)	490 (100%)	255 (47%)
Mixed	2519 (45%)	189 (34)	519 (41.1%)	0 (0%)	1669 (78%)	0 (0%)	142 (26%)
Religion							
Agnostic	935 (17%)	91 (16%)	219 (17%)	46 (8%)	530 (25%)	14 (3%)	35 (6%)
No religion, but believe in God	711 (13%)	75 (13%)	201 (16%)	142 (26%)	185 (9%)	12 (2%)	96 (18%)
Catholic	2796 (50%)	264 (47%)	559 (44%)	258 (47%)	1014 (47%)	390 (80%)	311 (57%)
Other religion	297 (5%)	23 (5%)	95 (8%)	43 (9%)	81 (3%)	8 (1%)	47 (8%)
No answer	813 (15%)	105 (19%)	189 (15%)	57 (10%)	338 (16%)	66 (14%)	58 (11%)

Table 2 Intercorrelations, means, and standard deviations (SD) of DSI-R Scores presented by sample

Variable	1	2	3
Argentinian sample			
DSI-R			
1. Emotional reactivity	-		
2. Emotional cutoff	.85**	-	
3. DSI-total score	.96**	.97**	-
Mean	39.60	42.32	82.72
SD	7.36	7.96	16.46
Chilean sample			
DSI-R			
1. Emotional reactivity	-		
2. Emotional cutoff	.82**	-	
3. DSI-total score	.95**	.96**	-
Mean	39.73	41.39	81.18
SD	8.08	7.71	14.50
Ecuadorian sample			
DSI-R			
1. Emotional reactivity	-		
2. Emotional cutoff	.90**	-	
3. DSI-total score	.97**	.98**	-
Mean	35.8	35.75	72.73
SD	7.87	8.34	15.13
Spanish sample			
DSI-R			
1. Emotional reactivity	-		
2. Emotional cutoff	.83**	-	
3. DSI-total score	.95**	.96**	-
Mean	40.50	43.32	84.37
SD	7.55	8.03	15.10
Mexican sample			
DSI-R			
1. Emotional reactivity	-		
2. Emotional cutoff	.84**	-	
3. DSI-total score	.97**	.95**	-
Mean	38.94	42.25	80.79
SD	7.92	6.99	14.22
Peruvian sample			
DSI-R			
1. Emotional reactivity	-		
2. Emotional cutoff	.78**	-	
3. DSI-total score	.94**	.95**	-
Mean	37.10	37.99	75.87
SD	7.35	8.29	14.50

** The correlation is significant at the 0.01 level

Metric invariance

We next tested a model that specified metric invariance, which has been cited as a minimum requirement to assume construct validity across different samples or groups (Kline, 2016). In this model, we placed equality constraints on all factor loadings across the six samples. Metric invariance is met if this model does not result in a deterioration of fit compared with the configural model. Results from the tests of Model 2, which tested for metric invariance, suggest the model fit the data well. Although the chi-square test was significant, $X^2(1086) = 3579.98$, $p < 0.001$, the CFI (0.901) and RMSEA (0.051) values suggest a good fitting model. Additionally, the ΔCFI and ΔRMSEA values, ΔCFI = -0.004, ΔRMSEA = -0.001, are beneath those cutoff criteria for accepting measurement invariance (see Table 3).

Scalar invariance

In our final model, Model 3, we tested scalar invariance on the S-DSI-A among the six samples. Results indicated that, as a function of the additional constraints on the item intercepts, there was substantial deterioration in model fit, with the CFI value exceeding those that indicate good fit (0.878). Additionally, the ΔCFI (-0.023) was also beyond the recommended cutoff points to reject scalar invariance (i.e., -0.01; See Table 3). We attempted to establish partial scalar invariance; however, after examining the modification indices and making sequential changes to the model (i.e., allowing DSI 18 and DSI 20 intercepts to vary freely among the six samples) model fit did not improve (CFI = 0.880, RMSEA = 0.054, $X^2(1166) = 4210.17$, $p < 0.001$).

Discussion

The present study aimed to establish the measurement equivalence of the Spanish Differentiation of Self Inventory for Adolescents (S-DSI-A) across Spanish-speaking countries, including Argentina, Chile, Ecuador, Mexico, Peru, and Spain. The primary objective was to determine whether the S-DSI-A could be used reliably and validly across different Spanish-speaking cultural contexts, enabling researchers and practitioners to make meaningful comparisons and draw accurate conclusions about adolescents' DoS. The study employed multigroup confirmatory factor analysis (MGCFA) to test for configural, metric, and scalar invariance of the S-DSI-A across the six samples. The results indicated that the S-DSI-A demonstrated configural and metric invariance, but scalar invariance was not achieved. Thus, partial invariance was obtained for the S-DSI-A for Spanish-speaking adolescents in the sampled countries.

The findings of configural invariance indicated that the factor structure of the S-DSI-A, which includes the Emotional Reactivity (ER) and Emotional Cutoff (EC) subscales, was consistent across the six Spanish-speaking samples. The metric invariance results further supported the construct

Table 3 Tests of measurement invariance of a two-factor model of differentiation of self

Model	$\chi 2$ (df)	CFI	RMSEA 90% CI	RMSEA	$\Delta\chi 2$ (df)	ΔCFI	ΔRMSEA
1. Configural	3390.93 (996)	.906	.052	[.050−.054]	-	-	-
2. Metric	3579.98 (1086)	.901	.051	[.050−.050]	189.05 (90)	−.004	−.001
3. Scalar	4280.84 (1176)	.878	.055	[.053−.056]	707.86 (90)	−.023	.004

$\chi 2$ chi-square; *df* Degrees of freedom; *CFI* Comparative fit index; *RMSEA* Root mean square error of approximation; Δ = increment

Table 4 Factor loadings of the S-DSI-A scale items

Argentina			Chile		Ecuador		Mexico		Peru		Spain	
Item	ER	EC	ER	EC	ER	EC	ER	EC	ER	EC	ER	EC
1	.47	-	.53	-	.47	-	.50	-	.48	-	.49	-
2	-	.47	-	.52	-	.48	-	.46	-	.52	-	.49
3	-	.50	-	.56	-	.52	-	.53	-	.52	-	.52
4	-	-	-	-	-	-	-	-	-	-	-	-
5	-	.48	-	.52	-	.44	-	.44	-	.45	-	.51
6	-	.35	-	.43	-	.35	-	.35	-	.34	-	.43
7	.64	-	.69	-	.65	-	.68	-	.67	-	.68	-
8	-	.47	-	.50	-	.46	-	.44	-	.48	-	.49
9	-	.57	-	.61	-	.58	-	.54	-	.62	-	.58
10	.60	-	.65	-	.58	-	.65	-	.58	-	.62	-
11	-	.43	-	.44	-	.40	-	.41	-	.43	-	.50
12	.58	-	.57	-	.54	-	.59	-	.57	-	.59	-
13	-	.51	-	.56	-	.48	-	.47	-	.51	-	.56
14	.50	-	.51	-	.48	-	.51	-	.48	-	.50	-
15	.67	-	.71	-	.62	-	.66	-	.63	-	.68	-
16	.60	-	.63	-	.57	-	.61	-	.61	-	.63	-
17	-	.48	-	.52	-	.47	-	.46	-	.52	-	.48
18	.51	-	.55	-	.49	-	.55	-	.50	-	.56	-
19	-	.41	-	.43	-	.39	-	.36	-	.39	-	.40
20	.52	-	.54	-	.47	-	.53	-	.54	-	.54	-
21	.58	-	.64	-	.59	-	.58	-	.60	-	.59	-

EC Emotional cutoff; *ER* Emotional reactivity

validity of the S-DSI-A, as the factor loadings of the items were similar across the samples. These findings indicate that the S-DSI-A measures the same underlying constructs of ER and EC in a consistent manner across the Spanish-speaking countries. However, the study did not find scalar invariance, indicating that the means of ER and EC are not comparable across the six samples (Zhao et al., 2023).

The lack of scalar invariance highlights the importance of considering cultural and contextual factors that may influence the manifestation and interpretation of DoS. It is possible that cultural norms, values, and family dynamics vary across these countries, leading to differences in the levels of ER and EC. These results are consistent with those of a prior investigation of the S-DSI on adults (Rodríguez-González et al., 2020). In that study, configural and metric invariance were also established, signifying that the factor structure and factor loading of the DoS measures remained consistent across diverse cultural groups (i.e., Spain, Italy and the U.S.). Such results, in conjunction with those of the current study, suggest that participants from various cultures ascribe comparable meanings to the constructs of ER and EC. However, the non-invariance of latent means across the samples prevents direct comparisons of the means of ER and EC between the Spanish-speaking countries. Similarly to the current study, the study run by Rodríguez-González et al. (2020) also hindered direct comparison of mean levels of ER and EC participants from the US., Spain and Italy.

Future research should explore the specific cultural factors that contribute to variations in DoS across different populations. Moreover, future studies are needed to explore invariance in DoS among adults in Spanish-speaking countries, as this study with adolescents is the first where invariance

among Spanish-speaking countries has been tested. According to Bowen (1978), DoS changes during adolescence and achieves stability in adulthood. Although empirical research exploring how this process unfolds is scarce, based on Bowen's hypotheses, one would expect to find differences in DoS through development from adolescence and into adulthood. In the current study, we did not find any age differences across the six samples. Further, because our data were cross-sectional, we were not able to investigate changes in DoS across different development periods or age. Longitudinal research beginning in adolescences and into early adulthood is best positioned to investigate this theoretical proposition that DoS levels solidify in adulthood.

The findings of this study have important implications for the cross-cultural measurement and understanding of DoS. Establishing measurement invariance is essential to ensure that the assessment tool measures the same construct consistently across diverse populations (Gracia et al., 2019). By demonstrating configural and metric invariance, the study provides evidence for the cross-cultural applicability of the S-DSI-A in Spanish-speaking countries. However, the lack of scalar invariance highlights the need for caution when making comparisons between different cultural groups. Researchers and clinicians should be mindful of cultural variations in DoS and consider the cultural context when interpreting and applying the S-DSI-A. Because partial invariance was obtained on the S-DSI-A across Argentina, Chile, Ecuador, Mexico, Peru, and Spain, future research could examine associations between DoS and other variables of interest across these different groups, as correlation, regression and structural equation modeling are all appropriate statistical techniques when partial invariance on a given measure has been demonstrated (Steenkamp & Baumgartner, 1998).

Although all the countries included in our sample are Spanish-speaking, it is important to acknowledge that there exist important cultural differences among them. For example, Belintxon et al. (2022) found that adolescents from Chile, Mexico, Peru, and Spain differed in the levels of certain internal developmental assets (i.e., interpersonal competence and commitment to learning) and in substance use. Additionally, Orejudo et al. (2022) found that the associations between some family variables and positive youth development were different across Hispanic countries. Furthermore, the findings of a study by van Zyl and Meiselman (2015) provide concrete evidence supporting the notion that cultural differences exist not only across different languages but also within the same language across different countries. Their research examined the emotional responses and language usage related to beverages among Spanish-speaking countries, specifically comparing Mexican and Spanish respondents. The results revealed notable distinctions between the two groups, with Mexican respondents reporting a higher percentage of applicable emotions to beverages compared to Spanish respondents. Intriguingly, there were greater similarities in relevant emotions between Mexican respondents and English-speaking respondents from countries such as the USA, UK, Australia, and New Zealand, than between Mexican and Spanish respondents, despite sharing the same root language. These findings underscore the importance of considering cultural factors, beyond nationality, when examining the responses elicited by research inventories (van Zyl & Meiselman, 2015). In sum, these findings emphasize the need to account for cultural disparities and variations when assessing measurement invariance and making cross-cultural comparisons in research. These variations may have contributed to the lack of evidence documenting full measurement invariance across the six Spanish-speaking samples included in this study. Factors such as social norms, values, educational systems, and historical contexts differ among Spanish-speaking countries (Buré-Reyes et al., 2013). These differences can, in turn, shape individuals' perceptions and responses to the measures used in our study. Moreover, these prior studies together with our results in the current study suggest future research should be conducted to test the DSI-R invariance across English-speaking countries (e.g., UK, USA, Canada, Australia), as (to the best of our knowledge) they have not been conducted so far.

The strengths of this study include the large sample size and the inclusion of multiple Spanish-speaking countries, which enhances the generalizability of the findings. However, there are some limitations to consider. In the current study, we relied on self-report measures, which are subject to potential biases and limitations. Future studies might incorporate a qualitative approach, in addition to self-report, to provide a more comprehensive understanding of DoS. Additionally, the reliance on an anonymous questionnaire administered online during class time introduces certain limitations. The online format may have influenced the participants' responses, potentially leading to response biases. It is also important to note that the acquisition of parental permission varied across schools, as each institution followed its own policies. This variation in obtaining parental consent may have introduced selection biases. Therefore, caution should be exercised when interpreting the results, considering the potential limitations associated with the study's methodology.

Bowen (1978) postulated the cross-culture universality of his theory, including the principles and hypotheses related to the differentiation of self construct. In this regard, this study provides only partial confirmation of this assumption, as scalar invariance was not achieved. According to Bowen's theory, self-report is not the optimal approach to measure levels differentiation of self, and this partial confirmation through invariance testing could be explained by experts in the theory as a potential measurement effect. Moreover, differentiation is a multidimensional construct and, accordingly, although this is not a statement postulated by Bowen,

previous research (e.g., Rodríguez-González et al., 2020), together with the current study, support the idea that some traits or dimensions of differentiation are more stable across cultures than others.

This study is only a first step into investigations that seek to further understand the applicability of BFST to adolescent populations, for example, future research is needed to test the development and stability of DoS during adolescence and into emerging adulthood, and the ability of the individual to differentiate from one's family of origin and achieve levels of DoS that are either similar or different. Even though the research on the development of DoS in adolescence is lacking, prior research has shown that DoS in adolescence is a relevant factor to adolescent development. For example, Knauth et al. (2006) found that DoS in adolescents aged 14–19 is a cognitive factor that is predictive of health risk behaviors such as substance use through the modulation of adolescent anxiety. This research suggests that DoS, even if not fully developed, may play a contributing role on adolescent risk behavior development.

In conclusion, the present study contributes to the literature by examining the measurement equivalence of the S-DSI-A across Spanish-speaking countries. The findings support the configural and metric invariance of the S-DSI-A, indicating its cross-cultural applicability in assessing differentiation of self. However, the lack of scalar invariance emphasizes the need to consider cultural variations in the interpretation and application of the S-DSI-A, and highlights the need to conduct invariance tests even between countries with the same language (e.g., Spanish, English, Portuguese). Future research should continue to explore the cultural factors influencing differentiation of self and develop culturally sensitive measures to enhance our understanding of this important construct in diverse populations.

Funding Open Access funding provided thanks to the CRUE-CSIC agreement with Springer Nature. Project YourLife has been supported by Project "PI18/01126" and Project "PI22/00624", both funded by Instituto de Salud Carlos III and co-funded by the European Union (ERDF, "A way to make Europe").

Data availability Data supporting the results reported in the article can be found in Zenodo: https://doi.org/10.5281/zenodo.8300667

Declarations

Ethical approval Ethical approval was obtained from the Ethics Committee of the University of Navarra, Spain (project ref. 2018/077).

Competing interests The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

Antazo, B.G. (2020). Psychometric evaluation of the differentiation of self inventory-revised and mental health inventory-18 for Filipinos. https://doi.org/10.31234/osf.io/mnc2f

Belintxon, M., Calatrava, M., Osorio, A., Balaguer, Á., & Vidaurreta, M. (2022). Internal developmental assets and substance use among Hispanic adolescents. A cross-sectional study. *Journal of Advanced Nursing, 78*, 1990–2003. https://doi.org/10.1111/jan.15100

Bowen, M. (1978). *Family therapy in clinical practice*. Jonson Aronson.

Buré-Reyes, A., Hidalgo-Ruzzante, N., Vilar-López, R., Gontier, J., Sánchez, L., Pérez-García, M., & Puente, A. E. (2013). Neuropsychological test performance of Spanish speakers: Is performance different across different Spanish-speaking subgroups? *Journal of Clinical and Experimental Neuropsychology, 35*(4), 404–412. https://doi.org/10.1080/13803395.2013.778232

Byrne, B. (2008). Testing for multigroup equivalence of a measuring instrument: A walk through the process. *Psicothema, 20*(4), 872–882.

Calatrava, M., Martins, M. V., Schweer-Collins, M., Duch-Ceballos, C., & Rodríguez-González, M. (2022). Differentiation of self: A scoping review of Bowen Family Systems Theory's core construct. *Clinical Psychology Review, 91*, 102101. https://doi.org/10.1016/j.cpr.2021.102101

Cheung, G. W., & Rensvold, R. B. (1999). Testing factorial invariance across groups: A reconceptualization and proposed new method. *Journal of Management, 25*(1), 1–27.

Choi, S. W., & Murdock, N. L. (2017). Differentiation of self, interpersonal conflict, and depression: The mediating role of anger expression. *Contemporary Family Therapy., 39*, 21–30. https://doi.org/10.1007/s10591-016-9397-3

D'amico, E. J., Tucker, J. S., Shih, R. A., & Miles, J. N. (2014). Does diversity matter? The need for longitudinal research on adolescent alcohol and drug use trajectories. *Substance Use & Misuse, 49*(8), 1069–1073. https://doi.org/10.3109/10826084.2014.862027

Dimitrov, D. M. (2017). Testing for factorial invariance in the context of construct validation. *Measurement and Evaluation in Counseling and Development, 43*, 121–149. https://doi.org/10.1177/0748175610373459

Duch-Ceballos, C., Osorio, A., Calatrava, M., & Rodriguez-Gonzalez, M. (2022). Spanish validation of the differentiation of self inventory for adolescents. *Revista Iberoamericana de Diagnóstico y Evaluación-E Avaliacao Psicologica, 4*(65), 125–141. https://doi.org/10.21865/RIDEP65.4.10

Gracia, E., Martín-Fernández, M., Lila, M., Merlo, J., & Ivert, A. K. (2019). Prevalence of intimate partner violence against women in Sweden and Spain: A psychometric study of the 'Nordic paradox.' *PLoS One, 14*(5), e0217015. https://doi.org/10.1371/journal.pone.0217015

Henrich, J., Heine, S. J., & Norenzayan, A. (2010). Most people are not WEIRD. *Nature, 466*(7302), 29–29.

Hooper, L. M., & Doehler, K. (2011). The mediating and moderating effects of differentiation of self on body mass index and depressive symptomatology among an American college sample. *Counseling Psychology Quarterly, 24*, 71–82. https://doi.org/10.1080/09515070.2011.559957

Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Işık, E., & Bulduk, S. (2015). Psychometric properties of the differentiation of self inventory-revised in Turkish adults. *Journal of Marital and Family Therapy, 41*(1), 102–112. https://doi.org/10.1111/jmft.12022

Jankowski, P. J., & Hooper, L. M. (2012). Differentiation of self: A validation of the Bowen theory construct. *Couple and Family Psychology: Research and Practice, 1*, 226–243. https://doi.org/10.1037/a0027469

Jeong, S., & Lee, Y. (2019). Consequences of not conducting measurement invariance tests in cross-cultural studies: A review of current research practices and recommendations. *Advances in Developing Human Resources, 21*(4), 466–483. https://doi.org/10.1177/1523422319870726

Kerr, M. E., & Bowen, M. (1988). *Family evaluation*. Norton & Company.

Kline, R. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Knauth, D. G., & Skowron, E. A. (2004). Psychometric evaluation of the differentiation of self-inventory for adolescents. *Nursing Research, 53*, 163–171. https://doi.org/10.1097/00006199-200405000-00003

Knauth, D. G., Skowron, E. A., & Escobar, M. (2006). Effect of differentiation of self on adolescent risk behavior: Test of the theoretical model. *Nursing Research, 55*(5), 336–345. https://doi.org/10.1097/00006199-200609000-00006

Lam, C. M., & Chan-So, P. C. (2015). Validation of the Chinese version of Differentiation of Self Inventory (C-DSI). *Journal of Marital and Family Therapy, 41*(1), 86–101. https://doi.org/10.1111/jmft.12031

Lampis, J., Busonera, A., Cataudella, S., Tommasi, M., & Skowron, E. A. (2017). Psychometric properties of an Italian version of the Differentiation of Self Inventory-Revised (it-DSI-R). *Journal of Adult Development, 24*, 144–154. https://doi.org/10.1007/s10804-016-9253-6

Major, S., Miranda, C., Rodríguez-González, M., & Relvas, A. P. (2014). Adaptação portuguesa do Differentiation of Self Inventory Revised (DSI-R): Um estudo exploratório. *Revista Iberoamericana de Diagnóstico y Evaluación-e Avaliação Psicológica, 1*(37), 99–121.

Orejudo, S., Balaguer, Á., Osorio, A., De la Rosa, P. A., & Lopez-del Burgo, C. (2022). Activities and relationships with parents as key ecological assets that encourage personal positive youth development. *Journal of Community Psychology, 50*, 896–915. https://doi.org/10.1002/jcop.22689

Peleg, O., Boniel-Nissim, M., & Tzischinsky, O. (2022). The mediating role of emotional distress in the relationship between differentiation of self and the risk of eating disorders among young adults. *Clinical Psychiatry, 8*, 144. https://doi.org/10.21203/rs.3.rs-1496540/v1

Peleg, O., Boniel-Nissim, M., & Tzischinsky, O. (2023). Adolescents at risk of eating disorders: The mediating role of emotional distress in the relationship between differentiation of self and eating disorders. *Frontiers in Psychology, 13*, 8389. https://doi.org/10.3389/fpsyg.2022.1015405

Peleg, O., Miller, P., & Yitzhak, M. (2015). Is separation anxiety in adolescents and parents related to parental differentiation of self? *British Journal of Guidance & Counselling, 43*, 413–428. https://doi.org/10.1080/03069885.2014.974021

Putnick, D. L., & Bornstein, M. H. (2016). Measurement invariance conventions and reporting: The state of the art and future directions for psychological research. *Developmental Review, 41*, 71–90. https://doi.org/10.1016/j.dr.2016.06.004

R Core Team. (2022). *R: A language and environment for statistical computing* (4.2.0). R Foundation for Statistical Computing.

Rodríguez-González, M., Lampis, J., Murdock, N. L., Schweer-Collins, M. L., & Lyons, E. R. (2020). Couple adjustment and differentiation of self in the United States, Italy, and Spain: A cross-cultural study. *Family Process, 59*(4), 1552–1568. https://doi.org/10.1111/famp.12522

Rodríguez-González, M. R., Skowron, E. A., & Anchía, R. J. (2015). Spanish Adaptation of The Differentiation of Self Inventory-Revised (DSI-R). *Terapia Psicologica, 33*(1), 47–58. https://doi.org/10.4067/S0718-48082015000100005

Rodríguez-González, M., Skowron, E. A., Cagigal, V., & Muñoz, I. (2016). Differentiation of self, mate selection, and marital adjustment: Validity of postulates of Bowen theory in a Spanish sample. *American Journal of Family Therapy, 44*, 11–23. https://doi.org/10.1080/01926187.2015.1099415

Rosseel, Y. (2012). lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, *48*(2). https://doi.org/10.18637/jss.v048.i02

Segall, M. H., Lonner, W. J., & Berry, J. W. (1998). Cross-cultural psychology as a scholarly discipline: On the flowering of culture in behavioral research. *American Psychologist, 53*(10), 1101.

Skowron, E. A. (2000). The role of differentiation of self in marital adjustment. *Journal of Counseling Psychology, 47*, 229–237. https://doi.org/10.1037/0022-0167.47.2.229

Skowron, E. A., & Friedlander, M. L. (1998). The Differentiation of Self Inventory: Development and initial validation. *Journal of Counseling Psychology, 45*(3), 235–246. https://doi.org/10.1037/0022-0167.45.3.235

Skowron, E. A., & Schmitt, T. A. (2003). Assessing interpersonal fusion: Reliability and validity of a new DSI Fusion with Others subscale. *Journal of Marital and Family Therapy, 29*(2), 209–222. https://doi.org/10.1111/j.1752-0606.2003.tb01207.x

Spector, P. E., Liu, C., & Sanchez, J. I. (2015). Methodological and substantive issues in conducting multinational and cross-cultural research. *Annual Review of Organizational Psychology and Organizational Behavior, 2*(1), 101–131. https://doi.org/10.1146/annurev-orgpsych-032414-111310

Steenkamp, J. B. E., & Baumgartner, H. (1998). Assessing measurement invariance in cross-national consumer research. *Journal of Consumer Research, 25*(1), 78–90. https://doi.org/10.1086/209528

Van Doren, N., Zainal, N. H., & Newman, M. G. (2021). Cross-cultural and gender invariance of emotion regulation in the United States and India. *Journal of Affective Disorders, 295*, 1360–1370. https://doi.org/10.1016/j.jad.2021.04.089

van Zyl, H., & Meiselman, H. L. (2015). The roles of culture and language in designing emotion lists: Comparing the same language in different English and Spanish speaking countries. *Food Quality and Preference, 41*, 201–213. https://doi.org/10.1016/j.foodqual.2014.12.003

Zhao, X., Dale, C., Hare, M., DiMarzio, K., Hayes, T., Ahemaitijiang, N., Han, Z. R., & Parent, J. (2023). Measurement invariance in the assessment of parenting practices: A cross-cultural comparison of China and the United States. *Journal of Family Psychology, 37*(6), 774–785. https://doi.org/10.1037/fam0001099