**Psychometric properties of the Spanish Perception of Inclusion Questionnaire (PIQ-E)**

**Abstract**

The Perceptions of Inclusion Questionnaire (PIQ) is an instrument that assesses the perception of inclusion in secondary school students through three scales: 1) social inclusion, 2) emotional inclusion and 3) academic self-concept. The main objective of this study is to provide new empirical evidence about the validity and reliability of the Spanish form of the instrument PIQ-E via a sample of 1000 Spanish adolescents (50% female; 49.3% male; 0.7% preferred not to answer) aged from 12 to 16 years (M = 14, SD = 1.41). The analytical process was carried out in two phases. In the first phase, a descriptive analysis of the dataset was conducted. In the second phase, after confirming the data's suitability for factorial analysis through Kaiser Meyer Olkin (KMO) and Bartlett's sphericity tests, a confirmatory factor analysis was performed on the polychoric correlation matrix between items. Two possible alternative models were contrasted: one factor and three factors, respectively. The model with three correlated factors obtained the best indices of overall fit. Subsequently, the reliability of the measurements was estimated on this model. The results reaffirm the validity of the PIQ for evaluating the perception of inclusion in Spanish adolescents and confirm the PIQ's reliability as an instrument for assessing social inclusion.

***Keywords:*** Adolescents; confirmatory factor analysis; Perceptions of Inclusion Questionnaire; psychometric properties; social inclusion; Spanish validation.

Psychometric properties of the Spanish Perception of Inclusion Questionnaire (PIQ-E)

Social inclusion (SOI) is defined by considering the concepts of equity and social justice, focusing primarily on human potential rather than deficits (Sheppard, 2021). The experience of belonging and being included in a group, as well as having access to resources and opportunities are central elements of SOI (Alemanji, 2023). Despite different conceptualizations in the literature, 3 fundamental aspects are evident regarding the construct: a) participation in social activities (Shepherd & Parsonage, 2011); b) sense of belonging, which arises through participation and the experience of participation in society; and c) citizenship and rights (civic aspect of participation through established systems and represents political or altruistic interests of the individual and rights and obligations of society) (Cordier et al., 2017).

While belonging and connectedness are essential at any age, research suggests that in adolescence, inclusion is of particular importance. Adolescents are extremely sensitive to peer rejection, indicating a significant threat to their mental health (Filia et al., 2022). Furthermore, this period marks increased independence from parents and increased dependence on peers, with identity development largely dependent on peer groups, highlighting the importance of friendships among adolescents, although relationships are sometimes complicated by the fluidity of in-group and out-group rules (Tomova et al., 2021). Moreover, for adolescents, the feeling of being socially included at school is a relevant factor for academic success and emotional well-being (Catalano et al., 2004). Thus, SOI can act as a protective mechanism that helps to decrease different problems such as racism, bullying or ostracism, and the impact they have on social, emotional and health outcomes (Juvonen et al., 2019; Thomas & Griffin, 2023). Promoting and nurturing SOI during adolescence can change educational inequality and provide a strong foundation for a range of positive outcomes, such as school completion.

There have been several attempts to operationalise the assessment of SOI (Cordier et al., 2017), with research focusing on examining indicators of SOI in relation to educational outcomes, which are often limited to a societal level. Research thus focuses on comparing the effectiveness of various educational settings, such as special versus inclusive classes, for students with disabilities or special educational needs (SEN); emphasising the need to assess students' social-emotional functioning, and not only academic performance, to shed light on the effectiveness of inclusive schooling (e.g. Garrote et al., 2022; Grüter et al, 2023; Knickenberg et al., 2020; Pozas et al., 2023; Zurbriggen et al., 2017; Zwierzchowska et al., 2022).

Considering the importance of the construct and its different dimensions, it is worth mentioning as an assessment tool the Perceptions of Inclusion Questionnaire (PIQ; Venetz et al., 2015) (https://piqinfo.ch/), an instrument that addresses the perception of inclusion in secondary school students through three scales: 1) Social Inclusion (SOI); 2) Emotional Inclusion (EMI); and 3) Academic Self-Concept (ASC). According to Kytälä et al. (2023), these dimensions are directly “related to concepts of school well-being (Tobia et al., 2019), school satisfaction (Liu et al., 2016), school engagement (Pietarinen et al., 2014) and school belongingness (Tian et al., 2016)” (p.3). Furthermore, all these concepts refer to connectedness and the feeling of being included emotionally, socially or academically, thus containing emotional (positive emotions) and social elements (feelings of being accepted and valued by others) and are associated with academic achievement (Braun, 2019; Bücker et al., 2018).

PIQ is based on the German questionnaire, Questionnaire for Assessing Dimensions of Integration of Students, (FDI 4-6; Haeberlin et al., 1989) and was developed by Venetz et al. (2014) as a shortened version of this along with two further versions: one for teachers (PIQ-T) and one for parents (PIQ-P). In their initial research they provided evidence of convergent validity for the EMI scale through high positive correlations with affective states during lessons (r = 0.55), for the SOI scale through moderate negative correlations with teachers' reports of students' problems with peers (r = -0. 45) and for the ASC scale by high correlations with another self-concept scale (r = 0.72), as well as moderate positive correlations with academic achievement in mathematics and home language (r = 0.46 and 0.40, respectively), in this case German.

Subsequently a study by DeVries et al. (2018) provides further evidence of construct validity, showing strong measurement invariance across levels of study, gender and students with or without SEN, as well as the parent version (PIQ-P) showed good psychometric qualities (Schwab et al., 2020). As research continues, the PIQ presents itself as a promising tool for assessing perceptions of inclusion in diverse educational settings, providing valuable insight from the students' perspective. Furthermore, different versions of the questionnaire have been developed in different countries, such as the English Version (Venetz et al., 2015), Arabic (Alnahdi & Schwab, 2021), Slovenian (Schmidt et al., 2021), Austrian (Knickenberg et al., 2022), Polish (Zwierzchowska et al., 2022), French (Guillemot & Hessels, 2022), and Finnish (Kyttälä et al., 2023). Additionally, questionnaire has also been translated into more than 24 languages, including African, Italian, or Spanish. However, the latter languages lack validation of the scale properties in their respective populations.

Regarding the Spanish version, this questionnaire has attempted to be validated by Pozas et al. (2023) in a population of Mexican high school students, but they did not obtain clear validity evidence for this version. In Spain, inclusion has only been assessed based on teachers' perceptions of their readiness to support inclusive education using tests such as the Evaluation of Teachers’ Inclusion Readiness Questionnaire (CEFI-R; Rojos-Ramos & Gómez-Paniagua, 2022). Therefore, as far as the authors know, there are no standardized questionnaires or scales with appropriate psychometric properties for measuring this construct in the Spanish population.

Overall, the PIQ (Venetz, et al., 2015) assesses students' perceptions of inclusion with an emphasis on SOI, emotional well-being and ASC (Knickenberg et al., 2020), relevant aspects from the point of view of adolescent mental health. And, although the PIQ is currently available in different languages, the Spanish version of the PIQ has not been explored in a Spanish sample so far. Therefore, the present study aims to analyse the psychometric properties of the Spanish version of the PIQ in a representative sample of adolescent of the Spanish population.

**Methods**

**Participants**

A total of 1000 Spanish adolescents (50% female; 49.3% male; 0.7% preferred not to answer) aged between 12 and 16 years (M = 14; SD = 1.41) participated, using stratified random sampling (sampling error 3.1% with a confidence level of 95.5% for an infinite universe and under the assumption of maximum indeterminacy). The sample was balanced in terms of distribution across Spain, although 92.8% of the participants considered their ethnicity to be Western European as opposed to others such as Roma, Eastern European or Afro-descendants. Most of the adolescents attended public schools (69.5%), as opposed to charter schools (25.6%) and/or private schools (4.9%), and only 7.3% of the sample had a diagnosis of mental disorder, physical illness or disability.

## **Procedure**

An online survey was carried out using CAWI (Computer Assistance Web Interview) methodology through an access panel by contracting the company Análisis e Investigación (CCI/Esomar code of ethics, Quality Management System audited in accordance with ISO 20252, Information Security Management System (ISMS) audited in accordance with ISO 27001).

Sampling and data collection took place in October and November 2023. Inclusion criteria for participants were (a) age 12-16 years; (b) internet access and mobile device or computer. Informants were recruited by invitation through a personalised link to those individuals who were the target of the study: parents or legal guardians of children aged 12 to 16. They were offered information about the study, as well as informed consents to be signed before participating in the survey. Subsequently, the children completed the survey using multi-device technology (PC, tablet, smartphone, etc.). A cross-sectional natural group design (NGD) (Shaughnessy et al., 2012) was used to assess the consistency of responses. The online questionnaire is divided into two parts. The first part is addressed to families and includes 6 ad hoc closed-ended questions to collect socio-demographic data. This is followed by the questions addressed to adolescents. The average length of the online questionnaire is 5 minutes for adults and 25 minutes for adolescents.

All data collected are anonymous and have been approved by the ethics commission of the University of Valladolid (registration number PI 23-3245NOHCUV).

## **Variables and instruments**

Socio-demographic characteristics. By ad hoc questions parents were asked to answer the age of the child, the type of educational centre the child attends and whether the child has or has had any mental disorder, physical illness, or disability. Adolescents were asked to answer their gender and ethnicity.

Perceptions of inclusion. The PIQ questionnaire (Venetz et al., 2015) was used, whose items refer to adolescents' subjective perception on three dimensions: EMI, SOI, and ASC. Each of the subscales is composed of 4 items that are answered on a 4-point agreement scale (1 = strongly disagree; 2 = disagree; 3 = agree; 4 = strongly agree). Items 4, 8 and 12 are reversed. Representative items from the EMI subscale are: 'I like going to school or school' or 'I have fun at school or school'. From the SOI subscale: "I have many friends in my class" or "I get along very well with my classmates". And from the ASC: "I am a good student" or "For me, many things are very difficult at school or college". The questionnaire was translated into Spanish with the permission of the authors of the original scale. It was then re-translated into English and back into Spanish by bilingual independent researchers.

**Data analysis**

The analysis was carried out in two phases. In the first phase, a descriptive analysis of the data set was carried out. In the second phase, after checking the suitability of the data for factor analysis using the Kaiser Meyer Olkin (KMO) and Bartlett's sphericity tests, a confirmatory factor analysis was performed. The KMO statistic is a measure of the suitability of the data for factor analysis, i.e., it indicates whether the data are suitable for carrying out factor analysis. Kaiser and Rice (1974) suggest that KMO values below .5 are unacceptable for factor analysis, values above .6 are considered mediocre, above .7 acceptable, above .8 meritorious, and above .9 excellent. In addition to the KMO measure for the complete test, it is possible to check the sample adequacy measures for each of the indicators that make up the test using the individual sample adequacy measures (measure of sampling adequacy — MSA) (Kaiser, 1970; Kaiser and Rice, 1974; Lorenzo-Seva and Ferrando, 2021). Again, MSA values close to 1 will indicate that each item (individually considered in this case) is suitable for factor analysis, while items with MSA values below 5 should be discarded from factor analysis (Lorenzo-Seva and Ferrando, 2021). In this case, a KMO value of .88 was obtained and in the Bartlett's sphericity test χ²(66) = 854.97; p < .001. For their part, the items obtained MSA values between .84 (item 1) and .95 (item 10). Likewise, in this phase, the presence of multivariate outliers was checked using Mahalanobis D2 distances and Guttman errors.

Subsequently, two models were estimated using confirmatory factor analysis (CFA) on the polychoric correlation matrix: unifactorial and three correlated factors. The reliability of the measures (internal consistency, reliability of individual indicators, construct reliability, and measurement error) was estimated on the latter model.

In addition, evidence was obtained regarding the convergent and discriminant validity of the proposed model. Regarding the evidence of convergent validity, the following was checked: (a) the proportion of shared variance by the indicators of each latent variable; (b) whether the factor loadings of all the indicators are significant and greater than .5; and (c) whether the mean extracted variance from the item saturations in each factor is greater than .5. All these clues can be considered indicators of convergent validity.

The evidence of discriminant validity shows that each construct analyzed is unique and different from others. To check if there is evidence of discriminant validity, four approaches have been used (Hair et al., 2010). First, the correlation between each pair of factors was set to 1 and the fit of the resulting models was checked against the fit of the original 3 correlated factor model. Second, the confidence interval test (Anderson and Gerbing, 1988) was applied to check if the confidence interval of the correlations between the factors does not contain 1. Third, it was tested whether the HTMT ratio (Henseler et al., 2014), of correlations between indicators of different factors (heterotrait-heteromethod correlations – HT) between correlations of indicators of the same factor (monotrait-heteromethod correlations – MT) is less than .9.

All models were estimated using diagonally weighted least squares on the polychoric correlation matrix using the R software version 4.3.1 (2023-06-16) (R Core Team, 2023) and the lavaan package (Rosseel, 2012). The fit of the different models was evaluated using the following parameters: chi-square, degrees of freedom, p-value, comparative fit index (CFI), Tucker-Lewis Index (TLI), root mean square error of approximation (RMSEA) with 90% confidence intervals, and normalized root mean residual (SRMR). Evidence of sufficient fit and, therefore, adequate model fit was considered if CFI > .95, TLI > .95, RMSEA < .06, and SRMR < .08 (Browne and Cudeck, 1992; Hu and Bentler, 1999).

To compare models, the recommendations of Chen (2007) and Cheung and Rensvold (2002) were followed. These recommendations suggest that increments of less than .010 in CFI and TLI, and decrements of less than .015 in RMSEA suggest that there are no significant changes in the fit of a model compared to the next most restrictive model. This is used to establish the relevance of differences in fit between models.
**Reliability**

In general terms, reliability is understood as the control of error, such that the repeated application of the same measurement instrument on multiple occasions should lead to consistent results, if there are no theoretical or empirical reasons that could have modified the variable on which the instrument is applied (Muñiz, 2018). However, it is common for situations in which the repeated application of the same measurement instrument is not possible or advisable. In these cases, the internal consistency of the instrument is considered a good approximation of its reliability. This internal consistency, the degree to which the items that make up a scale are correlated with each other, would indicate that the different items that make up a given measurement instrument, since they are correlated with each other, are probably measuring the same variable. There are different statistics to estimate this internal consistency, one of the most used is Cronbach's alpha, which is defined as the proportion of the total variance of the scale that can be attributed to the latent variable that the scale is supposed to measure.

Initially, the full-scale internal consistency was checked using the Cronbach's alpha coefficients for ordinal data (Gadermann et al., 2012) and McDonald's omega (McDonald, 2013); (Revelle & Zinbarg, 2009) and subsequently, once the fit of the three-factor model was checked, the reliability of each of the subscales was checked. Overall, an ordinal alpha value α = .91 [0.90, 0.92] was obtained, and omega ωt = .91 [0.90, 0.92]. Both values were considered excellent

**Results**

**Phase 1. Descriptive Analysis**

Table 1 shows the response frequencies obtained for each of the items that make up the questionnaire, ordered by subscale. In terms of EMI, it is observed that a considerable proportion of participants show a positive attitude towards school, as 73.2% said they enjoyed going to school and 74.5% like school in general, even 82.9% have fun there. However, the presence of 33.8% of responses indicating that they do not feel like going is also notable.

In terms of Social Inclusion, it is highlighted that 93.2% of participants say they get along very well with their classmates, which indicates a strong social connection. However, 11.8% admit to feeling lonely in their class. Regarding ASC, it is evident that the majority perceive themselves as good students, with 92.3% stating this. However, 37.9% find that many things in school are difficult. These results provide an integrated view of the participants' perception of their academic and social experience. Table 2 presents the measures of central tendency and dispersion for each of the items.

**Table 1**

*PIQ Response Frequencies*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Label** | **Item** | **1** | **2** | **3** | **4** | **%** **1 to 2** | **%** **3 to 4** | **missing** |
| *Emotional well-being* |  |  |  |  |  |  |  |
| PIQ1 | I like going to school | 57 | 211 | 531 | 201 | 26.8 | 73.2 | 0 |
| PIQ4R | I have no desire to go to school | 80 | 258 | 411 | 251 | 33.8 | 66.2 | 0 |
| PIQ7 | I like it in school | 53 | 202 | 539 | 206 | 25.5 | 74.5 | 0 |
| PIQ10 | School is fun | 22 | 149 | 613 | 216 | 17.1 | 82.9 | 0 |
| *Social inclusion* |  |  |  |  |  |  |  |
| PIQ2 | I have a lot of friends in my class | 28 | 156 | 529 | 287 | 18.4 | 81.6 | 0 |
| PIQ5 | I get along very well with my classmates | 8 | 60 | 596 | 336 | 6.8 | 93.2 | 0 |
| PIQ8R | I feel alone in my class | 10 | 108 | 446 | 436 | 11.8 | 88.2 | 0 |
| PIQ11 | I have very good relationships with my classmates | 5 | 57 | 573 | 365 | 6.2 | 93.8 | 0 |
| *Academic self-concept* |  |  |  |  |  |  |  |
| PIQ3 | I am a fast learner | 9 | 153 | 586 | 252 | 16.2 | 83.8 | 0 |
| PIQ6 | I am able to solve very difficult exercises | 24 | 253 | 543 | 180 | 27.7 | 72.3 | 0 |
| PIQ9 | I do well in my schoolwork | 11 | 66 | 590 | 333 | 7.7 | 92.3 | 0 |
| PIQ12R | Many things in school are too difficult for me | 57 | 322 | 477 | 144 | 37.9 | 62.1 | 0 |

**Table 2**

*Measures of Central Tendency*

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Item** | **n** | **mean** | **sd** | **median** | **trimmed** | **mad** | **min** | **max** | **range** | **skew** | **kurtosis** | **se** |
| PIQ1 | 1000 | 2,88 | 0,79 | 3 | 2,92 | 0 | 1 | 4 | 3 | -0,47 | -0,06 | 0,03 |
| PIQ2 | 1000 | 3,08 | 0,74 | 3 | 3,13 | 0 | 1 | 4 | 3 | -0,53 | 0,1 | 0,02 |
| PIQ3 | 1000 | 3,08 | 0,66 | 3 | 3,11 | 0 | 1 | 4 | 3 | -0,28 | -0,05 | 0,02 |
| PIQ4 | 1000 | 2,83 | 0,9 | 3 | 2,89 | 1,48 | 1 | 4 | 3 | -0,34 | -0,68 | 0,03 |
| PIQ5 | 1000 | 3,26 | 0,6 | 3 | 3,29 | 0 | 1 | 4 | 3 | -0,4 | 0,56 | 0,02 |
| PIQ6 | 1000 | 2,88 | 0,72 | 3 | 2,88 | 0 | 1 | 4 | 3 | -0,21 | -0,23 | 0,02 |
| PIQ7 | 1000 | 2,9 | 0,78 | 3 | 2,94 | 0 | 1 | 4 | 3 | -0,49 | 0,02 | 0,02 |
| PIQ8 | 1000 | 3,31 | 0,7 | 3 | 3,4 | 1,48 | 1 | 4 | 3 | -0,68 | -0,06 | 0,02 |
| PIQ9 | 1000 | 3,24 | 0,62 | 3 | 3,29 | 0 | 1 | 4 | 3 | -0,49 | 0,73 | 0,02 |
| PIQ10 | 1000 | 3,02 | 0,67 | 3 | 3,06 | 0 | 1 | 4 | 3 | -0,46 | 0,55 | 0,02 |
| PIQ11 | 1000 | 3,3 | 0,59 | 3 | 3,33 | 0 | 1 | 4 | 3 | -0,35 | 0,16 | 0,02 |
| PIQ12 | 1000 | 2,71 | 0,78 | 3 | 2,71 | 1,48 | 1 | 4 | 3 | -0,16 | -0,39 | 0,02 |

**Phase 2. Confirmatory Factor Analysis**

In the second phase, the goodness of fit of two alternative one- and three-factor models was compared. The result was favorable to the three-factor correlated model. As can be seen in Table 3, the improvement in the fit of the four-factor model over the rest was conclusive.

**Table 3**

*Comparison of the Fit of the Considered Models*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | χ² (df) | Δχ² (Δdf) | *p(Δχ²)* | RMSEA | ΔRMSEA | CFI | ΔCFI | TLI | ΔTLI |
| 1 Factor | 707.488 (54) |  | . | .110 | . | .907 | . | .892 | . |
| 3 Factors  | 139.609 (51) | 262.99 (3) | < .001 | .042 | -.068 | .988 | .081 | .984 | .092 |

*Note.* RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI = Tucker-Lewis index; df = degrees of freedom; CI = confidence interval; Δ (CFI, TLI, RMSEA) = changes in fit with respect to the previous least restrictive model.

As noted, overall, ordinal alpha (Gadermann et al., 2012) values of α = .91 [.90, .92] were obtained, and omega ωt = .91 [.90, .92] (McDonald, 2013; Revelle and Zinbarg, 2009). Both values are considered excellent. Regarding the EMI subscale, good internal consistency indices were found (α1 = .89 [.88, .91]; ωt1 = .90 [.89, .91]). As for the SOI, adequate reliability indices were achieved (α2 = .91 [.91, .92]; ωt2 = .92 [.91, .92]). Likewise, about ASC, adequate reliability values were obtained (α3 = .84 [.83, .86]; ωt3 = .85 [.83, .87]).

The analysis of the composite reliability (CR) of each latent variable provides an indicator of construct reliability. In all cases, CR was greater than or very close to .70 (CR1 = .86; CR2 = .86; CR3 = .68), so it can be concluded that the indicators of the four subscales, considered together, are a reliable measure of the construct. Regarding the average extracted variance (AVE), values greater than or very close to .5 were obtained, AVE1 = .60 for the first latent variable; AVE2 = .60 for the second, AVE3 = .48 for the third. Since the average extracted variance is greater than or very close to .50 in all cases, it is concluded that a substantial amount of the variance of the indicators is explained by the construct compared to the measurement error. Overall, all of these indicators constitute indications of reliability in the operationalization of the three latent variables that make up the scale.

Simultaneously, the reliability of the individual indicators was also analyzed. It is possible to check the reliability of each indicator by examining the R2 values, which show the proportion of the variance of each indicator that explains the latent variable, where high R2 values indicate that the indicator is reliable (Table 4). Table 4 shows the saturations, standard errors, t-values, p-values, and R2 of the standardized solution of four correlated factors. In all cases, both the saturations and R2 values were statistically significant with p < .001.

In this model, the most reliable indicator of Emotional Inclusion is item 1 ("I like going to school or college") R2 = .71 and the least reliable is item 4 ("I don't feel like going to school or college") R2 = .42. In the scale of Social Inclusion, the most reliable is item 11 ("I have a good relationship with my classmates") R2 = .67 and the least reliable is item 8 ("I feel lonely in my class") R2 = .49. In the scale of ASC, the most reliable is item 3 ("I learn quickly") R2 = .56 and the least reliable is item 12 ("Many things are very difficult for me in school or college") R2 = .34.

In terms of convergent validity evidence (e.g., the indicators of each latent variable share a high proportion of common variance), as can be seen in Table 8, (a) the factor loadings of all indicators were significant; (b) all of them, except two, were greater than .4; and (c) in addition, the average extracted variance of the saturations of the items in each factor is greater than or very close to .5, which can also be considered an indicator of convergent validity.

**Table 4**

*Estimates of the Three-Factor Correlated Solution*

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **Latent Factor**  | **Indicator**  | **B** | **SE** | **Z** | **p-value** | **Beta** | **R2** |
| Emotional  | PIC1  | .666 | .022 | 30.764 | 0 | .842 | .709 |
| Emotional  | PIC4R  | .582 | .033 | 17.862 | 0 | .650 | .423 |
| Emotional  | PIC7  | .639 | .022 | 28.410 | 0 | .818 | .669 |
| Emotional  | PIC10  | .526 | .024 | 22.357 | 0 | .781 | .611 |
| Social  | PIC2  | .576 | .023 | 24.578 | 0 | .777 | .603 |
| Social  | PIC5  | .484 | .019 | 26.021 | 0 | .806 | .650 |
| Social  | PIC8R  | .491 | .024 | 20.463 | 0 | .702 | .493 |
| Social  | PIC11  | .486 | .019 | 25.918 | 0 | .817 | .668 |
| Academic  | PIC3  | .493 | .021 | 23.007 | 0 | .747 | .558 |
| Academic  | PIC6  | .498 | .024 | 21.064 | 0 | .694 | .481 |
| Academic  | PIC9  | .454 | .022 | 20.665 | 0 | .734 | .538 |
| Academic  | PIC12R  | .455 | .031 | 14.567 | 0 | .583 | .340 |

The evidence of discriminant validity shows that each of the constructs analyzed is unique and different from other constructs. To verify whether there is evidence of discriminant validity, four approaches have been used (Hair et al., 2010).

First, the correlation between each pair of factors was fixed at 1 and the fit of the resulting models was compared to the fit of the original three-factor correlated model. The results showed that this model is significantly superior to the models in which the correlation between F1 and F2 was fixed at 1 (Δχ² (1) = 161.13, p < .001); between F1 and F3 (Δχ² (1) = 108.77, p < .001); and between F2 and F3 (Δχ² (1) = 151.34, p < .001) as can be seen in Table 5.

Second, the confidence interval test (Anderson and Gerbing, 1988) showed that the confidence interval of the correlations between the factors does not contain 1 (ρF1-F2 = .544 [.480 - .608], SE = .032; ρF1-F3 = .640 [.574 - .706], SE = .033; ρF2-F3 = .493 [.421 - .565], SE = .036).

Third, it has been found that the HTMT ratio (Henseler et al., 2014), of correlations between indicators of different factors (heterotrait-heteomethod correlations – HT) to the correlations of indicators of the same factor (monotrait-heteomethod correlations – MT) is less than .9 (F1 – F2, HT / MT = .583; F1 – F3, HT / MT = .666; F2 – F3, HT / MT = .519).

**Table 5**

*Comparison of the Fit Indices of the Four Three-Factor Models*

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Model | χ² (df) | Δχ² (Δdf) | *p(Δχ²)* | RMSEA | ΔRMSEA | CFI | ΔCFI | TLI | ΔTLI |
| 3 Factors | 139.609 (51) | - | - | .042 | - | .988 | - | .984 | - |
| 1 (F1-F2) | 483.13 (52) | 161.13 (1) | < .001 | .091 | .049 | .942 | -.046 | .926 | -.058 |
| 2 (F1-F3) | 311.22 (52) | 108.77 (1) | < .001 | .071 | .029 | .965 | -.023 | .955 | -.029 |
| 3 (F1-F4) | 504.11 (52) | 151.34 (1) | <.001 | .093 | .051 | .939 | -.049 | .922 | -.062 |

*Note.* RMSEA = root mean square error of approximation; CFI = comparative fit index; TLI =

Tucker-Lewis index; df = degrees of freedom; CI = confidence interval; Δ (CFI, TLI, RMSEA) = changes in fit with respect to the previous least restrictive model.

Fourthly, the Fornell and Larcker (1981) criterion states that discriminant validity evidence can be considered if the average extracted variances of each factor are greater than the squared correlations between each pair of factors (Table 6). This criterion was met in all cases.

**Tabla 6**

*Fornell & Larcker Criterion*

|  |  |  |  |
| --- | --- | --- | --- |
|  | EMI  | SOI  | ASC |
| EMI | *.603* |  |  |
| SOI | .296 | *.604* |  |
| ASC  | .410 | 0.243 | *.480* |

Note. AVE on the diagonal (italicized), ρ² on the bottom.

**Discussion and Conclusions**

This study examines the psychometric properties of the PIQ (Perception of Inclusion Questionnaire) in Spanish adolescents, expanding the understanding of the perception of inclusion in diverse educational settings. The adaptation of the instrument to a specific cultural and linguistic context is crucial, in line with the need to validate tools in various regions (Guillemot & Hessels, 2021).

The first phase of the study considered the type of educational institution and the gender of the sample. According to empirical evidence, these factors can be perceived differently between boys and girls, with girls reporting higher levels of emotional well-being and SOI, and boys reporting higher levels of ASC. In addition, other authors have argued for differences in the socio-emotional development of students attending public or private schools, indicating certain differences in variables such as self-esteem and self-concept. However, empirical research on this topic is still scarce.

The second phase of the study used confirmatory factor analysis to support a three-factor correlated model, strengthening the structure of the PIQ. Evidence of reliability, internal consistency, and convergent validity reinforce the robustness of the instrument. Individual indicators demonstrate reliability, which is essential for a comprehensive assessment.

The research of Venetz et al. (2014) was crucial for establishing the basis for the construct validity of the PIQ. Their work with Swiss students in grades 4 to 6 provided valuable evidence for the validity of the EMI, SOI, and performance-motivated inclusion scales. They observed significant correlations with related measures, and the adaptability of the instrument was evident by adjusting the name of the performance-motivated inclusion scale to more accurately reflect its focus on ASC. Other studies have also validated the PIQ in different social and linguistic contexts (DeVries et al., 2018; Schwab et al., 2020; Zurbriggen et al., 2017).

In the second phase, following some proposals from the previous literature (e.g., Knickenberg et al., 2022; Kyttälä et al., 2023), two alternative models, one-factor and three-factor, were estimated for the confirmatory factor analysis, based on the distribution and categorization of the questionnaire factors. The results obtained have shown evidence in favor of the three-factor correlated model, as is the case with the research of Venetz et al. (2014).

In terms of reliability, sufficient evidence was collected to support the claim that the three subscales of the instrument show adequate internal consistency, and sufficient reliability in individual indicators and appropriate structural reliability. Regarding convergent validity, the factor loadings of the indicators are significant and exceed the threshold of 0.4, indicating a positive and significant association with the latent construct. This finding is a solid indicator of convergent validity. In addition, the average extracted variance exceeds or approaches the desired threshold of 0.5, suggesting that the proposed indicators are appropriate. These results, like those found in the studies of Knickenberg et al. (2022) and Zwierzchowska et al. (2022), show satisfactory levels of reliability, thus supporting the findings of this study.

In addition, a comprehensive evaluation of discriminant validity was conducted using various methods, such as the HTMT ratio, the Anderson and Gerbing confidence interval test (1988), and the Fornell and Larcker criterion, to ensure the robustness and reliability of the model. The results obtained, based on the aforementioned criteria, are consistent. The HTMT ratio for all pairs of constructs was found to be below the threshold of 0.9, indicating discriminant validity. The Anderson and Gerbing confidence interval test supported this conclusion by showing that the difference between the mean extracted variances shared does not include 1.

In general, the results of the analysis have provided evidence that supports the reliability of the indicators of the PIQ as indicators of reliability in the operationalization of the three latent variables that make up the scale (Venetz et al., 2015): (a) SOI, (b) EMI, and (c) ASC (ASC). Thus, the evidence of discriminant validity reveals that each construct analyzed is unique and different.

Finally, it is important to highlight that the results of this study should be interpreted considering certain limitations. First, there is a lower representation of the population with a lower socioeconomic status and those who reside in rural areas, probably due to the online approach used. On the other hand, although the sample size (1000 participants) is considerable, there are limitations in terms of representation in specific variables. For example, there is no representation of adolescents who identify as non-binary or outside the male-female spectrum. Second, the exclusive use of self-report methods can lead to the possibility of bias in the assessment. Third, the comparison with previous information has been restricted due to the scarcity of research on the performance of the PIQ in the adolescent population, especially in the national context, as well as other tests that evaluate inclusion from this perspective.

The study, despite its limitations, supports the usefulness, validity, and reliability of the PIQ in students (Schwab et al., 2020; Zurbriggen et al., 2017). It is suggested that future research focus on this and other instruments for assessing the perception of inclusion, given its importance for quality of life and mental health. In addition, it is urged to explore the implications of using the questionnaire in Spanish adolescents with SEN as it has been done in other countries (e.g. Alnahdi et al., 2022; DeVries et al., 2018; Schmidt et al., 2021), as well as its versions for teachers (PIQ-T) and parents (PIQ-P). The relevance of considering the gender of the users is highlighted, as perceptions of inclusion can vary depending on developmental maturity and social perspectives (e.g. Ato et al., 2014; DeVries et al., 2021; Guillemot & Hessels, 2022; Knickenberg et al., 2022; Krull et al., 2018; Schneekloth & Andersen, 2013).

In summary, the need for continued research on the dimensionality of the instrument and its impact on adolescent mental health is emphasized, supporting previous claims in similar studies (Venetz et al., 2019; Schwab & Alnahdi, 2021). In the context of inclusive education, the PIQ could provide educators with a deeper understanding of student perceptions, making it easier to identify those at risk and allowing for specific interventions or direct feedback (Grüter et al., 2023; Knickenberg et al., 2022).

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