Validation of the construct of self-determination through the ARC-INICO scale for teenagers [1]

Validación del constructo de autodeterminación a través de la escala ARC-INICO para adolescentes

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Abstract:

Self-determination is a good predictor of quality of life, which is defined as a strategy that aims to increase and improve the educational practices focused on individuals' needs at a global and life-long-term level. Hence, the evaluation of this construct has undergone notable advances in our country due to the acceptance of international theoretical models and the design of specific instruments for our context. The ARC-INICO scale (Verdugo et al., 2014) assesses four characteristics of self-determined behavior in teenagers: autonomy, self-regulation, empowerment and self-concept. This structure is based on the Wehmeyer's Functional Model (1999, 2003). It has only been validated with Spanish students with intellectual and developmental disabilities. The purpose of this study is to assess the psychometrical properties of this scale in Galician population, checking its equivalence both for use with young people with neurological development disorders and without them. The sample was made up of 2 220 high school students. A Confirmatory Factor Analysis was conducted to test the scale structure using the original proposal based on a higher-order factor structure on a correlated four factor model, and a single-factor model which assumes the unidimensionality of self-determination. Regarding the reliability, high overall internal consistency and for its sections has been found. Although the unifactorial model offers an acceptable adjustment (Model 1: GFI = .958, AGFI = .941, RMSEA = .057), it is superior in the higher order model (Model 2: GFI = .970, AGFI = .954; RMSEA = .049).

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In addition, the factorial invariance measure shows the utility of model 2 to compare scores according to the presence or absence of neurological development disorders. In conclusion, the ARC-INICO scale provides an important basis for decisions making regarding the design of care programs, through the development of resources, guidelines and strategies, and provides information for the differential provision of said resources and supports.

Keywords: self-determination, students, questionnaire, test reliability, test validity.

Resumen:

La autodeterminación se sitúa como un buen predictor de la calidad de vida, entendida como una estrategia que pretende incrementar y mejorar las prácticas educativas centradas en las necesidades de la persona a nivel global, y a lo largo de su desarrollo vital. De ahí que la evaluación de este constructo haya experimentado notables avances en nuestro país, fruto de la acogida de modelos teóricos internacionales y del diseño de instrumentos específicos para nuestro contexto. La escala ARC-INICO (Verdugo et al., 2014) evalúa cuatro características de la conducta autodeterminada en adolescentes: autonomía, autorregulación, empoderamiento y autoconcepto, basándose en el Modelo Funcional de Wehmeyer (1999, 2003). Ha sido validada únicamente con estudiantes españoles con discapacidad intelectual y del desarrollo. Este estudio pretende evaluar sus propiedades psicométricas con población adolescente gallega, comprobando su equivalencia tanto para su uso con jóvenes con Trastornos del Desarrollo Neurológico como sin ellos. Se emplea una muestra de 2 220 estudiantes. La estructura de la escala fue estudiada mediante Análisis Factorial Confirmatorio, usando la propuesta original con una estructura factorial de orden superior correlacionada con cuatro factores, y un modelo unifactorial que asume la unidimensionalidad de la autodeterminación. Respecto a la fiabilidad, presenta una elevada consistencia interna global y en sus secciones. Aunque el modelo unifactorial ofrece un ajuste aceptable (Modelo 1: GFI = .958, AGFI = .941; RMSEA = .057), es superior en el modelo de orden superior (Modelo 2: GFI = .970, AGFI = .954; RMSEA = .049). Además, la medida de invarianza factorial muestra la utilidad del modelo 2 para comparar puntuaciones según la presencia o no de Trastornos del Desarrollo Neurológico. En conclusión, la ARC-INICO ofrece una base importante para la toma de decisiones respecto al diseño de programas de atención, mediante el desarrollo de recursos, pautas y estrategias, y dota de información para la provisión diferencial de dichos recursos y apoyos.

Descriptores: autodeterminación, adolescentes, cuestionario, fiabilidad del test, validez del test.

1. Introduction

The construct of self-determination is especially relevant in the design of educational practices that prioritize enabling children and adolescents to achieve progressively higher levels of independence, autonomy, control over their lives, and responsibility for their actions. Self-determination is, therefore, understood as a psychological construct that defines individuals as «active contributors to, or 'authors' of their behaviour» (Walker et al., 2011, p. 7). Accordingly, the perspective of the *individual's capacity for action* is being adopted. This emphasises the acquisition and expression of a series of abilities and skills that permit the person to act as the primary causal agent in her life (Shogren & Wehmeyer, 2016; Shogren, Wehmeyer, Palmer, & Paek, 2013; Wehmeyer & Abery, 2013; Wehmeyer, Field, & Thoma, 2012; Wehmeyer & Shogren, 2018).

The adolescent period is the developmental stage in which the most experiential learning occurs, and this is orientated towards the individual gradually acquiring control over her behaviour and actions (Lee et al., 2012; Vega, Gómez-Vela, Fernández-Pulido, & Badia, 2013). In recent decades, there have been many studies focussing on offering a theoretical and conceptual framework for the construct of self-determination in adolescence (Adams, Little, & Ryan, 2017; Griffin, Adams, & Little, 2017; Murumbardó, Guàrdia, & Giné, 2018), with special emphasis on students with neuro-developmental disorders (Shogren et al., 2016; Shogren, Wehmeyer, Schalock, & Thompson, 2017; Vicente, Guillén, Gómez, Ibáñez, & Sánchez, 2018; Wehmeyer, 2015).

Among these, the functional self-determination model stands out, developed by Wehmeyer between 1999 and 2003, which defines self-determination in terms of the acquisition and expression of four basic characteristics: autonomy, self-regulation, psychological empowerment or training, self-realisation and self-knowledge. To activate these components, the individual must possess a series of skills and abilities, which she acquires throughout her life, and which will enable her to act as the causal agent of the events that happen in her surroundings when expressing observable behaviour, enriched by her interactions with her setting and by the influence of the personal factors that intervene in her learning.

This model has had a broad impact in Spain, where study of this construct can be classed as relatively recent (Arellano & Peralta, 2013; Peralta & Arellano, 2014; Vega, et al., 2013; Vicente, Verdugo, Gómez-Vela, Fernández-Pulido, & Guillén, 2015; Vicente, Verdugo, Gómez-Vela, Fernández-Pulido, & Guillén, 2017). At present, a specific instrument has been designed to evaluate the degree of self-determination of Spanish adolescents: the ARC-INICO scale (Verdugo et al., 2014).

This instrument was designed to be applied to students with intellectual and developmental disabilities. Indeed, preliminary studies have been carried out

to establish the structure underlying the set of data provided by the ARC-INICO scale. These analyses were of two types: on the one hand, exploratory factor analysis (AFE), in which an effort was made to *explore* the structure of the relationships between the instrument's variables, without knowing in advance the number of factors or dimensions they comprise (e.g. the studies by Verdugo et al., 2014; Vicente et al., 2015) and, on the other hand, confirmatory factor analysis (AFC), to *confirm* a previously-established factorial or dimensional structure based on prior literature and formulated as a hypothesis (e.g. the study by Verdugo et al., 2015). In the present study, evaluating the level of self-determination is considered to be very useful, not just with students who have neuro-developmental disorders, but for all students. This tool could be used to diagnose the needs present in the classroom and individual needs to establish individual and group action plans.

Therefore, this study focusses on analysing the factorial structure of the ARC-INICO scale (Verdugo et al., 2014) in a sample of adolescents, for which the presence or absence of neuro-developmental disorders is considered. The aim of this factorial analysis is to identify the structure underlying the data matrix, through analysis of the relationships between the items that make up the scale and their simplification into various factors or defining dimensions of self-determination, in such a way that it enables us to expand our understanding of self-determination as a construct.

2. Method

2.1. Participants

The participants are 2,220 students (55.41% male and 44.59% female) from public and private ordinary and special schools in the Autonomous Region of Galicia, with ages ranging from 12 to 19 ($M = 13.9$; $SD = 1.59$).

2.2. Instrument

The ARC-INICO self-determination scale (Verdugo et al., 2014) is an adaptation of the original Arc self-determination scale (Wehmeyer, 1995; Wehmeyer & Kelchner, 1995). It comprises 61 items divided into four sections measuring autonomy (25 items), self-regulation (12 items), empowerment (14 items), and self-knowledge (10 items), coinciding with the proposal of the functional model (Wehmeyer, 1999, 2003). Participants answer on a 3-point Likert-type scale for the autonomy section, and a 4-point scale in the other sections. It is a questionnaire for that the participants complete themselves, although support can be offered if the adolescent requires it.

2.3. Data collection and procedure

Data collection took place in educational centres in the four provinces of the Spanish Autonomous Region of Galicia. After contacting the institutions and obtaining authorisation from the schools and families, the questionnaires were applied in the classes (groups of 20-25 students) or, in the case of students requiring support, they were applied individually with the students receiving support from their teachers and the

research personnel. After collecting the data, the questionnaires were reviewed and ones with five or more unanswered items were eliminated (176 questionnaire eliminated).

2.4. Information analysis process

To study the factorial structure of the ARC-INICO scale, item parcelling was used with the aim of reducing the breadth of the questionnaire and the idiosyncratic influence of the items measured individually (Bandalos, 2002; Bandalos & Finley, 2012). The parcelling of the items was based on the recommendations in the literature (Little, 2013; Little, Cunningham, Shahar, & Widaman, 2002): (a) selection of conceptually similar items and (b) ones that show a strong unidimensionality in exploratory factor analysis (EFA).

Exploratory factor analysis (EFA) is useful in this study as a preliminary measure before confirmatory factor analysis as it enables us to explore the extent to which the items that make up an instrument can be grouped coherently to offer an explanation of common variance (Bryman, 2016; Prieto & Delgado, 2010). To establish this value, the *total variance explained* calculation is normally used. This indicates what percentage of variance is represented by the set of items included.

Following this, a confirmatory factor analysis (CFA) was performed. The use of this type of analysis is justified by the *non-observable* nature of the construct under consideration (self-determination); in other words, to be able to study the relationships between latent variables or indicators (that are not directly observable), it is necessary to use *observable indicators* (the answers to questionnaire items). To do this, a previously-bounded theoretical structure must be taken as a basis. In the case of this study, it refers to the following models:

- *Model 1. Unidimensional model:* this assumes the unidimensionality of the self-determination construct; in other words, for each section, there is a single factor in which all of the variables measured are saturated (parcels).

- *Model 2. Higher-order factorial model:* a structure with a higher level of abstraction is imposed, based on the influence of a higher-order factor (self-determination), which explains the co-variations between the two first-order factors (autonomy, self-regulation, empowerment, and self-knowledge). This hierarchical representation is supported by the functional self-determination model (Wehmeyer, 1999, 2003).

In each model, it was expected that: each observed variable would only be saturated in the factor it attempted to measure; that the measurement errors associated with said variables would not be correlated; and, in the case of model 2, that all of the covariances between each first-order factor would be better explained by a general dimension in which all of the items would saturate at the

same time in the higher-order factor (hierarchical model) (Kelloway, 2014; Kline, 2015).

Finally, the invariance of the scale was analysed to compare the results of the two different groups (adolescents with neuro-development disorders and ones without) to establish whether the measurements obtained from both groups are similar, and so whether its use is valid for both groups (Elosua, 2005). A multi-group analysis was performed using a progressive process (Byrne, 2008; Elosua, 2005): configural invariance (the pattern of factor loadings is the same), metric invariance (the pattern of loadings and the factorial weights are equal), and scalar invariance (this also entails equal variances for errors). To estimate the fit of the data, various indexes were used that make it possible to select the model from the two models considered that has the smaller discrepancy from the true model. These indexes are the Akaike information criterion (AIC) and Bentler's comparative fit index (CFI).

These analyses were supported by the IBM Statistical Package for the Social Sciences (IBM SPSS) version 23, and the confirmatory factor analyses were done using the IBM SPSS AMOS 23.0 program.

3. Results

3.1. Preliminary analysis

Table 1 shows the final matrix comprising 13 parcels that represent the four sections of the ARC-INICO scale. The eigenvalues and percentage of variance explained were calculated, corroborating the hypothesis that each parcel represents a unidimensional structure with eigenvalues above one and with over 50% of the variance explained by each one. In addition, all of the parcels displayed adequate or high reliability, evaluated using Cronbach's Alpha index ($\alpha \leq .80$).

Regarding univariate normality, the measurements of distribution of skewness and kurtosis are used, which make it possible to identify how the data sets group or separate around a central point. The skew values z(G1) for the parcels are greater and lesser at $\pm$ 1.96, except in parcel P1_4, where z(G1) = .29 indicates a symmetrical distribution. Therefore, the null hypothesis of a symmetrical distribution is rejected in almost all of these cases. Furthermore, calculating the kurtosis indicates that the null hypothesis that the distribution is mesokurtic (z[G2]> $\pm$ 1.96) is not fulfilled in most cases, except for parcels P2_1 (z [G2] = 1.587), P2_3 (z [G2] = −1067), P3_2 (z [G2] = −1,442), P3_3 (z [G2] = 1,712) and P4_1 (z [G2] = 1,376). In the skew and kurtosis comparison set, the assumption of univariate normality is not met as in all cases $k^2 > 5.98$. Finally, the Kolmogorov-Smirnov goodness-of-fit test, with Lilliefors' modification, indicates rejection of the null hypothesis of normality of the parcels as, for a 95% confidence level, all of the values obtained are $p < .005$. Therefore, the hypothesis that the data are from a normal univariate distribution was rejected.

TABLE 1. Analysis of the unidimensionality and univariate normality comparisons of the ARC-INICO scale.

Sections	Parcels	Eigen-values *a*	% vari-ance ex-plained *b*	α stand-ardised	Skew		Kurtosis				K-S test		
					z	*ET*	*z (G1)*	*z*	*ET*	*z (G2)*	K^2	K-S[a]	*p*
Autonomy	P1_1	4.95	82.442	.957	.28	.052	5.46	−.43	.104	−4.16	47.16	.337	.00
	P1_2	4.45	55.637	.884	−.79	.052	−15.23	−.40	.104	−3.87	246.92	.179	.00
	P1_3	4.27	71.179	.917	−.18	.052	−3.40	−.87	.104	−8.35	81.24	.188	.00
	P1_4	3.72	74.476	.913	.02	.052	0.29	.30	.104	2.86	8.24	.244	.00
Self-regulation	P2_1	4.81	96.146	.990	−.23	.052	−4.48	.17	.104	1.59	22.60	.319	.00
	P2_2	3.84	96.006	.986	−.39	.052	−7.52	.22	.104	2.09	60.89	.288	.00
	P2_3	2.45	59.861	.857	−.32	.052	−6.15	−.11	.104	−1.07	39.01	.294	.00
Empowerment	P3_1	3.87	77.439	.911	−.48	.052	−9.31	.26	.104	2.53	93.04	.147	.00
	P3_2	3.64	90.924	.967	−.27	.052	−5.21	−.15	.104	−1.44	29.24	.253	.00
	P3_3	2.88	98.648	.978	−.44	.052	−8.46	.18	.104	1.71	74.54	.311	.00
Self-knowledge	P4_1	3.79	94.781	.972	−.25	.052	−4.87	.14	.104	1.38	25.04	.307	.00
	P4_2	3.45	86.288	.947	−.98	.052	−18.92	.71	.104	6.83	404.69	.204	.00
	P4_3	2.95	73.803	.881	−.71	.052	−13.67	.52	.104	5.01	212.05	.174	.00

Note:

a. Eigenvalues: these reflect, in decreasing order, the degree of variation in the set of variables, which explains the factor, or in other words, the amount of information each variable provides to the factor. The sum of all of the eigenvalues being equal to the number of variables introduced in the analysis.

b. % Variance explained: the percentage of variance is represented by the set of items included.

Initials and Statistics: α – Cronbach's Alpha index; K-S Comparison: Kolmogorov-Smirnov test comparison to calculate the normality of the distribution; z – Statistical value referring to the standard deviation obtained for one variable, compared with the value of the mean; SE: Standard Error, indicating oscillations compared with the value of Z.

Source: Own elaboration.

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TABLE 2. Correlation between parcels on the ARC-INICO scale.

	P1_1	P1_2	P1_3	P1_4	P2_1	P2_2	P2_3	P3_1	P3_2	P3_3	P4_1	P4_2	P4_3
P1_1	1												
P1_2	.399**	1											
P1_3	.335**	.593**	1										
P1_4	.231**	.268**	.298**	1									
P2_1	.300**	.366**	.324**	.249**	1								
P2_2	.330**	.458**	.416**	.335**	.441**	1							
P2_3	.317**	.407**	.362**	.223**	.488**	.447**	1						
P3_1	.249**	.374**	.323**	.275**	.351**	.429**	.327**	1					
P3_2	.260**	.389**	.317**	.181**	.290**	.313**	.287**	.465**	1				
P3_3	.303**	.466**	.385**	.205**	.300**	.376**	.358**	.349**	.359**	1			
P4_1	.202**	.393**	.318**	.194**	.352**	.387**	.311**	.387**	.315**	.320**	1		
P4_2	.137**	.157**	.110**	.129**	.228**	.233**	.227**	.274**	.186**	.098**	.224**	1	
P4_3	−.012	.074**	.054*	.081**	.153**	.144**	.067**	.224**	.141**	.096**	.241**	.188**	1

Note: *p < .05 **p < .001. This value refers to the probability associated with the statistic, which gives information about acceptance of the hypothesis that there are statistically significant correlations, with an associated confidence level of 95%.
Source: Own elaboration.

To test multivariate normality, the normality and outliers test in IBM SPSS AMOS 23 was performed. The value of the multivariate kurtosis ($g^2 = 11.91$; $cr = 14.20$) indicates that the variables display a kurtosis which is significantly different from a normal multivariate analysis. The analysis of multivariate outliers using the Mahalanobis distance figure (D^2) indicates the presence of 15 extreme values ($p < .001$). It was decided not to exclude or convert them, as they are errors that reflect the idiosyncrasy of the students sampled.

Mulicollinearity was verified by calculating the correlation matrix, as shown in Table 2. The remaining values show the absence of multicollinearity in the data, with values lower than .90; the highest correlation coefficient found was $r_{xy} = .593$ between parcels P1_2 and P1_3.

Finally, Cronbach's Alpha index (α) was analysed for each section and for the scale. This index makes it possible to determine the degree of reliability of the instrument used. The results show high reliability for the scale ($\alpha = .957$) and for its four sections (autonomy $\alpha = .927$; self-regulation $\alpha = .945$; empowerment $\alpha = .915$; self-knowledge $\alpha = .867$).

3.2. Confirmatory Factor Analysis

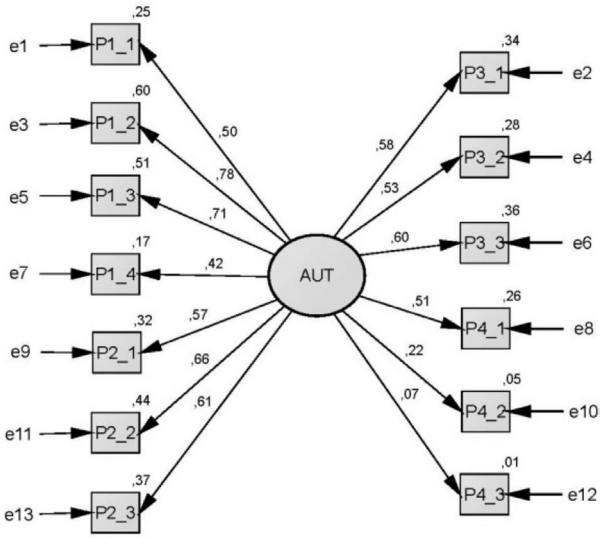
Given the non-compliance with the assumptions of normality and linearity, the weighted least squares (WLS) estimation method was used, which AMOS defines as asymptotically distribution-free (ADF). Various fit indexes were used to evaluate and test goodness of fit (Kelloway, 2014; Kline, 2015): firstly, the chi-squared statistic (χ^2) and its relative version (χ^2 / df) to evaluate the general fit, where a non-significant χ^2 and values of χ^2 / df < 2 indicate a good fit; and secondly, given these indexes' sensitivity to variations in sample size, addition indexes were used to evaluate the absolute partial fit: root mean square residual (RMR $\leq$. 08 shows an adequate fit); goodness of fit index (GFI) and adjusted goodness of fit index (AGFI), which should have a value of .90 or more. Furthermore, the parsimony of fit was evaluated using the root mean square error of approximation (RMSEA $\leq$.08 shows an adequate fit) and non-nested models, which indicate that the model has a lower discrepancy with the true model (Akaike information criterion, AIC and consistent Akaike information criterion, CAIC) and they contain more generalisable data (expected cross validation index). Once the best factor solution for the scores on the ARC-INICO scale had been found, the composite reliability (CR) and McDonald's ω were calculated.

3.2.1. Model 1: Unidimensional Model

The first model examined supposes the existence of a single factor, which explains the covariance of all of the items in the test. This corresponds to a unidimensional theoretical conception of self-determination. Given the lack of empirical evidence to support the unidimensionality of this construct, this model is used as an element of comparison with regards to the possible multidimensional estimates.

Graph 1 shows the initial standardised solution for model 1. All of the coefficients are significant (t values significantly different from 0), with prediction errors that vary from .01 to .60, so that the squared correlation coefficients (r^2) vary from .99 to .40. Almost all of the figures for r^2 are greater than .5, with the exception of P1_2 and P1_3. These results indicate that the proportion of the variance in the observed variables that can be explained by the latent factor (self-determination) approximates to the appropriate value, so long as the variables that are far from the optimal values are eliminated. The factor loadings range between .07 and .78, six of them being lower than .6. This could indicate that the single-factor model is not sufficient to reproduce the original covariance matrix.

GRAPH 1. Standardised parameters of Model 1 (Unidimensional Model).



Source: Own elaboration based on IBM SPSS AMOS 23.

When analysing the model's fit with the empirical data, the figures for which are shown in Table 3, deficient indexes of fit can be seen (χ^2 528.929; χ^2 / df = 8.145; p <.000), and a partial fit that can be improved in the evaluation of the model using the RMR and RMSEA indexes (RMR = .648; RMSEA = .057). There is also a specification error (p = .007). In contrast with this, some absolute partial fit indexes have satisfactory results (GFI = .958; AGFI = .941).

3.2.2. Model 2: Higher-Order Factorial Model

This model derives from a proposal for self-determination as a factorial and hierarchical construct in which, within a general self-determination factor (second-order factor), there are four factors (first-order factors) grouped by the parcels corresponding to autonomy, self-regulation, empowerment, and self-knowledge.

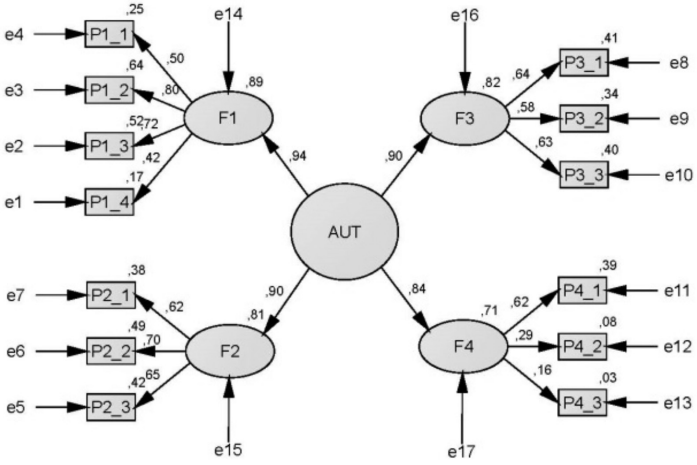
TABLE 3. Goodness of fit statistics.

	Absolute fit				Partial fit							
					Absolute			Parsimonious		Non-Nested Parsimonious		
	χ^2	*gl*	P	χ^2 / df	RMR	GFI	AGFI	RMSEA	P	AIC	CAIC	ECVI
Model 1	528.929	65	.000	8.137	.648	.958	.941	.057 [.052 – .061]	.007	580.93	755.27	.262 [.230 – .297]
Model 2	420.1	60	.000	6.334	.553	.970	.954	.049 [.044 – .054]	.623	442.03	649.89	.199 [.173 – .299]

Note: χ^2: chi-square; df: degrees of freedom; χ^2 / df: relative χ^2; RMR: root mean square residual; GFI: goodness of fit index; AGFI: adjusted goodness of fit index; RMSEA: root mean square error of approximation; AIC: Akaike information criterion; CAIC: consistent Akaike information criterion; ECVI: expected cross validation index.
Source: Own elaboration based on IBM SPSS AMOS 23.

From the empirical perspective, this model establishes independence relating to the four sections pf ARC-INICO, which are grouped into a single general second-order factor. Graph 2 shows the standardised solution, which shows prediction errors varying from .03−.64 with coefficients of determination of .36 to .97. The factor loadings for the endogenous variables in the observed variables display fairly high values (range: .80−.42), with loadings greater than 0.4 (except for P4_2 = .29 and P4_3 = .16). The same circumstance is seen in the factor loadings of the endogenous variables compared with the exogenous variables (range .84−.94), although their prediction errors are also high (.70 ≤ e ≤ .89).

GRAPH 2. Standardised parameters of Model 2 (higher-order factorial model).



Source: Own elaboration based on IBM SPSS AMOS 23.

The empirical results, shown in Table 3, indicate that this model has a better fit than the previous one, with higher values (GFI = .970; AGFI = .954; RMSEA = .049, and RMR = .553) with a PCLOSE value = .623 indicating a good fit of the data for a 90% confidence level. In addition, if we take into account the magnitude of χ^2 / df (420.1 / 60), it should be noted that this model has a better fit than model 1, given its smaller size. As was expected, in accordance with the theoretical backing of the multidimensional models of self-determination, it can be said that this model has a better fit with the data, as it takes into account the existence of first-order factors that correspond with the four sections defined rationally in the test.

3.3. Comparison of models

Finally, regarding the parsimonious indexes of fit that compare the non-nested models, Akaike's AIC and its consistent version (CAIC) are interpreted in such a way that their lowest value fits the specified model better (West, Taylor, & Wu, 2015). Likewise, the interpretation of the expected cross validation index (ECVI) is based on the comparison between models, assuming that the model with the lower value is the one with the greatest poten-

tial for replication (Browne & Cudeck, 1993). Consequently, the comparison between the models based on these indexes indicated a better fit for model 2, as shown in Table 3.

3.4. Factorial Invariance Analysis

Based on Abalo, Lévy, Rial, and Varela (2006), the same model was estimated (Model 2) for two samples of students depending on whether they have neuro-development disorders. The indexes of fit obtained are shown in Table 4. These make it possible to accept the equivalence of the basic measurement models between the two samples. Although the chi-squared value exceeds that required to accept the invariance hypothesis, the other indexes contradict this conclusion (GFI = .966, AGFI = .949, RMSEA = .036; AIC = 594.9; CFI = .718) which enables us to accept the base invariance model (unrestricted model).

TABLE 4. Goodness of fit indexes of Model 2 in factorial invariance.

Model	CMIN	df	GFI	AGFI	NFI	CFI	RMSEA	AIC
Without restrictions	470.906*	120	.966	.949	.663	.718	.036	594.9
Metric invariance	587.051*	129	.958	.940	.580	.632	.040	693.1
Scalar invariance	587.669	132	.958	.942	.580	.633	.039	687.7

Note: *p < .05.
Source: Own elaboration based on IBM SPSS AMOS 23.

Metric invariance was obtained by adding restrictions on factor loadings to the base model. The values shown in Table 4 make it possible to accept this level of invariance. The GFI (.958) and RMSEA (.040) continue to provide convergent information in this sense. Furthermore, the AIC (693.051) does not undergo large variations. Even so, the CFI (.632) has fallen. The criteria for evaluating nested models proposed by Cheung and Rensvold (2002) was used. This suggests that the restricted model should be regarded as good when the calculation of the difference in CFI for both nested models falls to .01 or less and so factorial invariance is achieved. Furthermore, the difference between the CFIs also allows us to accept the metric invariance model. We can conclude that the factor loadings are equivalent in both samples.

After demonstrating metric invariance between samples, the equivalence between intercepts was evaluated (strong factorial invariance). The indexes (Table 4) display a good fit for this model, with both of them evaluated independently and analysed with regards to their nesting with the metric invariance model. The difference between the Bentler comparative indexes is .001. The GFI is .958 and RMSEA is .039. If strong invariance is accepted, both of the models evaluated are equivalent with regards to the coefficients of the factor and to the intersections.

In both cases, confirmatory factor analysis (CFA) results display a good fit for the higher-order factorial model. The subgroup with the better fit is the one comprising students who do not have neuro-developmental disorders. In any case, the generally uniform fit between the groups suggested that the four-factor solution is appropriate for these subgroups from the sample.

3.5. Reliability and correlation between factors

Finally, the reliability and validity of the final model and the correlations between the latent variables were tested. Firstly, composite reliability (CR) was calculated, which indicates the consistency of all of the constructs extracted from the analysis. This figure is excellent for the model in general (CR = .924), and adequate in the second-order factor (CR = .799), and in the first-order factors (.696 $\leq$ CR $\geq$ .808). Secondly, the general saturation of the scale is studied with the aim of testing convergent validity using McDonald's ω, which gives excellent results for the total scale (ω = .922), and adequate results for the second-order factor (ω = 552), and for each first-order factor (ω = .821−.700). Finally, the correlation coefficients between the latent variables in Model 2 were calculated, which indicate the extent to which the model's variables vary jointly, and the extent to which they vary with regards to the model (Table 5).

TABLE 5. Correlation coefficients between endogenous variables in Model 2 and self-determination.

	Self-determination	Autonomy	Self-regulation	Empowerment	Self-knowledge
Self-determination	1				
Autonomy	.846	1			
Self-regulation	.820	.593	1		
Empowerment	.798	.564	.543	1	
Self-knowledge	.639	.309	.424	.430	1

Source: Own elaboration.

The results show reasonably satisfactory values given that the correlation coefficients between first-order factors (r = .309 − .593), indicate a relationship of 30.9% to 59.3% between autonomy, self-regulation, empowerment, and self-knowledge. Similarly, the self-determination construct has a very good relationship with the variables that define it, reaching 84.6% (r = .846) with regards to autonomy, 82% (r = .820) regarding self-regulation, 79.8% (r = .798) regarding empowerment, and 63.9% (r = .639) regarding self-knowledge.

4. Discussion

The aim of this study was to collect information about the validity and reliability of the ARC-INICO scale for evaluating self-determination, designed by Verdugo et al. (2014) by expanding the study population, not just to adolescents with neuro-development disorders, but also to young people in general, aged between 12 and 19. The aim of this validation goes beyond the research aim, as it intends to test its usefulness as a tool for evaluating individual and group needs to guide the design of educational ideas aimed at improving the personal control, autonomy, and independent life of young people. Likewise, an analysis of factorial invariance was included with which to test the equivalence of the structure obtained through confirmatory factor analysis in two different groups: students with and without neuro-developmental disorders.

Self-determination is an educational approach that encompasses all students and has an essential perspective on their development and learning. The change proposed from the self-determination perspective and the improvement in the quality of life allude to the importance of focussing attention on the student as the central figure in her education. Therefore, the support or assistance each student requires should be evaluated with the greatest precision and reviewed frequently by professional teams.

As a result, it is important to have a valid instrument and a theoretical referent that make it possible to conceptualise this construct. The evaluation and comparison of the fit of two different theoretical models (unidimensional model and higher-order factorial model) has made it possible to confirm the results of previous research which showed that self-determination is a multidimensional construct, comprising a structure with four factors: autonomy, self-regulation, empowerment, and self-knowledge, whose covariations are explained by the higher-order factor: self-determination (Wehmeyer, 1999, 2003; Verdugo et al., 2014). The CFA revealed adequate indexes of fit (CFI, GFI, AGFI, and RMSEA) with significant parameters in almost all cases, as well as a better fit in terms of the non-nested model when compared with the unidimensional model.

Similarly, in relation to the multi-group CFA an adequate fit was obtained for the data with the higher-order model in both samples: adolescents with and without neuro-developmental disorders. This suggests that this multidimensional model for measuring the self-determination of all students is viable. Furthermore, the comparison between the groups reflects significant differences with a higher level of self-determination in respondents who do not have neuro-development disorders compared with those who do. In this sense, several studies show worse self-determination results in students with various support needs (Cho, Wehmeyer, & Kinston, 2013; Chou, Wehmeyer, Palmer, & Lee, 2016; Vega et al., 2013).

This evidence suggests that the ARC-INICO scale is a valid and reliable scale for studying self-determination in adolescence, with Wehmeyer's functional model (1999, 2003) being an adequate representation of this construct. In this respect, it is possible to refer to other studies with similar results. For example, Verdugo et al. (2014) and Vicente et al. (2015) carried out studies of the psychometric properties of this scale, through exploratory and confirmatory factor analysis, which support a structure comprising four independent factors. Similarly, these studies support the results found in relation to the values of the correlation coefficients between first-order factors and with regards to the second-order factor.

This study has several implications for educational practices. Education has a special role in training and supporting students, especially the most vulnerable ones, so that they can acquire control over and responsibility for their actions and decide how to live their own lives (Arellano & Peralta, 2013; Lee et al., 2012; Wehmeyer et al., 2012; Wehmeyer & Shogren, 2018; etc.). These supports refer to aspects such as «the provision of professional interventions, the creation of settings and the presentation of individualised support strategies» (Schalock, 2018, p. 12), which require prior evaluation that makes it possible to determine the need for support and a final evaluation of the impact of the interventions on personal results. Consequently, it is important to develop and validate sold diagnostic tools as a basis for designing actions intended to lead to educational, personal, and social improvement.

We conclude by emphasising the importance of continuing with this line of research in order to corroborate or refute the data obtained in this study, also taking into account the limitations stated in it, such as:

a) The threat to the possibility of generalising these results given that all of the participants are Galician students. This could be overcome by expanding the sample to include students from other autonomous regions of Spain.
b) The use of a self-report measure, which derives from the instrument being evaluated itself, and which could contain biases deriving from social desirability.
c) The rapid advance in international research in the field of self-determination, which offers new empirical evidence including the foundations for constructing a new theoretical model and for developing evaluation and promotion tools.

One example of this is causal agency theory (Shogren, Wehmeyer, Palmer, & Forber-Pratt, 2015; Shogren et al., 2016; Shogren, Wehmeyer, & Burke, 2017), which proposes an extension of the functional model, focussing on the theoretical and practical reformulation of the original model and giving particular importance to the individual's capacity for action, defined as being able to «act as the primary

causal agent in one's life» (Shogren et al, 2015, p. 258). Even so, this new formulation should be regarded as a way of going into greater depth in the aspects relating to the individual's personality, motivation, and personal development, completing and opening necessary and emerging lines of research, but it does not replace the functional model.

Notes

[1] A first approach to the subject of this article was presented at the AIDIPE Congress, in Salamanca, June, 2017.

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