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Factor analysis of the Spanish version of the Q-Set Attachment Questionnaire

Análisis factorial de la versión en español del Cuestionario de Apego Q-Set

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Abstract:

Introduction: The Attachment Q-set Version 3.0 (AQS) is an instrument that allows for the evaluation of individual differences in attachment security during the preschool stage.
Objective: To determine the psychometric properties of the Spanish version of the Attachment Q-Set (AQS) 3.0 adapted to Ecuador, through the analysis of its factorial structure, validity, and reliability in Ecuadorian children aged 1 to 5 years.
Methodology: This was an observational, descriptive, and correlational study with a quantitative approach. It was conducted at a single site using non-probability sampling. Data were collected from 71 families through institutional records from public and private Comprehensive Diagnostic Centers (CDIs), as well as UDIPSAI. Exploratory factor analysis was conducted, and internal consistency was evaluated using Cronbach's alpha and McDonald's omega.
Results: The model showed poor fit (SRMR = 0.123; RMSEA = 0.101, 95% CI [0.093–0.109]; CFI = 0.486; TLI = 0.445). Significant loadings were found for key items such as I77 (0.73) and I18 (0.85; $p < .001$). Internal consistency was excellent for the total scale ($\alpha = 0.87$; $\omega = 0.88$), though subscale reliability varied (e.g., Z: $\alpha = 0.80$; V: $\alpha = 0.30$).
Conclusions: Despite limitations in model fit and subscale consistency, the Spanish version of AQS 3.0 adapted to the Ecuadorian context demonstrated high overall reliability, supporting its future use in attachment assessment in children under 5 years of age.

Keywords: attachment, child preschool, psychometrics, adaptation

Resumen:

Introducción: El Attachment Q-set versión 3.0 (AQS) es un instrumento que permite evaluar las diferencias individuales en la seguridad del apego durante la etapa preescolar.
Objetivo: Determinar las propiedades psicométricas de la versión en español del AQS 3.0 adaptado a Ecuador, mediante el análisis de su estructura factorial, validez y fiabilidad en niños ecuatorianos de 1 a 5 años.
Metodología: Estudio observacional, descriptivo y correlacional con enfoque cuantitativo. Se realizó en un solo sitio, utilizando muestreo no probabilístico. Se recopilaron datos de 71 familias a partir de registros institucionales de Centros de Diagnóstico Integral (CDI) públicos y privados, así como de UDIPSAI. Se realizó un análisis factorial exploratorio y se evaluó la consistencia interna mediante los coeficientes alfa de Cronbach y omega de McDonald.
Resultados: El modelo presentó un ajuste deficiente (SRMR = 0.123; RMSEA = 0.101, IC 95% [0.093–0.109]; CFI = 0.486; TLI = 0.445). Se observaron cargas factoriales significativas en ítems clave como el I77 (0.73) y el I18 (0.85; $p < .001$). La consistencia interna fue excelente para la escala total ($\alpha = 0.87$; $\omega = 0.88$), aunque la fiabilidad por subescalas fue variable (por ejemplo, Z: $\alpha = 0.80$; V: $\alpha = 0.30$).
Conclusiones: A pesar de las limitaciones en el ajuste del modelo y en la consistencia de algunas subescalas, la versión en español del AQS 3.0 adaptada al contexto ecuatoriano mostró una alta fiabilidad global, lo que respalda su uso futuro en la evaluación del apego en niños menores de 5 años.

Palabras clave: apego, niño en edad preescolar, psicometría, adaptación

Introduction

The Attachment Q-set Version 3.0 (AQS) is an instrument created by Waters (1), which allows us to appreciate individual differences in attachment security during the preschool stage.

Attachment bonds are built from childhood, when children use their attachment figure as a secure base in exploring the environment (2). The attachment figure is related to instinctive behavior during breastfeeding and aims to maintain proximity to the maternal figure, essential for the survival and emotional well-being of the infant (3).

Different attachment styles are recognized based on the sensitivity and responsiveness of the caregiver to the child's needs (4). Among the forms of attachment, the secure, the anxious, the ambivalent, the anxious, the avoidant and the disorganized stand out, analyzed from the position of the child and the caregiver (5).

Secure attachment, characterized by a trusting and sensitive relationship with the caregiver, facilitates healthy social-emotional development and strengthens the child's ability to manage stress and negative emotions (6,7). Conversely, insecure forms of attachment, such as avoidant anxious attachment, can have long-term negative repercussions, affecting mental health and interpersonal relationships in adult life (8,9).

Various instruments have been developed to measure attachment in children, with contributions and limitations. Among the best known are Mary Ainsworth's "Strange Situation" (10), the "Attachment Behavior Q-Set" (11), and the "Inventory of Parent and Peer Attachment" (12). Although these instruments have been valuable in attachment research, they have limitations that must be considered. Many of these instruments lack robust psychometric validation, which can affect the accuracy and reliability of the results obtained (13).

Several authors have emphasized the importance of adapting these instruments to specific cultural contexts to ensure that attachment measures are relevant and accurate in different populations. Cultural adaptation involves understanding differences in parenting practices and emotional expressions, which can significantly influence the results of attachment assessments (14).

The Q-Set (AQS) 3.0 is one of the most widely used instruments to assess attachment in young children. This questionnaire is composed of 90 items that describe typical and atypical attachment behaviors, allowing evaluators to classify the behaviors observed in natural contexts such as the home (1). Its international application has proven very useful in various research, providing a standardized tool to compare results across different populations (15).

The study population corresponds to 63,331 infants between 12 and 60 months of age residing in the province of Azuay, Ecuador, based on the 2021 National Population Projections published by the National Institute of Statistics and Censuses (INEC) (16). These projections, derived from the census, were the most recent official demographic estimates available at the time the study was designed and conducted, as the results from the 2021 national census had not yet been released.

Although not all children in this population are enrolled in the Comprehensive Child Development (CDI) program, this reference was used to contextualize the scope and representativeness of the sample. The final sample was drawn from three participating CDIs—both public and private—and the specialized service UDIPSAI, all located within the province of Azuay.

Given the importance of culturally adapted tools for early emotional development, this study aims to analyze the psychometric properties of the Spanish version of the Attachment Q-Set (AQS) 3.0 adapted to the Ecuadorian population, particularly for children between 1 and 5 years of age.

This adaptation is essential because Ecuador lacks validated instruments for evaluating attachment in early childhood that are culturally sensitive to local parenting practices, linguistic expressions, and contextual variables. Therefore, the development and validation of a tool like the AQS 3.0 will support clinical and research efforts in early childhood mental health across diverse regions of the country.

Methodology

Type of Research

This study employed an observational, descriptive, and correlational design with a quantitative approach.

Population

The study population comprised 63,331 children between 12 and 60 months of age residing in the province of Azuay, Ecuador. This estimate was based on the 2021 National Population Projections, derived from the 2021 national census data provided by the National Institute of Statistics and Censuses (INEC) (16). These projections were the most current and officially available data at the time of the study and were formally requested and supplied by INEC.

Sample

The study sample was drawn from a reference population of 63,331 children aged 12 to 60 months living in the province of Azuay, Ecuador. This estimate was based on the 2025 National Population Projections, which in turn were derived from the 2021 national census, as no official data from the 2022 census were available at the time of the study. These projections, provided by the National Institute of Statistics and Censuses (INEC), represented the most up-to-date and accessible demographic data and were formally requested and obtained from INEC (16).

This population estimate was used to contextualize the scope and potential representativeness of the sample, recognizing that not all children in this group were enrolled in the Comprehensive Child Development (CDI) program. The study was limited to data from institutional records of a subset of CDIs operating in Azuay. In total, three CDIs—including both public and private institutions—and the Unidad de Diagnóstico Psicopedagógico para la Inclusión y Adaptación al Sistema Educativo (UDIPSAI) participated in the research.

Research instruments

The Attachment Q-Set (AQS) is an instrument designed to assess the quality of children's attachment in naturalistic environments, such as the home, without exposing the child to stressful or artificial conditions. It is specifically intended for children between 12 and 60 months of age and aims to evaluate the security of attachment behaviors toward the primary caregiver. The questionnaire comprises 90 items describing a broad spectrum of typical and atypical behaviors related to attachment, including expressions of security, trust, anxiety, or insecurity. Through direct observation and complementary information provided by the caregiver, the trained evaluator is responsible for sorting the items according to their frequency and relevance. This method results in a detailed and accurate assessment of the child's attachment style and behavioral tendencies in daily interactions.

The AQS is widely used by psychologists and other professionals in clinical and research settings due to its ability to provide a detailed evaluation of attachment style without introducing external stressors or anxiety in the child (1). This makes it a valuable tool for identifying secure, ambivalent, or avoidant attachment patterns and for studying early emotional development in diverse family contexts. Additionally, the AQS allows for the assessment of caregiver-child relationships in a flexible and ecologically valid manner, as it is applied in the child's usual environment, enabling a more natural and precise interpretation of observed behaviors.

The original instrument was developed and validated by Waters (1), and its Spanish version has been adapted and content-validated for the Ecuadorian context by Díaz and Nóblega (17).

Procedure

Records of children aged 12 to 60 months enrolled in public and private Centers for Child Development (CDIs) in the province of Azuay were reviewed to identify potential participants. Families were invited to participate through various channels, such as WhatsApp, in-person visits to institutions, and social media announcements. Those who expressed interest received detailed information about the study's objectives, methodology, and ethical considerations. Written informed consent was obtained from all participating caregivers.

Participants were selected based on the following inclusion criteria: (a) residency in the province of Azuay, (b) families with at least one child aged 12 to 60 months, and (c) voluntary participation of the primary caregiver. Exclusion criteria included: (a) children with diagnosed organic or neurological conditions, and (b) children receiving pharmacological treatment, except for antihistamines.

The Attachment Q-Set (AQS) 3.0 was administered through direct structured observation by trained psychology professionals. Sessions were held in either the child's home or the regular CDI setting to ensure a familiar and ecologically valid environment. Each evaluation lasted approximately 60 to 90 minutes and included systematic observation of child–caregiver interaction. Semi-structured interviews with caregivers were also conducted to collect relevant contextual information.

All evaluators were previously trained in standardized AQS administration and were instructed to identify potential warning signs of socio-emotional difficulties. When necessary, referrals were coordinated with the CDI system to provide appropriate follow-up.

Statistical analysis

Factor analysis was performed to examine the underlying structure of the Spanish questionnaire and evaluate its psychometric properties. Prior to this, item distributions were assessed using the Shapiro-Wilk test, which is particularly appropriate for small to moderate sample sizes such as the one in this study (n = 71). Additionally, skewness and kurtosis values were analyzed to further assess the normality assumption. These procedures ensured that the statistical assumptions required for the factor analysis were adequately verified.

Subsequently, the correlation matrix between the items was examined to verify if there was an adequate relationship between them, allowing the application of a factor analysis. The adequacy of the sample was evaluated using the Kaiser-Meyer-Olkin index (KMO), which showed a satisfactory value, and the Bartlett sphericity test, which was significant. Both indicators confirmed that the data was adequate to proceed with the exploratory factor analysis.

During the exploratory factor analysis, the principal component extraction method was used. To determine the number of factors to be retained, eigenvalues greater than one were considered and the sedimentation plot (scree plot) was used, which allowed the identification of the underlying factor structure. In addition, items with factor loads in more than one factor were reviewed to ensure the clarity and coherence of the questionnaire structure.

The fit of the proposed factor model was evaluated through several fit indices. The Comparative Fit Index (CFI) reflected a good fit of the model compared to the standalone model. The Tucker-Lewis Index (TLI) indicated a significant improvement in the parsimony of the adjusted model. The Bentler-Bonett Non-normed Fit Index (NNFI) showed a positive fit when compared to the null model. In addition, the Relative Noncentrality Index (RNI) confirmed the adequacy of the model in terms of factor centrality, and the Bentler-Bonett Normed Fit Index (NFI) revealed a favorable relationship between the proposed model and the independent model.

Other indices were also considered to further evaluate the fit of the model. Bollen's Relative Fit Index (RFI) indicated a high correlation between the items and the identified factors, while Bollen's Incremental Fit Index (IFI) showed incremental improvements in factor model fit. Finally, the Parsimony Normed Fit Index (PNFI) evaluated the parsimony of the model considering its complexity and the level of adjustment achieved.

In the final stage of the analysis, the internal reliability of the factors was calculated using Cronbach's alpha, confirming an adequate internal consistency in each of the identified dimensions.

Results

Table 1 presents the model fit indices, specifically the Standardized Root Mean Square Residual (SRMR) and the Root Mean Square Error of Approximation (RMSEA), both commonly used in the evaluation of model fit in factor analyses. The SRMR obtained was 0.123, which indicates a suboptimal model fit, as values above 0.08 are generally considered indicative of poor fit. This index reflects the standardized mean discrepancy between the observed correlations and the correlations predicted by the model. As for the RMSEA, its value was 0.101, with a 95% confidence interval ranging from 0.093 to 0.109 and a p-value < .001. These results confirm that the model does not meet the criteria for acceptable fit, as RMSEA values above 0.08 suggest poor fit, and the upper bound of the confidence interval further exceeds the conventional threshold.

Regarding the RMSEA, the value obtained was 0.101, with a 95% confidence interval ranging from 0.093 to 0.109 and an associated p-value of < .001. These results indicate that the model does not meet acceptable fit criteria, as RMSEA values above 0.08 are generally interpreted as evidence of poor fit, and in this case, the upper bound of the confidence interval also exceeds the recommended threshold.

It is worth noting that these fit indices were derived from the Spanish version of the AQS 3.0, which had been culturally adapted for use with the Ecuadorian population.

Table 1. Fit Index

		95% Confidence Intervals		
SRMR	RMSEA	Lower	Upper	RMSEA p
0.123	0.101	0.093	0.109	<.001

Note. AQS 3.0 adjustment index adapted to the Ecuadorian population

Table 2 shows the comparison of the proposed model with the reference model using several adjustment indices, highlighting the limitations of the adjustment of the proposed model for the Spanish version of AQS 3.0, adapted to the Ecuadorian population.

The Comparative Fit Index (CFI) showed a value of 0.486, indicating a poor fit, since values close to or above 0.90 are usually considered a good fit. Similarly, the Tucker-Lewis Index (TLI) was 0.445, again reflecting an inadequate adjustment, as this index also requires values above 0.90 to be acceptable.

The Bentler-Bonett Non-normed Fit Index (NNFI) obtained a value of 0.445, which reinforces the idea that the model did not fit the data properly. The Relative Noncentrality Index (RNI) showed an identical result to the CFI, with 0.486, which signaled a low improvement in the adjustment compared to the null model.

In addition, the Bentler-Bonett Normed Fit Index (NFI) was particularly low, with a value of 0.307, evidencing that the proposed model did not adequately explain the variance and covariance of the data. Similarly, Bollen's Relative Fit Index (RFI) was 0.252, reinforcing the model's lack of fit.

On the other hand, the Bollen's Incremental Fit Index (IFI) reached a slightly higher value of 0.513, suggesting a slight improvement over other indices, but still insufficient to be considered a good fit. Finally, the Parsimony Normed Fit Index (PNFI) was 0.284, indicating that, although the model was not adjusted, it had a certain structural simplicity that could have been useful in other contexts, but was not sufficient to compensate for the lack of overall fit.

Taken together, the results of these indices suggested that the model proposed for the Spanish version of AQS 3.0 adapted to the Ecuadorian population did not fit well with the observed data, and a revision or refinement of the model would be necessary to improve its accuracy.

Table 2. Proposed model vs baseline model

SRMR	RMSEA
Comparative Fit Index (CFI)	0.486
Tucker-Lewis Index (TLI)	0.445
Bentler-Bonett Non-normed Fit Index (NNFI)	0.445
Relative Noncentrality Index (RNI)	0.486
Bentler-Bonett Normed Fit Index (NFI)	0.307
Bollen's Relative Fit Index (RFI)	0.252
Bollen's Incremental Fit Index (IFI)	0.513
Parsimony Normed Fit Index (PNFI)	0.284

Note. Proposed model versus baseline model of the AQS 3.0 Spanish version adapted to the Ecuadorian population

Table 3 presented the factor loads of the measurement model along with the 95% confidence intervals. In this table, the relationship between latent and observed variables was detailed, where each observed element was associated with a specific latent variable. It was noted that item I44 was used as a reference point, as its load was set at 1.0000, thus setting a standard for the other estimates.

Burden estimates for other items, such as I28 and I53, showed significant values, although their confidence intervals were wide, indicating some uncertainty in the estimate. In the case of I28, an estimate of 3.7553 was reported, with a p-value of 0.064, which suggested a tendency to be significant, but without reaching the conventional threshold. On the other hand, items I77 and I18 presented remarkable results, with loads of 0.7349 and 0.8492 respectively, both with p-values less than 0.001, which indicated a strong relationship with the latent variable.

In the section corresponding to the variable U, item I7 was also fixed as a reference, while other items such as I9 and I66 showed lower and non-significant loads, suggesting that their relationship with the latent variable was weak. Similarly, variable V showed a mixed behavior; although I40 and I68 had estimated loads of 1.6864 and 1.4962 respectively, their confidence intervals suggested that the evidence was not completely conclusive.

When analyzing the W variable, it was evident that item I31 was set again as a reference. In this case, items I23 and I43 presented significant estimates (1.2731 and 0.3155), suggesting that they were well related to their latent variable. However, some items, such as I81 and I33, showed negative values, indicating that they could be correlating inversely with the latent variable to which they were related.

Finally, the items of the Z variable also varied in their relationship with latent charge. Item I38 was used as a reference, while others, such as I74, presented a significant load (1.0569) with a p-value of less than 0.001, which reinforced the idea that it was positively related to the latent variable.

Table 4 presented the reliability indices for several variables of the AQS 3.0, adapted to the Ecuadorian context. In this table, reliability estimates were reported using two indicators: Cronbach's α and McDonald's ω_1.

For variable S, which refers to the first latent dimension identified through factor analysis—related primarily to items describing child behaviors of proximity seeking and responsiveness to the caregiver—a Cronbach's alpha (α) of 0.571 and a McDonald's omega (ω_1) of 0.580 were observed, suggesting moderate reliability. Variables T and U, associated with emotional regulation and social exploration, both showed α values of 0.700; however, their ω_1 were 0.717 and 0.483, respectively. This indicated that, although the internal consistency of these variables was acceptable, the composite reliability was not as strong in the case of U. On the other hand, variable V, which included items reflecting behavioral disengagement, presented the lowest indices (α = 0.304, ω_1 = 0.345), suggesting insufficient reliability for inclusion in future analyses.

Table 3. Factor loads of the Measurement Model 95% confidence intervals

Latent	Estimate	Lower	B	P												
S	I44	1.0000	0.000	1.00000	1.0000	0.2236			I28	3.7553	2.025	-0.21301	7.7236	0.8335	1.855	0.06
	I11	0.5135	0.743	-0.94340	1.9703	0.0904	0.691	0.490	I53	3.9670	2.182	-0.30992	8.2439	0.6679	1.818	0.069
	I70	2.5731	1.504	-0.37515	5.5213	0.4534	1.711	0.087	I71	2.0338	1.312	-0.53762	4.6053	0.3187	1.550	0.121
T	I19	1.0000	0.000	1.00000	1.0000	0.7340			I77	0.7349	0.179	0.38494	1.0848	0.5274	4.116	<.001
	I18	0.8492	0.164	0.52837	1.1700	0.6660	5.188	<.001	I41	0.1933	0.185	-0.16914	0.5558	0.1341	1.045	0.296
	I32	1.0750	0.209	0.66555	1.4844	0.6605	5.146	<.001	I1	0.7422	0.190	0.37038	1.1141	0.5013	3.912	<.001
U	I7	1.0000	0.000	1.00000	1.0000	0.1845			I48	1.1692	0.992	-0.77531	3.1137	0.2300	1.178	0.239
	I9	2.7315	1.826	-0.84762	6.3105	0.9066	1.496	0.135	I66	1.7212	1.307	-0.83951	4.2819	0.3219	1.317	0.188
	I45	0.6051	0.511	-0.39627	1.6064	0.2328	1.184	0.236	I37	2.1609	1.478	-0.73604	5.0579	0.6107	1.462	0.144
V	I35	1.0000	0.000	1.00000	1.0000	0.2398			I59	0.1323	0.424	-0.69823	0.9629	0.0414	0.312	0.755
	I20	0.0533	0.475	-0.87864	0.9852	0.0147	0.112	0.911	I40	1.6864	0.921	-0.11822	3.4910	0.7417	1.832	0.067
	I68	1.4962	0.817	-0.10461	3.0969	0.7432	1.832	0.067	I85	0.5973	0.386	-0.15985	1.3544	0.3348	1.546	0.122
W	I31	1.0000	0.000	1.00000	1.0000	0.7057			I23	1.2731	0.232	0.81857	1.7275	0.8652	5.490	<.001
	I83	0.3317	0.170	-0.00160	0.6651	0.2541	1.951	0.051	I43	0.3155	0.124	0.07175	0.5593	0.3317	2.537	0.011
	I81	-0.3137	0.196	-0.69754	0.0701	-0.2075	-1.602	0.109	I33	-0.3015	0.331	-0.95019	0.3472	-0.2015	-0.911	0.362
X	I75	1.0000	0.001	1.00000	1.0000	0.7270			I26	0.4851	0.156	0.17875	0.7914	0.3719	3.104	0.002
	I13	0.6336	0.151	0.33758	0.9296	0.4998	4.195	<.001	I34	0.4407	0.158	0.13048	0.7509	0.3341	2.784	0.005
	I10	0.4339	0.158	0.12460	0.7432	0.3300	2.750	0.006	I33	1.1400	0.308	0.53561	1.7444	0.7847	3.697	<.001
Y	I39	1.0000	0.000	1.00000	1.0000	0.3314			I76	-0.1490	0.403	-0.93903	0.6410	-0.0448	-0.370	0.712
	I69	1.9769	0.752	0.50380	3.4501	0.5893	2.630	0.009	I58	-0.1903	0.409	-0.99198	0.6114	-0.0566	-0.465	0.642
	I17	0.2918	0.406	-0.50301	1.0865	0.0890	0.720	0.472	I25	0.8895	0.491	-0.07277	1.8519	0.2678	1.812	0.070
Z	I38	1.0000	0.000	1.00000	1.0000	0.7638			I74	1.0569	0.140	0.78343	1.3304	0.8408	7.574	<.001
	I6	0.5403	0.167	0.21335	0.8673	0.3898	3.239	0.001	I79	0.6727	0.143	0.39168	0.9537	0.5526	4.692	<.001
	I81	1.4339	0.216	1.00983	1.8580	1.0124	6.627	<.001	I2	0.6489	0.165	0.32454	0.9732	0.4676	3.921	<001

Note. AQS 3.0 division model Spanish version adapted to the Ecuadorian population

The W and X variables had more favorable results, with a α of 0.710 and 0.695, and ω_1 of 0.479 and 0.683, respectively, which indicated that both showed adequate internal consistency. In contrast, variable Y registered low reliability values, with a α of 0.316 and a ω_1 of 0.199. Finally, the Z variable stood out for its high reliability, with a α of 0.804 and a ω_1 of 0.833, indicating that this variable was particularly consistent in the measurements.

Table 4. Reliability Ratings

Variable	α	ω_1
S	0.571	0.580
T	0.700	0.717
U	0.700	0.483
V	0.304	0.345
W	0.710	0.479
X	0.695	0.683
Y	0.316	0.199
Z	0.804	0.833

Note. Reliability index of the AQS 3.0 version in Spanish adapted to the Ecuadorian population

Table 5 presents the reliability indicators for the total AQS 3.0 scale. The mean score was 3.00, with a standard deviation (SD) of 0.375. Internal consistency was high, as reflected by a Cronbach's alpha (α) of 0.871 and McDonald's omega (ω) of 0.877.

In relation to subscale agreement, item groups corresponding to dimensions U, W, and Y showed lower internal consistency. Specifically, U presented α = 0.700 and ω_1 = 0.483; W showed α = 0.710 and ω_1 = 0.479; while Y exhibited the lowest indices, with α = 0.316 and ω_1 = 0.199. These values reflect reduced agreement between the items within each of these dimensions.

Table 5. Scale Reliability Statistics (Total)

	Media	SD	Cronbach's alpha	McDonald's ω
Scale	3.00	0.375	0.871	0.877

Note. Reliability of the total scale AQS 3.0 version in Spanish adapted to the Ecuadorian population

Discussion

The present study included 71 families, each with at least one child between 12 and 60 months of age, recruited from public and private Child Development Centers (CDIs) and from the specialized psychopedagogical service UDIPSAI in the province of Azuay, Ecuador. For each participating family, one child was evaluated using the AQS 3.0 protocol. Although developmental diagnoses were not formally assessed, the characteristics of the participating CDIs suggest that the sample likely included children with both typical and atypical developmental profiles.

The fit indices indicated poor model adequacy, with an SRMR of 0.123 and an RMSEA of 0.101 (95% CI: [0.093–0.109]), both exceeding the conventional threshold of 0.08. Similarly, the CFI (0.486) and TLI (0.445) were substantially below the acceptable cut-off of 0.90, suggesting the need for model refinement. While some items, such as I44 and I77, demonstrated strong and statistically significant factor loadings, others exhibited wide confidence intervals or low estimates, indicating instability in some parameters.

The overall internal consistency of the scale was high (α = 0.871; ω = 0.877), supporting the reliability of the total score. However, reliability indices varied markedly across the latent dimensions. For example, dimension T showed adequate consistency (α = 0.700; ω = 0.717), whereas dimensions such as V and Y showed weak reliability (e.g., V: α = 0.304; Y: α = 0.316), raising concerns about the consistency of specific subdomains of the instrument.

It is important to note that the use of family records and institutional recruitment may have introduced heterogeneity in the sample. Although the inclusion criteria excluded infants with clear organic or neurological pathologies, it was not possible to fully rule out the presence of undiagnosed neurodevelopmental conditions, such as Autism Spectrum Disorder (ASD) or other developmental delays. This limitation may have contributed to the variability in item performance and internal consistency. While prior content validation by Díaz-Noriega et al. suggested readiness of the Spanish AQS 3.0 for application in children with and without neurodevelopmental conditions, those conclusions were based primarily on expert judgment rather than empirical testing across subgroups.

Therefore, this study highlights the importance of conducting future research with more differentiated samples: (a) children with typical development, (b) children diagnosed with ASD, and (c) children with other neurodevelopmental disorders. This would allow for a more precise understanding of attachment profiles across these groups and provide clearer evidence for the instrument's discriminant validity.

In addition, while the AQS is designed to evaluate the caregiver–child relationship, the scoring system ultimately reflects the attachment style of the child. As such, future studies should clearly report the number of children assessed, rather than only the number of participating families, to ensure precision in sample characterization.

In comparison with previous validation studies of the AQS in Latin American populations, some congruence was found in the overall pattern of results, particularly in relation to normative profiles (18–20). However, the lower-than-expected internal consistency in several dimensions and the suboptimal model fit observed in this study underscore the need for further cultural adaptation and empirical refinement of the AQS 3.0 for its reliable application in the Ecuadorian context.

Mosquera and Nóblega, who focused on the linguistic and conceptual adaptation of the AQS 3.0 to the Ecuadorian context through expert consensus and content validation. Their work reported high interrater agreement for secure attachment profiles based on theoretical vignettes, with a Pearson correlation of r = 0.884 and a PABAK index of 0.77, but it did not involve empirical application of the instrument in a real sample of children. Therefore, this study represents the first application of the AQS 3.0 in an Ecuadorian sample of children potentially characterized by neurodevelopmental diversity, particularly in a CDI context where developmental diagnoses are not routinely assessed. These differences in methodology and sample characteristics must be taken into account when comparing psychometric results (20).

In this study, it was found that the factor loadings for some AQS items presented wide confidence intervals (item I28, item I53, item I9, and item I66), providing uncertainty in the estimates, and in several cases, the factor loadings were significant but insufficient to improve the overall model fit (item I44 and item I77). This suggests that although some items showed a relationship with the latent variables, the lack of precision in the estimates affected the overall reliability of the model, indicating the need for further refinement to achieve a better fit.

On the other hand, the study by Feldstein et al., (21) which examined the relationship between the Postnatal Attachment Questionnaire (PAQ) and the AQS, found a significant relationship between the affective component of attachment (measured by the PAQ) and the behavioral component (measured by the AQS), with $F(1,61) = 8.164$, $p = 0.006$, and an explained variance of 11%.

This contrasts with the correlations between items and the attachment dimensions in our study, where individual dimensions showed considerably variable internal reliability (Cronbach's alpha ranging from 0.304 to 0.804), and the overall model fit was inadequate. It is worth noting that while our study achieved acceptable general reliability with a Cronbach's alpha of 0.871 and an omega of 0.877, the overall statistical results suggest that the factor structure of the Ecuadorian version of the AQS requires a deeper review, possibly incorporating modifications to the items and the analytical model (20).

The theoretical and practical implications underscore the importance of culturally adapting and validating psychometric instruments (5), such as the Attachment Questionnaire Q-Set (AQS) 3.0 in different contexts. Theoretically, the results highlight the need for adjustments to the factor structure of the AQS 3.0 to ensure that it accurately captures attachment dynamics in specific populations (3), which reaffirms the relevance of considering cultural variations in psychological constructs.

Conclusions

The findings of this study provide preliminary evidence on the psychometric performance of the Spanish version of the Attachment Q-Set (AQS) 3.0 adapted for the Ecuadorian context. While the overall scale demonstrated high internal consistency, the reliability indices of several dimensions varied considerably, suggesting the need to optimize specific subcomponents of the instrument.

The model's unsatisfactory fit indices indicate that the current factorial structure may not fully capture the attachment dynamics in this population. This limitation, along with the relatively small sample size, underscores the importance of conducting future studies with larger and more diverse samples.

Additionally, the inconsistent factor loadings observed across some items highlight the necessity of further psychometric evaluations—including exploratory and confirmatory factor analyses—to refine the scale's structure and improve its cultural applicability. Future research should also consider stratifying samples according to developmental profiles to better understand attachment patterns in children with typical and atypical development in Ecuador.

Conflicts of interest

The authors declare that there are no conflicts of interest in relation to the research presented in this manuscript.

Author Contributions

J.A.V.F. led the conceptualization, supervised the project, developed the methodology, performed the formal analysis, and coordinated the manuscript drafting and review, managed the project administration and funding acquisition. L.P.B.V. collaborated in the conceptualization, conducted extensive statistical analysis, coordinated the data curation, and played a key role in the investigation. P.C.M.S. participated in the investigation, conducted statistical analysis, and ensured rigorous validation, contributed to the literature review and final editing of the manuscript. R.V.S. was responsible for data visualization, participated in the investigation, and contributed to the writing of the original draft. I.D.C.P. supported the methodology design, conducted additional data visualization, participated in the investigation, and contributed to the writing of the original draft and the final review of the manuscript. M.B.P.L. contributed to the data collection, investigation, and the final review and editing of the manuscript. A.L.V.-M. participated in the investigation, conducted a comprehensive literature review, and collaborated on the drafting and editing of the manuscript. M.J.P.C. supported data curation, contributed to the investigation, and collaborated in the final review and editing of the manuscript.

Ethical Statements

This study was conducted in accordance with the ethical principles outlined in the Declaration of Helsinki and was approved by the institutional ethics committee of the Catholic University of Cuenca (approval code: CUENC-Q-SET-2024). All participants provided informed consent prior to their inclusion in the study. Data were collected and processed anonymously to ensure the privacy and confidentiality of the participants. No minors or vulnerable populations were included in the research.

The application of the AQS 3.0 was carried out through direct observation by trained psychology professionals, in either the home or the regular CDI environment, over sessions lasting approximately 60 to 90 minutes. Caregivers were interviewed, and child–caregiver interactions were observed in a naturalistic context, following strict ethical guidelines and referral protocols when risk signs were detected.

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