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Psychometric Analysis and Factorial Invariance of the Self-Report of Assertive Behavior (ADCA-1) in Peruvian Adolescents

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ABSTRACT

Introduction: Assertive behavior in adolescence is important for well-being and socio-emotional functioning, therefore having valid instruments that are comparable across subgroups is essential. The Assertive Behavior Self-Report (ADCA-1) is frequently used, but its structure and equivalence across gender and age in adolescent populations require further evidence. **Objective:** To determine the psychometric properties and factorial invariance of the Assertive Behavior Self-Report (ADCA-1) in adolescents. **Method:** An instrumental design was used, with a non-probabilistic intentional sample consisting of 229 students aged 14 to 17 years ($M = 15.44$; $SD = .82$), 50.7% were male and 49.3% female. The instrument used was the Assertive Behavior Self-Report (ADCA-1). **Results:** Data were analyzed through a CFA for polychoric matrices and a WLSMV estimator, finding a two-factor model with 20 items, well-fitted, self-assertiveness and hetero-assertiveness. Internal consistency was adequate for both factors (self-assertiveness $\alpha = .749$, $\omega = .747$; hetero-assertiveness $\alpha = .782$, $\omega = .783$). In addition, factorial invariance was confirmed by gender and age, which allowed comparisons between groups. In the comparisons, significant gender differences were found, with higher scores in female adolescents. No differences were observed as a function of age. **Conclusion:** The findings support the validity and reliability of the ADCA-1 for use in adolescents and in comparative studies; it is suggested to extend the evidence with convergent validity and temporal stability in more diverse samples.

Keywords: ADCA-1, assertiveness, adolescents, factor analysis, validation.

INTRODUCTION

Assertiveness has been defined as the ability to express one's ideas, opinions, feelings, and needs in an honest yet respectful manner (Rosario Quiroz et al., 2020; Corral-Gil et al., 2023; Wachs et al., 2023; Pereira de Lima et al., 2024; Goel et al., 2024; Morón et al., 2024). Without this skill, personal desires may be relegated to a passive stance (Corral-Gil et al., 2023; Goel et al., 2024) or, conversely, manifested through aggressive

behavior (Pereira de Lima et al., 2024; Goel et al., 2024). In this sense, assertiveness is distinguished as a clear and balanced communicative style, which entails the validation of both one's own rights and desires and those of others (Rosario Quiroz et al., 2020; Corral-Gil et al., 2023; Wachs et al., 2023).

Violence constitutes a global problem of great magnitude, with significant economic and social repercussions (United Nations, 2020). This reality is also reflected in the Peruvian context,

where the Enares report indicated that 78% of adolescents experienced some form of domestic violence and 68% were victims of violence in the school environment at some point (INEI, 2019). In 2022, the SiseVe platform alone identified 12,099 cases of school violence, of which physical violence accounted for 42%, followed by psychological violence, which included constant insults and bullying (37%), and finally sexual violence, which reached 20%. In addition, the Ministry of Education (Minedu) reported an increase in cases of school bullying (Minedu, 2022), while the United Nations Children's Fund (UNICEF) highlighted that worldwide, half of adolescents have experienced school violence (UNICEF, 2018).

Considering this problem, the development of assertiveness during adolescence emerges as a key tool to counteract hate speech and social exclusion (Wachs et al., 2023; Morón et al., 2024), offering a means for resolving conflicts in a fair and respectful manner (Filella et al., 2018; Rusnac & Rosciupchin, 2023; Blegur et al., 2023). Assertiveness enables adolescents to defend their ideas, identity, and sexuality, fundamental aspects during this stage of personal exploration (McLean, 2020; Goel et al., 2024; Villanueva-Blasco et al., 2024). Likewise, this skill fosters a sense of personal control and greater self-esteem (Fortin et al., 2021; Corral-Gil et al., 2023; Goel et al., 2024), contributing to the prevention of mental health problems such as anxiety (Goel et al., 2024; Morón et al., 2024) and depression (Fortin et al., 2021), and ultimately enhancing overall well-being (McLean, 2020; Rusnac & Rosciupchin, 2023; Voulgaridou & Kokkinos, 2023; Pereira de Lima et al., 2024).

For the measurement of assertiveness, several instruments have been developed, whose validation in Latin American contexts has provided partial approaches to the construct. Among them is the Rathus Assertiveness Schedule (RAS), a unidimensional instrument validated in the adult population in Costa Rica (León & Vargas, 2009) and in Ecuadorian teachers (Saltos García & Rodríguez Ruiz, 2025). The Scale of Interpersonal Behavior (s-SIB) was validated in Brazil with a four-factor structure: expressing positive feelings, expressing negative feelings, defending one's own rights, and taking the initiative (Vagos et al., 2014). The Gambrill and Richey Assertiveness Inventory, which assesses Degree of Discomfort (GI) and Probability of Response (PR), has been validated in Peruvian adolescents (Ramos-Vera et al., 2021), in Spanish adults with schizophrenia (Casas-Anguera et al., 2014), and in Chilean university students (Navarro Saldaña et al., 2017). Likewise, the Multidimensional Assertiveness Scale (EMA), which measures Assertiveness, Non-assertiveness, and Indirect Assertiveness, was validated in Peruvian adolescents (Caballero Esquivel, 2014). In addition, in Brazil, the Adolescent Assertiveness Assessment Scale (AAA-S) was created, a three-dimensional instrument for adolescents that evaluates passive, aggressive, and assertive attitudes (Pereira de Lima et al., 2024). Although these instruments have made it possible to distinguish assertiveness from other behaviors and to evaluate the emotional reactions associated with them, their scope is limited to the external dimension, without considering the prior internal process, which is linked to the validation and respect of one's own desires and emotions. In this regard, the ADCA-1 represents a relevant contribution by including two dimensions:

self-assertiveness, which refers to the ability to recognize and respect oneself, validating one's own feelings, thoughts, and basic rights without experiencing guilt, which enables their adequate and authentic expression; and hetero-assertiveness, which refers to the recognition and respect of the rights and expressions of others, accepting their ideas and emotions under conditions of equality (Rosario Quiroz et al., 2020; Rodríguez Julca, 2019; García Benites, 2012). In this way, the ADCA-1 broadens the analysis toward the individual's relationship with oneself, providing a more comprehensive and precise approach to the construct of assertiveness in adolescence.

In Peru, this instrument has undergone validation attempts on three occasions. The first corresponds to García Benites (2012), who conducted his study with 636 adolescents from the La Libertad region, validating the original model without modifications to the items. Subsequently, Rodríguez Julca (2019) worked with 1,142 university students from the city of Trujillo, also incorporating content validity analyses but maintaining the original model without changes. Finally, Rosario Quiroz et al. (2020) carried out the most complete research, conducted with secondary school students from an institution in the city of Lima, in which a reduced version of 25 items was proposed. However, as will be detailed later, these investigations did not rigorously follow standardized validation procedures, which prevents the determination of a fully validated model for the Peruvian adolescent population. Likewise, the ADCA-1 has not been validated in other countries and does not have evidence of invariance, which limits the generalization of its results. Therefore, the objective of this study is to rigorously validate the ADCA-1 in the Peruvian adolescent population, to overcome the limitations of previous studies and provide a solid instrument for the evaluation of assertiveness.

METHODS

Design

A descriptive, cross-sectional study with an instrumental approach was conducted to examine and analyze the psychometric properties of a measurement instrument (Ato et al., 2013).

Participants

The sample consisted of 229 students (50.7% male and 49.3% female), aged 14 to 17 years ($M = 15.44$; $SD = .82$), from a public educational institution in Arequipa, Peru. The sample was selected through non-probabilistic, purposive sampling (Otzen & Monterola, 2017). Inclusion criteria were adolescents aged 14 to 17 years, of both sexes, with informed consent from a parent/guardian and student assent, who fully completed the instrument. Exclusion criteria were students who were absent on the day of the application, those who submitted incomplete protocols (omitted items), or those who, according to teacher reports, presented cognitive or emotional difficulties that prevented them from responding autonomously. From the initial population of 250 students, after applying the eligibility criteria, 21 cases were excluded, resulting in a final sample of 229 students. Since factorial analysis was employed, it was considered appropriate to have between 5 to 10 participants

per item of the questionnaire (Ferrando & Anguiano-Carrasco, 2010). For factorial invariance by age and sex, sample sizes were sought to be similar, with n between 100 and 500 participants deemed adequate for this analysis (Schumacker & Lomax, 2016). In addition, to calculate the sample size, the confirmatory factor analysis calculator by Arifin (2025) was used, assuming expected CFI = 0.90, two factors with 20 and 15 items, average factor loading = 0.50, average latent correlation between factors = 0.30, $\alpha = 0.05$ (two-tailed), power = 0.80, and 10% attrition. Under these assumptions, the minimum estimated sample size was $n = 236$. Ultimately, 229 students participated.

Instrument

The instrument used was the Assertive Behavior Self-Report (ADCA-1) by García and Magaz (2011). It can be administered individually or collectively, is applicable from 12 years of age through adulthood, and evaluates two main aspects: self-assertiveness (20 items), which measures the level of respect and consideration toward one's own feelings, ideas, and behaviors; and hetero-assertiveness (15 items), which evaluates respect and consideration toward the feelings, ideas, and behaviors of others. Responses are based on a Likert-type scale: "Never" (4), "Sometimes" (3), "Frequently" (2), and "Always" (1). In this instrument, high scores in the self-assertiveness and hetero-assertiveness subscales, as well as in the total score, indicate greater assertiveness, whereas low scores indicate deficits in assertive skills. ADCA-1 scores are interpreted using normative benchmarks by age and sex, established from percentiles (García & Magaz, 2011). The instrument demonstrates content validity and discriminant validity (cited in García & Magaz, 2000). Reliability by internal consistency was determined using Cronbach's alpha (self-assertiveness = .90; hetero assertiveness = .85), and the correlation between both subscales was moderate and positive ($r = 0.58$). In this study, the psychometric validation in the Peruvian population, conducted by Rodríguez Julca (2019) and by Rosario Quiroz et al. (2020) for Peruvian adolescents aged 13 to 17 years in Lima, Peru, was used, since the original version lacks evidence of internal structure validity.

Procedure

Authorization was obtained from the administration of the public educational institution in Arequipa and from the teachers responsible for the selected grades, to whom the objectives, scope, and procedures of the study were explained. Subsequently, the selected students were informed about the purposes of the research, the voluntary nature of their participation, and the confidentiality of the information collected. Written informed consent was obtained (in physical format). The Assertive Behavior Self-Report (ADCA-1), in its adapted version for Peruvian adolescents, was administered collectively or individually in a single application session. At the end, the physical questionnaires were collected and stored in a secure environment.

Data Analysis

Data analysis was carried out using the open-source software JASP (JASP Team, 2018) and RStudio, with the following

packages: lavaan (Rosseel, 2012), lavaan.survey (Oberski, 2014), semTools (Jorgensen et al., 2018), and semPlot (Epskamp, 2015). The demographic characteristics of the participants, the item response percentages, as well as descriptive statistics (mean, standard deviation, skewness, and kurtosis) were analyzed. Since the items are ordinal in nature, they do not require meeting the assumption of normality (Li, 2016).

A CFA was conducted using the WLSMV estimator (Weighted Least Squares Mean and Variance Adjusted), appropriate for the categorical and ordinal nature of the items (Brown, 2015; Suh, 2015; Kline, 2015). The Comparative Fit Index (CFI) and Tucker-Lewis Index (TLI) were evaluated, considering values $\geq .90$ as adequate (Bentler, 1990; Mueller & Hancock, 2008). The Standardized Root Mean Square Residual (SRMR) and Root Mean Square Error of Approximation (RMSEA) were also analyzed, accepting values $\leq .08$ with a 90% confidence interval (Brown, 2015; Hair et al., 1999; Hu & Bentler, 1998). Item elimination was performed based on modification indices, considering χ^2 values significant with expected parameter changes greater than 0.20 in the unstandardized estimates (Whittaker, 2012). Items were removed when they showed low factor loadings, semantic redundancy, or correlated errors, to optimize construct validity, parsimony, and overall model fit (Brown, 2015; Kline, 2015).

Models with correlated errors were not used, since they imply assumptions that are difficult to verify and can artificially increase model fit indices (DeShon, 1998). Additionally, standardized factor loadings (λ) greater than 0.50 were considered appropriate (Johnson & Stevens, 2001).

A multigroup CFA (MGCFA) was also performed to assess invariance by gender and age, which involves the evaluation of a series of hierarchically nested models to determine whether the instrument is stable across two or more groups (Byrne, 2016). Based on the CFA results, factorial invariance was analyzed progressively: first, configural invariance (no restrictions on the factorial structure); then, metric invariance (equalizing factor loadings); subsequently, strong invariance (equalizing factor loadings and intercepts); and finally, strict invariance (equalizing factor loadings, intercepts, covariances, and error variances) (Liengaard, 2024). Evidence of invariance was considered when $\Delta CFI < .01$ and $\Delta RMSEA < .015$ (Putnick & Bornstein, 2016; Chen, 2007).

Reliability through internal consistency was determined using Cronbach's alpha (α) and McDonald's omega (ω), with values above .70 considered acceptable (Hayes & Coutts, 2020; McDonald, 1999).

Finally, since measurement invariance was achieved, it was assumed that group comparisons were valid (Putnick & Bornstein, 2016). Consequently, differences in self-assertiveness, hetero-assertiveness, and overall assertiveness were analyzed according to sex and age. Welch's t -test was used due to the nature of the data, heterogeneity of variances, and different sample sizes (Wilcox, 2003). Additionally, effect size was calculated using Cohen's d , considering thresholds of $d > .30$ (small effect), $d > .50$ (medium effect), and $d > .80$ (large effect) (Cohen, 1992).

Ethical Considerations

The study was approved by the Ethics Committee of the Catholic University of Santa Maria (FAVORABLE OPINION 176 – 2025 CIEI-UCSM). In addition, all participants provided informed consent prior to the start of the study.

RESULTS

The analysis of demographic data indicates similar proportions regarding the level of education, age, and gender (Table 1).

Table 2 presents the descriptive data of the items. The highest averages in the self-assertiveness dimension are observed in items (1, 2, 10, 14), and in the hetero-assertiveness dimension, in items (25, 26, 28). The response trend ranges between ($M = 2.35$; $SD = .736$ and $M = 3.33$; $SD = 1.074$), indicating that responses range from 1 to 4, with the most frequent answers being “sometimes” and “never.” Furthermore, it is noted that the skewness and kurtosis values, both below 1.5, indicate normality of the data. The negative skewness suggests high scores for the responses “sometimes” and “never.”

In Table 3, it is observed that Model 1, with two latent factors of the ADCA-1 comprising 35 items (20 for the first factor and 15 for the second), does not exhibit an adequate fit. Similarly, Model 2, after removing items (1, 2, 3, 5, 10, 13, 14, 15, 17, 18, 19) from the first factor and items (21, 25, 26, 33) from the second factor (due to low factor loadings), shows adequate goodness-of-fit indices, with covariance ($As_6 \sim AS_{12}$). In Model 3, the covariance is removed, and adequate goodness-of-fit indices are observed ($\chi^2 = 266.543$, $df = 169$, $\chi^2/df = 1.577$; $CFI = .928$; $TLI = .919$; $RMSEA = .050$ [90% CI: .038, .062]; $SRMR = .072$).

In this model, 15 items from the original instrument were eliminated due to low factor loadings and high measurement errors, resulting in a model of 20 items with adequate fit indices and theoretical coherence.

Table 4 identified that Model 3, with two factors and 20 items (9 for self-assertiveness and 11 for other assertiveness), shows adequate standardized factor loadings ($\lambda > .5$), except for items (8, 9, 22, 24, 28, 31). Additionally, the correlation between the factors (self-assertiveness and other assertiveness) is .696. The model was subjected to measurement invariance. Internal consistency reliability was estimated using Cronbach's alpha (α) and omega (ω) coefficients. For the self-assertiveness factor, the values were ($\alpha = .749$; $\omega = .474$; 95% CI [.698 - .796]), and for the other-assertiveness factor, the values were ($\alpha = .782$; $\omega = .783$; 95% CI [.741 - .825]). Omega (ω) was analyzed because a

factor analysis model and a congeneric model were used.

In Table 5, measurement invariance was conducted, showing that the ΔCFI and $\Delta RMSEA$ values were $< .01$ when comparing groups by gender and age with progressive constraints (configural, metric, scalar, and strict). In both groups, strict invariance was revealed, indicating that the instrument is statistically equivalent for men and women as well as for the different age groups investigated. This information suggests that total scores can be compared between men and women or across age groups.

Table 6 shows the differences in assertiveness and its dimensions by gender and age. When comparing gender, statistically significant differences with small effect sizes are observed in the self-assertiveness dimension ($t = -2.364$; $p = .019$; $d = .312$), the other-assertiveness dimension ($t = -2.776$; $p = .006$; $d = .367$), and the overall assertiveness variable ($t = -2.949$; $p = .004$; $d = .390$). This indicates that adolescent females score higher than males in assertiveness and its dimensions. However, when comparing age, no statistically significant differences are found ($p > .05$).

DISCUSSION

The results of the confirmatory factor analysis indicated that the adjusted model of the Self-Report of Assertive Behavior (ADCA-1) demonstrated adequate fit indices in its final two-factor version: self-assertiveness and other-assertiveness, with a total of 20 items. Factor loadings were above 0.4 for all items, confirming the instrument's internal structure. Internal consistency reliability was adequate for both self-assertiveness ($\alpha = .749$, $\omega = .747$) and other assertiveness ($\alpha = .782$, $\omega = .783$), reinforcing the robustness of the instrument. Additionally, factorial invariance by gender and age was established, allowing for score comparisons between these groups.

The selection and modification of the bifactorial model of the Self-Report of Assertive Behavior (ADCA-1) are based on the need to rigorously validate its internal structure, given that previous versions of the instrument did not meet the parameters or goodness-of-fit indices in either EFA or CFA. This lack of compliance prevents the empirical verification of the model's construct validity.

Moreover, the original guide does not explicitly report the internal consistency coefficient; only a value of 0.90 for self-assertiveness and 0.85 for other-assertiveness was found. It is assumed that the coefficient used was Cronbach's alpha, given the use of SPSS software. Homogeneity issues were also

Table 1. Characteristics of the study sample

Demographic data		<i>n</i>	%
Degree	4th year of secondary school	113	49.3%
	5th year of secondary school	116	50.7%
Age	14 and 15 years old	128	55.9%
	16 and 17 years old	101	44.1%
Sex	Female	113	49.3%
	Male	116	50.7%

identified in several items of the first factor, with correlations below 0.30 (items 16, 18, 19), which remained in the instrument without a clear justification for their retention.

It was found, moreover, that previous psychometric studies aiming to validate the instrument in Peru did not employ updated methodologies or meet the necessary levels of rigor for factor analyses. These studies also did not incorporate tests of factorial invariance, which limited the validity of the instruments when applied to heterogeneous populations (Byrne, 2016). The present study addresses these methodological limitations by implementing a confirmatory factor analysis (CFA), a reliability

coefficient appropriate to the factorial model (Hayes & Coutts, 2020; McDonald, 1999), and measurement invariance tests by gender and age (Byrne, 2016). These procedures ensure that the ADCA-1 exhibits a valid and consistent structure across different population groups.

It is important to assess measurement invariance by gender, as the original manual of the instrument states that the items were written in a masculine tone to facilitate comprehension. This necessitates verification, through invariance analysis, of whether such wording is equally appropriate for both genders. Ensuring that the instrument measures assertiveness equitably

Table 2. Item Analysis.

Items	Always	Often	Sometimes	Never	M	SD	g1	g2
As_1	4.4%	5.7%	54.1%	35.8%	3.21	0.739	-1.021	1.490
As_2	7.0%	14.4%	36.7%	41.9%	3.14	0.910	-0.835	-0.143
As_3	7.9%	18.3%	49.8%	24.0%	2.90	0.855	-0.570	-0.154
As_4	15.7%	16.2%	31.4%	36.7%	2.89	1.073	-0.555	-0.962
As_5	11.8%	16.6%	43.7%	27.9%	2.88	0.952	-0.584	-0.518
As_6	15.3%	18.8%	38.0%	27.9%	2.79	1.019	-0.439	-0.899
As_7	17.9%	21.4%	41.0%	19.7%	2.62	0.995	-0.295	-0.945
As_8	9.2%	12.2%	49.8%	28.8%	2.98	0.883	-0.774	0.075
As_9	15.3%	15.3%	34.9%	34.5%	2.89	1.049	-0.575	-0.862
As_10	8.3%	17.5%	38.4%	35.8%	3.02	0.932	-0.658	-0.446
As_11	16.6%	14.4%	31.4%	37.6%	2.90	1.086	-0.587	-0.957
As_12	15.7%	21.8%	45.0%	17.5%	2.64	0.947	-0.352	-0.760
As_13	10.5%	17.0%	46.7%	25.8%	2.88	0.914	-0.589	-0.364
As_14	10.0%	14.0%	32.8%	43.2%	3.09	0.985	-0.825	-0.391
As_15	6.6%	17.5%	46.3%	29.7%	2.99	0.858	-0.613	-0.179
As_16	12.7%	18.8%	35.8%	32.8%	2.89	1.007	-0.525	-0.807
As_17	10.0%	19.7%	32.3%	38.0%	2.98	0.991	-0.592	-0.750
As_18	14.4%	13.1%	32.8%	39.7%	2.98	1.053	-0.706	-0.727
As_19	11.4%	19.7%	28.4%	40.6%	2.98	1.030	-0.596	-0.867
As_20	20.5%	11.8%	43.7%	24.0%	2.71	1.049	-0.481	-0.949
As_21	21.0%	15.7%	49.8%	13.5%	2.56	0.970	-0.415	-0.877
As_22	10.9%	23.1%	36.7%	29.3%	2.84	0.970	-0.408	-0.822
As_23	17.0%	24.0%	37.1%	21.8%	2.64	1.006	-0.239	-1.006
As_24	25.3%	20.5%	34.5%	19.7%	2.48	1.074	-0.099	-1.258
As_25	6.6%	11.4%	27.9%	54.1%	3.30	0.912	-1.148	0.351
As_26	8.3%	11.4%	31.9%	48.5%	3.21	0.944	-1.020	0.066
As_27	20.5%	20.5%	36.2%	22.7%	2.61	1.052	-0.240	-1.134
As_28	11.4%	13.1%	34.9%	40.6%	3.05	0.997	-0.794	-0.438
As_29	28.8%	21.4%	35.8%	14.0%	2.35	1.043	0.009	-1.245
As_30	21.4%	20.5%	40.6%	17.5%	2.54	1.015	-0.228	-1.063
As_31	17.5%	18.8%	43.2%	20.5%	2.67	0.993	-0.379	-0.874
As_32	19.2%	18.8%	43.2%	18.8%	2.62	1.000	-0.336	-0.944
As_33	16.6%	16.2%	36.2%	31.0%	2.82	1.052	-0.493	-0.945
As_34	23.1%	24.9%	38.0%	14.0%	2.43	0.996	-0.081	-1.084
As_35	22.3%	23.6%	36.7%	17.5%	2.49	1.024	-0.118	-1.124

Note: n = 229; M = arithmetic mean; SD = Standard Deviation; g1 = skewness; g2 = kurtosis.

between men and women is crucial, considering this particular characteristic in its design.

When comparing the results of this study with previous attempts to validate the Self-Report of Assertive Behavior (ADCA-1) in Peru, three relevant investigations were identified. Two of these studies were conducted at the regional level (García Benites, 2014; Rodríguez Julca, 2017) and one at the national level (Rosario Quiroz, 2020). However, it is important to note that, in the case of the national study, the sample was limited solely to the Lima region, which restricts the generalizability of its results.

In the study by Rodríguez Julca (2017), an item-test evaluation was used, which is not suitable for polychoric correlations, as is the case with the ADCA-1. Additionally, the procedure for factor selection in the exploratory analysis is not clearly specified, nor are important coefficients such as the KMO or Bartlett's test of sphericity mentioned, which are fundamental for assessing the adequacy of the data for factor analysis. The CFA reports goodness-of-fit indices (GFI) of 0.86 and 0.87 for the self-assertiveness and other-assertiveness dimensions, respectively. While these values are close, they do not meet the minimum recommended threshold (≥ 0.90) for good model fit. Lastly, it

Table 3. Goodness-of-fit indices of the Self-Report of Assertive Behavior (ADCA-1).

Model	χ^2	df	χ^2/df	CFI	TLI	SRMR	RMSEA (IC 90%)
Model 1: original	773.712	526	1.471	0.858	0.849	0.084	.054 [.038; .052]
Model 2: (cov 6-12)*	244.546	168	1.456	0.946	0.936	0.069	.045 [.032;.056]
Model 3:	266.543	169	1.577	0.928	0.919	0.072	.050 [.038;.062]

Note: CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardized Root Mean Square Residual, $p < 0.001$; * Errors 6,12 correlated.

Table 4. Factor loadings and internal consistency of the standardized CFA solution for the final model

Items	λ F1	λ F2
As_4: I dislike being seen by others when I am nervous.	0.562	
As_6: If I forget something, I get angry with myself.	0.556	
As_7: I get upset if I cannot do things perfectly.	0.559	
As_8: I feel bad when I have to change my mind.	0.472	
As_9: I get nervous when I want to praise someone.	0.496	
As_11: When I am sad, I dislike others noticing it.	0.528	
As_12: I feel bad about myself if I do not understand something being explained to me.	0.621	
As_16: I feel bad about myself when I realize I do not know something.	0.632	
As_20: When I receive compliments, I get nervous and do not know what to do or say.	0.501	
As_22: It irritates me greatly when others contradict me		0.451
As_23: I am bothered when others do not understand my reasons or feelings.		0.554
As_24: I get upset when I see people change their minds over time.		0.495
As_27: I dislike seeing people not putting much effort into doing their work as well as possible.		0.584
As_28: I get upset when I witness the ignorance of some people.		0.439
As_29: I feel bad when I see someone I care about making a wrong decision.		0.640
As_30: I get upset when I see someone behaving improperly.		0.600
As_31: I dislike being criticized.		0.429
As_32: I feel discomfort toward someone who denies me something reasonable that I politely request.		0.541
As_34: I dislike it when things are not given the importance they deserve.		0.609
As_35: I am bothered when someone does not accept fair criticism.		0.553
F1. Self-assertiveness	-	
F2. Other-assertiveness	0.696	-
ω	0.747	0.783
α	0.749	0.782
(IC 95%)	[.698 - .796]	[.741 - .825]
M	2.8	2.6
SD	0.584	0.57

was identified that the study used the Kolmogorov-Smirnov test to evaluate data normality. However, this test is less commonly used today due to its lower power and excessive sensitivity in large samples, which can lead to errors in interpreting results. For his part, García Benites (2014) also used an item-test correlation, which is inappropriate for this type of analysis. Although the study reports an acceptable correlation between scales (0.56) and internal consistency coefficients using Cronbach's alpha, there is no adequate justification for choosing this coefficient, as the necessary factor loadings to determine the type of measurement model applied are not provided. Furthermore, the study omits goodness-of-fit indices, preventing an adequate evaluation of the proposed model. Additionally, while percentiles are used as a scoring method, the lack of a significant effect size to generalize the results nationally considerably limits the relevance of these percentiles.

Regarding the study by Rosario Quiroz (2020), satisfactory results were obtained in the EFA, with a KMO index above 0.80 and a significant Bartlett test ($p < 0.05$). However, the study uses Kaiser's criterion for factor selection, a method known to overestimate the number of dimensions, resulting in the proposal of six factors without adequate justification. While the goodness-of-fit indices are correct, the study recommends replicating the research due to the low common variance in the model. In terms of internal consistency, it is evident that McDonald's ordinal alpha and omega are acceptable only for the first factor, while the other four factors present values below 0.70. Although the study seeks to identify gender differences, factorial invariance is not verified, limiting the ability to compare groups (Byrne, 2016).

This study, in turn, made the necessary adjustments to the factorial structure of the Self-Report of Assertive Behavior

Table 5. Measurement invariance for the two-factor model of ADCA-1 by gender and age.

		χ^2	df	RMSEA	Δ RMSEA	CFI	Δ CFI	SRMR	Δ SRMR	TLI	Δ TLI
Gender	Configural	390.584	380	0.037	-	0.932	-	0.078	-	0.923	-
	Metric	404.097	380	0.035	0.002	0.938	-0.006	0.085	-0.007	0.933	-0.010
	Scalar	425.952	374	0.035	0.000	0.933	0.005	0.087	-0.002	0.932	0.001
	Strict	445.727	394	0.034	0.001	0.933	0.000	0.090	-0.003	0.935	-0.003
Age	Configural	396.025	338	0.039	-	0.929	-	0.078	-	0.920	-
	Metric	399.299	356	0.033	0.006	0.947	-0.018	0.083	-0.005	0.944	-0.024
	Scalar	417.747	374	0.032	0.001	0.947	0.000	0.085	-0.002	0.946	-0.002
	Strict	433.616	394	0.030	0.002	0.952	-0.005	0.086	-0.001	0.953	-0.007

Note: χ^2 : Chi-square; df: degrees of freedom; CFI: Comparative Fit Index; TLI: Tucker-Lewis Index; RMSEA: Root Mean Square Error of Approximation; SRMR: Standardized Root Mean Square Residual; Δ CFI: difference in Comparative Fit Index values; Δ TLI: difference in Tucker-Lewis Index values; Δ SRMR: difference in Standardized Root Mean Square Residual values; Δ RMSEA: difference in Root Mean Square Error of Approximation values.

Table 6. Descriptive and inferential analysis of differences in assertiveness and its dimensions by age and gender.

		<i>M</i> (<i>SD</i>)	<i>t</i> (227)	<i>p</i>	<i>Lower CI</i>	<i>Upper CI</i>	<i>d</i>
Self-assertiveness	Male (<i>n</i> = 116)	24.5 (5.5)	-2.364	0.019	-2.978	-0.27	0.312
	Female (<i>n</i> = 113)	26.1 (4.8)					
	14 y 15 years (<i>n</i> = 128)	25.5 (5.2)	0.666	0.506	-0.914	1.847	-
	16 y 17 years (<i>n</i> = 101)	25.05 (5.2)					
Other-assertiveness	Male (<i>n</i> = 116)	27.6 (6.4)	-2.776	0.006	-3.871	-0.657	0.367
	Female (<i>n</i> = 113)	29.9 (6.0)					
	14 y 15 years (<i>n</i> = 128)	28.6 (6.4)	-0.112	0.911	-1.725	1.539	-
	16 y 17 years (<i>n</i> = 101)	28.7 (6.0)					
Assertiveness	Male (<i>n</i> = 116)	52.1 (10.3)	-2.949	0.004	-6.486	-1.29	0.390
	Female (<i>n</i> = 113)	56.0 (9.7)					
	14 y 15 years (<i>n</i> = 128)	54.1 (10.2)	0.277	0.782	-2.286	3.033	-
	16 y 17 years (<i>n</i> = 101)	53.8(10.0)					

Note: *n* = sample size; *M* = mean; *SD* = standard deviation; *t* = Welch's *t*; *p* = *p*-value; *d* = Cohen's *d* (effect size).

(ADCA-1) to improve the instrument's validity and reliability. The CFA revealed that the original two-factor model did not show adequate fit. As a result, several items with low factor loadings were removed, significantly improving the model's fit indices. The removed items included numbers 1, 2, 5, 10, 13, and 19 in the self-assertiveness dimension and items 21, 25, and 33 in the other-assertiveness dimension.

It was verified that, in the study by Rosario Quiroz (2020), items were also removed, although for different reasons than in this study. Rosario Quiroz (2020) removed items 9, 11, 19, 21, 24, 26, 28, 33, and 35 due to their low communality and inadequate homogeneity indices. Additionally, the item was removed because it belonged to only one factor. However, although items 2, 5, 10, 20, and 25 showed low factor loadings, they were not removed in Quiroz's study, which would have been recommended to improve the model fit.

In this study, the removal of items 1, 2, 5, 10, 13, 19, 21, 25, and 33 was fundamental to optimizing the model, as in factor analyses, items with low factor loadings do not adequately contribute to the construct being measured. They can introduce noise into the model, distort the factorial structure, and affect the validity of the latent factors. Considering that the original instrument still lacks a confirmatory factorial model and that previous studies reported inadequate fit indices or reliability, the procedures carried out in this study have ensured a simple and parsimonious structure, optimizing the model fit. As evidence, CFI (.928), TLI (.919), and RMSEA (.050) values were obtained, which meet the standards recommended in the literature (Rogers, 2023).

Regarding the analysis of factorial invariance by gender and age, it was confirmed that the instrument is invariant across both groups, supporting the validity of comparisons between men and women, as well as across different age groups. This finding is important to ensure that the observed differences between groups are not due to inconsistencies in measurement (Byrne, 2016).

In terms of gender differences, statistically significant differences were found in the self-assertiveness ($t = -2.364$, $p = .019$) and other-assertiveness ($t = -2.776$, $p = .006$) dimensions, with small to medium effect sizes. Adolescent females scored higher than males in both dimensions, suggesting they are more willing to express both their personal needs and their consideration for others. This finding may be influenced by social and cultural factors that promote greater development of interpersonal skills related to assertiveness in adolescent females (Villanueva-Blasco et al., 2024). Although these results contrast with the findings of Rodríguez Julca (2017), it is not possible to make a comparison by gender or age with that study, as measurement invariance was not performed for those data.

On the other hand, no statistically significant differences were found in assertiveness dimensions based on age, indicating that assertiveness remains relatively stable during early and middle adolescence.

Despite the satisfactory results obtained in validating the Self-Report of Assertive Behavior (ADCA-1), this study presents some limitations that should be considered when interpreting the findings. First, the sample was selected using non-probabilistic

sampling, which could affect the generalization of the results. Although the sample is adequate for the factorial analyses performed, its restriction to a population located solely in the city of Arequipa limits the representativeness of the findings at a national level. Future research could expand the sample to different regions to improve the generalizability of the results.

Secondly, although factorial invariance by gender and age was evaluated, other sociodemographic factors that could influence assertiveness, such as socioeconomic status, family environment, or prior educational experiences, were not considered. Including these variables in future studies could provide a more comprehensive understanding of the factors influencing adolescent assertiveness.

This study underscores the importance of having psychometrically robust and culturally adapted instruments. In the case of the ADCA-1, this is the first study in Peru that meets adequate psychometric criteria, establishing it as a more precise tool for assessing assertiveness. The ability of the ADCA-1 to differentiate between self-assertiveness and other-assertiveness offers a more comprehensive view of the attitudes and values that influence social behaviors, contributing not only to the prevention of a culture of violence but also to the effective evaluation of social competence training programs. Furthermore, this study lays the groundwork for future research and practical applications in educational and clinical settings, promoting the advancement of psychology in the Peruvian context.

Limitations and Recommendations for Future Research

The study presents some methodological considerations that should be noted. The use of non-probabilistic sampling could limit the degree of generalization of the results to other populations. Likewise, since the research was carried out only in the city of Arequipa, it is possible that the findings reflect characteristics of this geographical and cultural context. Another aspect to consider is that the validity evidence presented corresponds mainly to internal validity and its relationship with sociodemographic variables, so it would be advisable for future research to also explore external validity with other instruments and related constructions.

Based on this, it is recommended that future studies consider larger and more representative samples, which would reinforce the generalizability of the results and strengthen the analyses. Similarly, it would be pertinent to assess the cross-cultural invariance of the ADCA-1 to determine its stability in different sociocultural contexts. It is also suggested to explore the relationship of assertive behavior with external variables such as anxiety, depression, and social skills, which would contribute to broadening the evidence of external validity of the ADCA-1.

Clinical Implications

The results suggest that the ADCA-1 may become a valuable tool for the assessment of assertive behavior in clinical settings, facilitating the identification of communication patterns that affect mental health and interpersonal relationships. Its implementation in clinical practice would allow the design of interventions more closely tailored to individual needs, as well

as the monitoring of patients' progress in social skills training programs.

Conclusions

The present study represents an initial contribution to the validation of the ADCA-1 in the Peruvian population, providing solid evidence of validity and reliability. Unlike previous research, the instrument was rigorously analyzed, overcoming methodological limitations reported in earlier studies and ensuring greater consistency in its results. Furthermore, the invariance analysis supports that the structure of the ADCA-1 remains stable across different groups, which strengthens its applicability. Overall, the findings support the potential of the ADCA-1 as a useful tool in both clinical and academic settings, and open the possibility of further expanding research toward intercultural comparisons and the exploration of new associated variables.

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The authors declare that there were no conflicts of interest during data collection, data analysis, or manuscript preparation.

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DATA AVAILABILITY STATEMENT

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DECLARATION OF THE USE OF GENERATIVE ARTIFICIAL INTELLIGENCE

No generative artificial intelligence tools were used at any stage

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DISCLAIMER

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

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Análisis psicométrico e invarianza factorial del Autoinforme de Conducta Asertiva (ADCA-1) en adolescentes peruanos

RESUMEN

Introducción: La conducta asertiva en la adolescencia es relevante para el bienestar y el funcionamiento socioemocional, por lo que contar con instrumentos válidos y comparables entre subgrupos es fundamental. El Autoinforme de Conducta Asertiva (ADCA-1) se utiliza con frecuencia; sin embargo, aún se requiere evidencia sobre su estructura y equivalencia según género y edad en poblaciones adolescentes. **Objetivo:** Determinar las propiedades psicométricas y la invarianza factorial del ADCA-1 en adolescentes. **Método:** Se utilizó un diseño instrumental, con una muestra intencional no probabilística compuesta por 229 estudiantes de entre 14 y 17 años ($M = 15.44$; $DE = 0.82$); el 50.7 % fueron varones y el 49.3 % mujeres. El instrumento aplicado fue el Autoinforme de Conducta Asertiva (ADCA-1). **Resultados:** Los datos se analizaron mediante un análisis factorial confirmatorio para matrices policóricas con el estimador WLSMV, encontrando un modelo bifactorial de 20 ítems, bien ajustado, compuesto por autoasertividad y heteroasertividad. La consistencia interna fue adecuada para ambos factores (autoasertividad $\alpha = .749$, $\omega = .747$; heteroasertividad $\alpha = .782$, $\omega = .783$). Además, se confirmó la invarianza factorial por género y edad, lo que permitió realizar comparaciones entre grupos. En dichas comparaciones se hallaron diferencias significativas según el género, con puntajes más altos en adolescentes mujeres. No se observaron diferencias en función de la edad. **Conclusión:** Los hallazgos respaldan la validez y confiabilidad del ADCA-1 para su aplicación en adolescentes y en estudios comparativos. Se sugiere ampliar la evidencia con validez convergente y estabilidad temporal en muestras más diversas.

Palabras clave: ADCA-1, asertividad, adolescentes, análisis factorial, validación.