

## Validation of the Spanish version of the Student Adaptation to College Questionnaire (SACQ-50) with Peruvian Students

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## Abstract

**Objective:** to evaluate the psychometric properties of the short version of the Spanish Student Adaptation to College Questionnaire (SACQ-50, Spanish version). **Participants:** 1513 students from 14 universities in Peru, mainly females (61.5%), aged between 18 and 30 years. **Method:** Cross-sectional study with the questionnaire administered in person. Confirmatory factorial analysis was conducted to confirm the scale validity. **Results:** adequate fits were obtained for the multidimensional structure and for the second order factor of the test. Alpha and omega coefficients indicated adequate test reliability. **Conclusions:** The Spanish version of the SACQ-50 is a multidimensional scale displaying adequate reliability and validity. The scale may be useful for researchers and other professionals working in the university context.

## Introduction

During university life, young people face a series of obstacles and challenges that form part of their development and that involve coping with new, often unfamiliar, situations. During this life stage, students experience diverse demands from family and from social and interpersonal environments, and they also encounter the characteristic challenges of this developmental stage, such as developing identity, becoming independent, forming friendships, choosing a career and establishing future goals.<sup>1,2</sup> At this time of life, the university environment represents an important training ground, where young people face a series of challenges of academic, social and institutional nature.<sup>3</sup> Students who find it difficult to adapt to these demands will generally be more susceptible to developing mental health problems.<sup>4</sup>

In response to the importance of studying the process of immersion in university life, Baker and Siryk<sup>5</sup> developed a self-report instrument denominated the *Student Adaptation to College Questionnaire* (SACQ). The SACQ aims to evaluate the process of adapting to the multiple challenges that may arise during academic training within the university context. The authors of the scale proposed that the demands of university life can be grouped into four specific dimensions: academic adjustment, social adjustment, personal-emotional adjustment and institutional attachment. According to these authors, academic adjustment involves the degree of success in facing academic challenges and in academic achievement; social adjustment refers to handling of social links, interpersonal relationships and integration in social spheres within the university; personal/emotional adjustment evaluates the emotional state associated with university life and involves responses to stress and anxiety or physical reactions (e.g. sleep disruption) to academic demands; and, finally, institutional attachment reflects the degree to which the student identifies with and feels commitment towards the university to which they belong.<sup>5,6</sup>

The SACQ has been widely used to study the variables affecting university adaptation and has enabled identification of students who experience difficulties in adjustment.<sup>3,6-10</sup> The instrument has also identified variables related to academic success and academic persistence,<sup>11-13</sup> academic

1  
2 burnout<sup>14</sup>, university student retention, social support and whether or not the student has received  
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4 counselling<sup>3</sup>. Likewise, the SACQ has revealed links between variables associated with mental  
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6 health, such as the presence of depressive symptoms, stress, coping and the use of psychological  
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8 counselling services.<sup>3,14,15</sup>  
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12 The SACQ has been used in diverse contexts,<sup>3,9,16-19</sup> and different studies have demonstrated  
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14 the adequate reliability of the instrument.<sup>8,14,17</sup> In addition, alpha coefficients higher than .90 have  
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16 been reported for all subscales of the SACQ in a meta-analysis of 237 independent samples.<sup>3</sup> Indeed,  
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18 since publication of the scale, various studies have reported a test reliability consistent with that  
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20 reported in the manual.<sup>10</sup>  
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25 However, various criticisms have been made in regard to certain irregularities in the  
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27 development of the scale, which are expected to affect its capacity to reproduce the proposed factorial  
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29 structure.<sup>20</sup> In this respect, the scale has only been tested in freshmen year students, despite having  
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31 been proposed for use in the general university population. This calls into question the theoretical  
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33 basis used by the authors to organize the dimensions. In addition, there is poor distinction between  
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35 the test items, which thus tend to be saturated by more than one factor.<sup>3,10,20,21</sup> Finally, the use of  
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37 principal components analysis with the intercorrelation matrix of the SACQ subscales in the original  
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39 study has been criticised,<sup>6</sup> as this may prevent adequate exploration of the factorial structure of the  
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41 items and whether they correspond to the domains to which they supposedly belong.<sup>20</sup>  
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48 Rodríguez et al<sup>22</sup> conducted a new revision of the SACQ which improved the previous version  
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50 of the instrument while retaining its strong points. This new instrument denominated the SACQ-50,  
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52 Spanish version, retained the most representative items in each domain and reproduced the original  
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54 structure of the test. The researchers proposed eliminating those items yielding a standardized  
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56 coefficient below .30, those with secondary loadings in other factors and those that did not reflect the  
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58 actual situations in Latin-American and Ibero-American universities.  
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With this aim, the researchers evaluated a sample of 300 first-year students and finally concluded that 50 of the test items worked best as they were efficiently distributed in the four dimensions, following the model proposed by Baker and Siryk.<sup>6</sup> However, although the results demonstrated adequate psychometric functioning for this structure, the possible existence of a global dimension of adaptation was not explored,<sup>6</sup> despite the fact that the researchers proposed that three items of the SACQ-50 would contribute to this general measure.<sup>23</sup> Analysis of this second order dimension has been lacking in validation studies or has only been applied to the items conforming the four theoretical dimensions, but not to the other test items.<sup>24</sup>

The new, short version must be supported by psychometric data, particularly when obtained from diverse samples, as this would demonstrate the transcultural validity of the scale. Therefore, the objective of the present study was to evaluate the psychometric properties of the SACQ-50, Spanish version. A further aim was to test the possibility of establishing a second order scale that includes the 4 dimensions and all of the test items. In addition, given that the dimensionality of the SACQ and its variants have been called into question, unidimensional models will be compared in order to evaluate the viability of the multidimensional aspect of the theory.<sup>3,6,24</sup>

## Method

### *Participants*

The participants comprised 1513 students from fourteen universities (6 private and 8 public) in eight cities in Peru. The universities all belong to the *Red Peruana de Universidades* (Peruvian University Network) (RPU), which is formed by 26 of the universities in the country. Most of the participants were female (61.5%) and they ranged in age between 18 and 30 years ( $M=20.82$ ,  $SD=2.38$ ). A high proportion of the participants (41.8%) were undergraduates (i.e. in years 1 to 4 of their university courses, and most (61.37%) were attending a public university. The participants were enrolled in the following faculties: 45.1%, Art and Social Sciences; 18.9%, Sciences and Engineering; 18.4%, Biological or Health Sciences; 16.8%, Management and Accounting; and 0.8%, other faculties.

## *Instruments*

The instrument evaluated in the present study was the Spanish, 50-item version of the SACQ (Spanish SACQ-50).<sup>23</sup> This version is based on the instrument developed by Baker and Syrik<sup>6</sup> including 4 dimensions: academic adjustment, social adjustment, personal-emotional adjustment and institutional attachment. These dimensions were considered together with an additional 3 items to indicate the overall adjustment. The instrument is based on a Likert scale with 9 response options ranging from 1 (“totally disagree”) to 9 (“totally agree”).

Regarding the reliability of the scale, alpha and omega coefficients higher than .7 were reported for the four dimensions: academic adjustment ( $\alpha = .85$ ,  $\omega = .86$ ), social adjustment ( $\alpha = .85$ ,  $\omega = .84$ ), personal-emotional adjustment ( $\alpha = .86$ ,  $\omega = .84$ ) and institutional attachment ( $\alpha = .90$ ,  $\omega = .92$ ).<sup>23</sup>

## Procedure

The project was approved by an accredited ethics committee. Institutions belonging to the RPU were then invited to participate in the study. They were informed about the study objectives and permission was requested for the researchers to extract the required data.

In the universities that agreed to participate in the study, information was collected in face-to-face interviews in the classrooms. Informed consent was obtained from participating students, who signed a form outlining the voluntary, confidential and anonymous nature of the study. The students completed the paper questionnaires in the classrooms, supervised by the researchers.

## Data analysis

The data analysis was conducted with R statistical software, version 4.0.4.<sup>25</sup> Following the recommendations of Baker and Siryk,<sup>6</sup> items with three or more missing responses were excluded from the data set. Likewise, in cases with one or two missing responses, the mean value was calculated for the item.

The Mahalanobis distance was used to detect atypical cases, and items with extreme values ( $p < .001$ ) were excluded. In addition, Mardia's test for multivariate normality, carried out with the *MVN v5.8* package,<sup>26</sup> indicated that the data were not normally distributed (Mardia's coefficient of multivariate kurtosis of 85.73 and a coefficient of skewness of 47767.13).

Owing to the non-normal distribution of the data and following previous recommendations,<sup>3</sup> a confirmatory factorial analysis (CFA) was conducted with the Diagonally Weighted Least Squares (DWLS) estimation method, to evaluate the internal structure of the scale. In addition, the unidimensional fit was determined for each dimension of the short, Spanish version of the SACQ-50, with the aim of identifying dimensions with poor fits.

Two models were subsequently tested: (1) a four-factor model composed of 47 items included in the Spanish SACQ-50 scale, as proposed by Rodríguez et al<sup>23</sup>, and (2) a second-order model including a general factor composed of the four dimensions of the SACQ and the three items suggested by Rodríguez et al<sup>23</sup> as part of the overall adaptation score. Both models were compared with two unidimensional models including respectively 47 and 50 items, with the aim of testing the robustness of the multidimensional scale.

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2 Among the various goodness of fit indices available, the following incremental fit indices  
3 were considered: the Comparative Fit Index (CFI) and the Tucker Lewis Index (TLI) and the absolute  
4 fit indices Root Mean Square Error of Approximation (RMSEA) and Standardized Root Mean Square  
5 Residual (SRMR). Values of CFI and TLI  $> .90$ , and values of RMSEA and SRMR  $< .08$  were  
6 considered to indicate adequate fits.<sup>27</sup> The internal structure and reliability of the scale were evaluated  
7 using the *lavaan 0.6-8* package,<sup>28</sup> and the final model was plotted using the *semPlot 1.1.2* package.<sup>29</sup>  
8 With the aim of facilitating interpretation of the data and comparison with the findings of previous  
9 studies, the items are presented using the original numeration proposed by Baker and Siryk<sup>6</sup>. Finally,  
10 the test reliability was measured with the alpha and omega coefficients for each dimension and the  
11 total scale, measured using the *semTools v0.5-4* and *semPlot 1.1.2* packages<sup>30</sup>.

## 21 Results

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23 Evaluation of the unidimensional structure of each dimension of the Spanish SACQ-50  
24 revealed an adequate fit for each of the models (see Table 1). The Personal-emotional dimension  
25 yielded an almost perfect fit to the data, unlike the Academic and Institutional dimensions, which  
26 yielded marginal values of the corresponding indicators. Thus, the Academic dimension yielded  
27 values at the upper limit of the 90% confidence interval of the RMSEA above .08, and the Institutional  
28 dimension yielded an SRMR value of .082. At the local level, only one item yielded a value below .3  
29 (item 44 = .24). None of the items were removed from the individual dimensions due to the overall  
30 fit, with the aim of maintaining the original structure of the scale. In addition, McDonald's alpha and  
31 omega coefficients of reliability indicated adequate reliability for all of the models (see Table 1).

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33 Secondly, a one-factor solution was compared with the four-factor model proposed by  
34 Rodríguez et al<sup>23</sup>. The result of this analysis showed that the unifactorial model did not provide a  
35 good data fit (see Table 1). In addition, comparison of the models with a Chi squared difference test  
36 showed that the multifactorial model, based on the theory proposed by Baker and Siryk<sup>6</sup>, provided a  
37 significantly better data fit than the model with a single overall dimension ( $\Delta\chi^2 = 4053.69$ ,  $df = 6$ ,  $p$   
38  $< .001$ ). At the local level, only item 44 (from the 69-item SACQ scale) yielded a factorial loading  
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2 below .3 in the unidimensional model (item 44 = .26). Likewise, except for the relationship between  
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4 the Institutional and Personal-Emotional dimensions ( $r = .44$ ), the intercorrelations between the  
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6 dimensions of the Spanish SACQ-50 ranged from .54 to .86. The McDonald's alpha and omega  
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8 coefficients of reliability for this model ranged from .83 to .88 and from .83 to .84 respectively for  
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10 the dimensions of the Sp SACQ-50, indicating adequate reliability for this solution.  
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17 **[Table 1 here]**  
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22 In response to the high levels of intercorrelation between the dimensions of the Spanish  
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24 SACQ-50, the existence of a second-order factor was evaluated by comparison of the model with a  
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26 single factor model composed of all 50 items, following the recommendations of Rodríguez et al<sup>23</sup>.  
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28 The results of this analysis showed that the unifactorial model did not provide a good data fit (see  
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30 Table 1). Likewise, comparison of the models using a Chi squared difference test showed that the  
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32 second-order model yielded a significantly better data fit than the unidimensional model ( $\Delta\chi^2 = 3856$ ,  
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34  $df = 3$ ,  $p < .001$ ). At the local level, item 44 yielded a standardized coefficient of less than .3 in the  
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36 second order model (item 44 = .26).  
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45 **[Figure1 here]**  
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50 Regarding the reliability of this solution, the alpha and omega values of respectively .939 and  
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52 .924 indicated adequate internal consistency for the overall scale. These coefficients were also  
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54 calculated for the subscales of the Spanish SACQ-50, obtaining  $\alpha = .83$  and  $\omega = .82$  for the Academic  
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56 dimension,  $\alpha = .83$  y  $\omega = .80$  for the Social dimension,  $\alpha = .84$  y  $\omega = .80$  for the Personal-Emotional  
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2 dimension, and  $\alpha = .88$  y  $\omega = .83$  for the Institutional dimension. All of these coefficients indicate an  
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5 adequate level of reliability for each of the test dimensions.  
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## 10 Discussion

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12 The importance of studying how students adapt to university life is therefore indisputable. The  
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14 Student Adaptation to College Questionnaire (SACQ), developed by Baker and Syrik<sup>6</sup>, is globally  
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16 the most widely used instrument for measuring this variable; however, empirical evidence supporting  
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18 the psychometric properties is limited.<sup>8,20</sup> Rodríguez et al<sup>23</sup> developed the Spanish version of the  
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20 instrument and proposed a reduced version including 50 items that maintained the multidimensional  
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22 structure of the original scale. The aim of the present study was therefore to analyse the psychometric  
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24 properties of the short, Spanish version of the SACQ with the aim of providing empirical evidence  
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26 supporting the use of a shorter, more efficient version of the instrument administered in Spanish.  
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33 The results of the present study provide robust evidence supporting the validity and reliability  
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35 of the Spanish SACQ-50.<sup>31,32</sup> Regarding the internal structure of the test, the results of confirmatory  
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37 factorial analysis provide support for the four-factor model proposed by Rodríguez et al<sup>23</sup>, which is  
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39 based on the four dimensions of adaptation to university life proposed by Baker and Siryk<sup>6</sup>. In  
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41 addition, on the basis of the results obtained, we propose organization of these dimension in a factor  
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43 of an order higher than which they are included.  
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48 Thus, we first compared a 4-factor multidimensional model with a simple unidimensional  
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50 model and found that the 4-factor model provided the best fit to the data. This finding confirms the  
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52 multifactorial structure of adaptation and strengthens the findings of the authors of the Spanish  
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54 version of the instrument by replicating their model in another population.<sup>3,23</sup>  
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58 The second part of the present study confirmed the presence of an underlying global factor,  
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60 which was identified during evaluation of a second-order model. This model, which is based on the

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2 high correlations between the SACQ dimensions, provided an adequate fit to the data and also  
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4 performed better than a unidimensional model. This finding is similar to that reported in a previous  
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6 study supporting the use of an overall score for adaptation along with that for the SACQ dimensions.<sup>33</sup>  
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10 However, our findings also indicate that academic adjustment and institutional attachment  
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12 may be the weakest areas of the test because, although the models for each dimension provided good  
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14 fits for most of the indicators, some of the fits were marginal. The lack of good fit may be due to the  
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16 original proposal of Baker and Siryk<sup>6</sup> of assigning a series of items to multiple factors.<sup>20</sup> High  
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18 RMSEA and SRMR values have been observed in previous research evaluating the individual  
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20 structure in each dimension, in which it was found that the possible reason for the poor fits for these  
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22 indicators may be the presence of cross-loadings in the original version.<sup>23</sup> As the fits for these  
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24 indicators proved marginal in this study, it was decided to not remove them in consideration of global  
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26 fit and theory. On the other hand, at the local level, item 44, originally assigned by Baker and Siryk<sup>6</sup>  
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28 to academic and institutional dimensions proved to have a low factorial load in all of the models  
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30 evaluated.<sup>23</sup> This item (“*I attend classes regularly*”) is particularly conflictive in the Peruvian context,  
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32 as also indicated in another study in this population.<sup>34</sup> This may explain why this item does is not a  
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34 good identifier of academic adaptation in the students evaluated, as there is a high rate of attendance  
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36 (more than 77% of the students gave a positive response to this statement). The high attendance rate  
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38 is mainly due to the fact that class attendance is compulsory in Peruvian universities. However, class  
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40 attendance does not necessary indicate commitment or dedication to learning.<sup>35</sup>  
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50 Regarding the internal consistency of the four-factor model and the second-order model, these  
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52 displayed adequate reliability, consistent with previous findings.<sup>3,6,23</sup> The findings support the 50-  
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54 item, Spanish version of the SACQ proposed by Rodríguez et al<sup>23</sup> and provide promising evidence  
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56 for a robust, short, simple to administer instrument that can be interpreted in both multidimensional  
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and unidimensional models. This will allow efficient and reliable measurement of the process of adaptation of student to university life.

This study presents some limitations that should be taken into account. Firstly, although the group of universities involved incorporate students from different cultures, which should help to enrich the analysis, the disseminated nature of different groups, resulting from the sampling design, may have led to some bias in the results. However, the testing of a parsimonious model represents a contribution in favour of a revision of the psychometric properties of an alternative model constructed using a representative sample. Indeed, Rodríguez et al<sup>23</sup> used a sample of students selected at random, in which the proportion of males and females was representative of that at the corresponding university.

On the other hand, this study is backed up by the proposal of O'Donnell et al<sup>36</sup>, who suggested development of a short version of the SACQ which would be more accessible and easier for students to complete. The original version of the scale has not been modified since it was proposed in 1989, and we suggest researchers should develop a shorter version of the scale. Finally, the Spanish SACQ-50 has been shown in the present study to be a psychometrically valid, reliable instrument, of recognised value for research in Peruvian students. Owing to similar characteristics, we believe that the instrument can be used to measure student adaptation to university life in Latin America. We encourage researchers to evaluate use of the instrument in other contexts and languages, as this is a simpler and more efficient method of testing the process of adaptation to university life.

### ***Conflicts of interest***

The authors declare they have no conflicts of interests to report. The authors confirm that the research reported in this article complies with ethical guidelines and legal requirements in Peru.

1  
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In Review

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Table 1

*Confirmatory factorial analysis and reliability of the SACQ-50, Spanish version*

Model	$\chi^2$	<i>df</i>	CFI	TLI	RMSEA [90%CI]	SRMR	$\alpha$	$\omega$
Individual dimension								
Academic	756.16	77	.931	.919	.076 [.071, .081]	.075	.83	.82
Social	455.45	65	.960	.952	.063 [.058, .069]	.063	.83	.82
Institutional	90.33	20	.975	.965	.048 [.038, .059]	.082	.84	.83
Personal-Emotional	179.71	54	.991	.989	.039 [.033, .046]	.040	.87	.88
47-item models								
One-factor model	11812.32	1034	.887	.882	.083 [.082, .084]	.094	.93	.90
Four-factor model	7758.63	1028	.930	.926	.066 [.064, .067]	.074	.93 <sup>a</sup>	.93 <sup>a</sup>
50-item models								
One-factor model	12545.37	1175	.900	.896	.080 [.079, .081]	.090	.94	.91
Second-order factor	8689.37	1172	.934	.931	.065 [.064, .066]	.074	.94 <sup>a</sup>	.92 <sup>a</sup>

Note. *N* = 1515; Estimator = DWLS; <sup>a</sup>, alpha and omega values for the overall scale.



Review	Answer
<p>1, Table 1 remains difficult to read. If you wish to retain the portrait orientation, then please put the 90% CIs on a line below the RMSEAs (in the same column). That way, it won't appear that the SRMR is part of the CI.</p>	<p>We have changed the orientation of the table in order to fit all the numbers properly.</p>
<p>2, I'm curious as to why you chose the 90% CI rather than the conventional 95% CI. Does that indicate that you're willing to accept a higher degree of uncertainty (i.e., 10% as opposed to 5%)? If so, please explain. If you meant to report 95% CIs instead, please correct the table.</p>	<p>According to Klein (2016), a 90% confidence interval of RMSEA is more common in the literature because it allows researchers to infer the results of the hypothesis tests of exact, close and non-close fit (MacCallum, et al., 1996).</p>
<p>3, As I understand the analyses, you compared a 4-factor model to a 1-factor model with 47 items and a 4 + 1 (second order) model with to a 1-factor model with 50 items. But you do not seem to have compared the 4-factor model (47 items) with the 4 + 1 factor model (50 items), which would seem like a logical comparison to determine whether the second order factor contributes to the value of the scale. From the coefficients reported in table 1, it looks as if the fit of the 4 and 4 + 1 models is equivalent, so adding the second-order factor did not seem to have diminished model fit.</p>	<p>The 4-factor model (47 items) and the 4 + 1 factor model (50 items) were not compared because they are non-nested models. As far as our review goes, we were not able to find a way to contrast these two models when non normal data with the DWLS estimator is used.</p>
<p>4, It's interesting to me that none of the unidimensional models showed especially poor fit. In fact, only the Academic dimension showed marginal fit. Given your comments about intercorrelations among items, I'm surprised that you don't seem to have examined any modification indices that would have allowed error variances to correlate among pairs of theoretically related items. That's a proven way to enhance model fit within logical bounds. I suggest you do that for all of the models you tested. You might find that some models that don't look good now are vastly improved. As long as modification indices are used judiciously, they can contribute to the clarity of models. Here's an interesting discussion: <a href="https://centerstat.org/what-are-modification-indices-and-should-i-use-them-when-fitting-sems-to-my-own-data/">https://centerstat.org/what-are-modification-indices-and-should-i-use-them-when-fitting-sems-to-my-own-data/</a></p>	<p>We evaluated our models' modification indices; however, we did not find any significant improvement in their overall fits. It is important to mention that we discuss the idea of cross-loadings among items only for the unidimensional models that tested the fit of the SACQ subscales and had a marginal RMSEA and SRMR. In its early development, many items were shared among the subscales of the SACQ (Baker &amp; Siryk, 1989). We believed that these common items encourage the presence of cross-loadings among different items of the SACQ, undermining the one-dimensionality of each subscale as showed by the Spanish validation of the scale (Taylor &amp; Pastor, 2007; Rodríguez et al., 2012). Moreover, we found high intercorrelations among subscales that based our second order model of the scale. The overall good fit of this model is also evidence that the items are separate enough and behave properly.</p>

<p>5, It's also interesting that the four unidimensional models fit better than any of the multifactorial models. I wonder if this means that the SACQ is really four separate tests in a single package rather than a single test.</p>	<p>Unidimensional models were used to assess areas of local misfit in the Spanish validation of the scale used in this study (Rodríguez et al., 2012). This process reduces the number of items per factor as well as improved the unidimensional fit of each scale. On the other hand, issues regarding a lower fit for the multifactorial model have been discussed around the presence of items belonging to multiple factors in the original scale (Rodríguez et al., 2012; Taylor &amp; Pastor, 2007).</p>
<p>6, Given your finding that item #44 did not load &gt;.3 in any of the models, which is consistent with other's findings, why not test 46 and 46 + 1 item models to investigate whether item #44 could be dropped without doing damage to the structure of the test? This would be a valuable contribution, especially given your comments about the irrelevance of the item in the Peruvian context and perhaps in other Latin American contexts. This comment reflects my curiosity, not a demand for revision.</p>	<p>As mentioned in the study results, we took the decision to keep this item in order to preserve the original structure of the scale and because of the overall fit of the models tested. Previous validations of the SACQ scale have shown different internal structures with different number of items, making it difficult to compare and build a strong body of evidence. For this reason, we try to keep the original number of items in light of the adequate fit of the models.</p>
<p>7. I don't think you can make inferences about the validity of the Spanish SACQ-50 (Abstract; page 9, line 37/38 and page 11, line 55/56) based on this study because you didn't assess validity. You can attest to the stability of the factor structure, the reliability of the sub-scales, and the presence of the second order factor. Please mention as a limitation the lack of data on validity of the scale, perhaps with a brief explanation of why validity was not assessed.</p>	<p>According to Cook and Beckman (2006) and AERA, et al. (2014), internal/factor structure is a source of validity evidence. We add these citations at the beginning of our discussion in order to clarify this position.</p>