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## Validation of the brief scale on ageism in university students (BSAUS)

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## ABSTRACT

This study validates the Brief Scale on Ageism in University Students (BSAUS) to support educational objectives for reducing negative biases towards older adults. Using a quantitative methodology with inferential analysis and second-generation techniques, the study verified the factorial structure and psychometric properties of the BSAUS. Cross-sectional surveys were conducted with 1,347 students from the Universities of Valladolid, Lleida, and Zaragoza between 2018/19 and 2022/23. Confirmatory factor analysis revealed Cronbach's alpha values of 0.76 and 0.74 for the Ageism construct, while Wellbeing, Behavioural, and Personality dimensions scored 0.70–0.66, 0.55, and 0.58–0.60, respectively. Composite reliability exceeded the 0.7 criterion across measures. The BSAUS, comprising three dimensions, is validated as a reliable tool for assessing discrimination, prejudices, and stereotypes towards older adults in university contexts. This scale has potential for ageism reduction initiatives and can inform strategies to prevent discriminatory behaviour towards older adults.

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## Introduction

Ageing is a process of psychological changes that involves challenges that affect those who experience it in all their dimensions, as well as the people around them.<sup>1</sup> As the ageing world population grows—especially in more developed countries—due to decreasing birth rates and increasing longevity, older adults are often socially perceived as dependent and burdensome.<sup>2,3</sup> Attitudes and behaviours towards this group are deeply rooted in sociocultural structures, including traditions and customs, which shape the perspectives of future generations. Recently, special attention has been given to the analysis of age-based social discrimination,

observing its manifestations in various contexts such as professional, familial, social, and sexual, particularly in healthcare services.<sup>4,5</sup> According to Eurostat's 2023 reports, eight countries surpass the median age of EU member states (44.5 years). Among these, four are situated in South-Western Europe: Italy (48.4), Portugal (46.9), Greece (46.5), and Spain (45.3). The remaining four countries above this median are Bulgaria (46.8), Germany (45.4), Croatia (45.4), and Slovenia (44.9).<sup>6</sup> The phenomenon of population ageing has occurred at a considerably faster rate in South-Western European countries, necessitating different political, economic, and social adaptations compared to those in Northern Europe.<sup>7</sup>

Ageism was the term used by Robert Butler to describe systematic and discriminatory stereotypes directed towards people simply because they are older. These stereotypes manifest in attitudes such as disdain, dislike, insults, avoidance of physical contact, and marginalisation in access to housing, the labour market, or certain public services.<sup>8</sup> It is associated with increased anxiety, depression, and suicidal ideation in those who experience it, to the detriment of their

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quality of life.<sup>9–11</sup> While ageism is compared to racism and sexism, being the third most frequent form of discrimination after these,<sup>12</sup> is socially less recognized and frequently normalized.<sup>13</sup> Unlike race or sex, which are considered inherent characteristics of an individual, age is dynamic and changes over time, exposing everyone to the possibility of facing age discrimination.<sup>14</sup> Moreover, in a society deeply rooted in the capitalist model, the constant promotion of youth as a desirable ideal and the linkage of individual value with the capacity for consumption and production not only propose unattainable standards for older adults but also create, reinforce, and perpetuate negative stereotypes about ageing that can contribute to the marginalization and systemic discrimination of older adults.<sup>15</sup>

The impact of ageism across the international community led the World Health Organization (WHO) to publish a global report on ageism, defining the phenomenon as discrimination based on age, manifested through stereotypes and discriminatory practices.<sup>16</sup> As increased ageism over the last five years has highlighted discrimination against older adults,<sup>17,18</sup> the WHO proposed a series of strategies aimed at society, governments, and institutions to mitigate its impact, including the creation of policies, educational interventions, and the promotion of intergenerational contact. Furthermore, eradicating prejudices towards older adults will improve their well-being, as envisaged in the Sustainable Development Goals (SDGs), and the perception of healthcare quality.<sup>16</sup>

Previous research indicates that education can significantly improve perceptions of older adults and decrease age-related prejudices;<sup>19–22</sup> however, comparing results is complex due to the variety of measurement criteria employed. Some studies with university students from different disciplines which included nursing students show that, despite an initial negative attitudes towards older adults and a lack of interest in working with them are the same,<sup>23,24</sup> the perceptions of nursing students change after studying subjects focused in older people.<sup>9,25</sup> Exposure to gerontological content has been identified as a key factor in positively influencing student attitudes towards caring for older adults.<sup>26</sup> Furthermore, it has been suggested that curriculum design plays a crucial role in shaping students' attitudes towards nursing and elder care.<sup>27</sup> Educational programmes and interventions have been recommended to increase nursing students' awareness of elder abuse and improve their willingness to intervene in such cases.<sup>28</sup>

The first instrument designed to assess ageism was the 'Attitudes Toward Old (or older) People Questionnaire', created in 1953 by Tuckman and Lorge for adult psychology students. This questionnaire identified prevalent stereotypes about older adults, focusing exclusively on the cognitive aspects of older individuals.<sup>29</sup> Since then, various tools have been developed for the same purpose, highlighting Palmore's scales,<sup>30,31</sup> which explore physical and social domains in addition to the cognitive aspect, and the 'Kogan's attitudes towards older people scale' (KAOP)<sup>32</sup> which addresses only the cognitive and affective dimensions of ageism. The Fraboni Scale of Ageism (FSA) addresses the affective, cognitive, and behavioural areas,<sup>33</sup> while lesser-known instruments as the 'Ageing Semantic Differential' (ASD) by Rosencratz and McNevin which addresses only the affective aspects of ageism.<sup>34</sup> In Spain, Montorio and Izal proposed their questionnaire in 1991.<sup>35</sup> This questionnaire was developed in the framework of a Ph.D. dissertation and comprises 20 items; however, its factor loading is not significant across all of them, making it an extensive questionnaire with limited reliability. Although this instrument was not psychometrically validated, its items inspired in 2004 the development and validation of the Negative Stereotypes Towards Ageing Questionnaire (CENVE, according to its acronym in Spanish) in Spain.<sup>36</sup> The CENVE reduced the number of items to 15, distinguishing aspects such as health, motivational-social (MS), and character-personality (CP).

The importance of assessment questionnaires aligns with the WHO's proposal regarding educational interventions, which emphasises the need to generate effective tools to measure ageism in university students and to evaluate the impact of teaching methodologies used to reduce stereotypes.<sup>16,37</sup> Although various tools and questionnaires exist for studying age discrimination, there is still no consensus in the scientific literature on conceptualising the ageism construct as a multidimensional measure. Moreover, few studies psychometrically endorse the feasibility of the suggested questionnaires.<sup>38–40</sup> As assessing ageism in nursing students with valid and reliable tools and well-defined dimensions would guide educators in their educational planning aimed at reducing ageism and preventing ageist behaviours among future professionals, the aim of this work was to validate the Brief Scale on Ageism in University Students (BSAUS), based on the Montorio and Izal questionnaire.

## Materials and methods

### Study perspective

A quantitative methodology focused on inferential analysis and advanced second-generation techniques was adopted to explore the factorial structure of the scales. A first sample of university students was surveyed to assess the validity and reliability of the Stereotypes Towards Ageing Questionnaire proposed by Montorio and Izal.<sup>35</sup> Subsequently, the psychometric properties of the Brief Scale on Ageism in University Students (BSAUS) were assessed using a second sample verifying its applicability and consistency in different academic contexts.

### Population and sample

This study was conducted using data collected from undergraduate students enrolled at three universities in the northeast of Spain during two different academic years: 2018–19 and 2022–23. The sample comprised a total of 1347 students who completed the questionnaire during these two periods.

**Sample 1.** During the 2018–19 academic year, 688 responses were obtained, of which 140 (20.3 %) were from first-year students, 204 (29.7 %) from second-year students, 206 (29.9 %) from third-year students, and 138 (20.1 %) from fourth-year students.

**Sample 2.** During the 2022–23 academic year, 659 questionnaire responses were obtained, of which 212 (32.2 %) were from first-year students, 138 (20.9 %) from second-year students, 160 (24.3 %) from third-year students, and 149 (22.6 %) from fourth-year students.

### Tools

Data collection for this study was carried out by administering the Montorio and Izal questionnaire.<sup>35</sup> This questionnaire consists of 20 negatively phrased items about old age (Table 1), covering the areas of health, intellectual competence, motivational-social, motor function, personality-character, and work/retirement. Responses are given on a four-point Likert scale with options from strongly agree (1) to strongly disagree (4) with a score range spanning from 20 to 80 points, resulting in a reverse-scoring system where lower scores indicate a higher level of ageism.

### Data collection

For Sample 1, corresponding to the 2018–19 academic year, the questionnaires were distributed using a Google Forms link through the online teaching platform MOODLE to facilitate student access and participation, as well as the subsequent data collection and analysis.

**Table 1**  
Montorio & Izal questionnaire items (translated from Spanish version).<sup>35</sup>

#	Item
1	Most adults maintain an acceptable level of health until about 65 years of age, when health deteriorates sharply.
2	Most people over the age of 65 have a number of disabilities that make them dependent on others.
3	Most people, by the time they reach the age of 65 or so, begin to have a considerable deterioration of memory.
4	It is almost impossible for older people to learn new things.
5	As older people get older, they become more rigid and inflexible.
6	As people get older, they become less active.
7	In general, older people are less responsible than younger adults.
8	It is desirable for people to retire between the ages of 60 and 65.
9	Older people have fewer friends.
10	Older people are less interested in sex.
11	Because work is so important to people, retirement is likely to cause serious psychological distress.
12	As we grow older, we lose the ability to solve the problems we face.
13	Older people are often like children.
14	As we get older, we lose interest in things.
15	People's faults become more acute with age.
16	Older people are easily irritated and "cantankerous".
17	Old age is the time to rest after a lifetime of work.
18	Physical exercise is not recommended for older people.
19	Hardly anyone over the age of 65 does a job as well as a younger person.
20	A large proportion of people over the age of 65 are "old fogies".

Answer options: a) Strongly agree; b) Agree; c) Disagree; d) Strongly disagree.

For Sample 2, corresponding to the 2022–23 academic year, the questionnaires were distributed through the various data protection departments of the participating universities, using a generated QR code linked to a Microsoft Forms questionnaire. Students could access and submit their questionnaires from any electronic device. Participation was voluntary and anonymous, as the questionnaires did not include any variables that could identify the students participating in the study.

**Data analysis**

Firstly, descriptive analyses and normality tests of the sample data were conducted using IBM SPSS Statistics 27 (Armonk, NY: IBM Corp). Secondly, second-generation techniques were used to verify the factorial structure of the scale and its psychometric evaluation. Specifically, a variance-based structural equation modeling (PLS-SEM) approach, utilising the partial least squares (PLS) method, was adopted due to its capability to handle complex models with small to medium sample sizes and non-normally distributed data.<sup>41</sup> The data were analysed with the statistical software SmartPLS (v.4.1.0.0). In this research, PLS-SEM was chosen in the initial stages of data analysis, considering that the model formulation involves higher-order modelling, which simultaneously modelling lower-order and higher-order constructs.<sup>42</sup> Specifically, a repeated indicators approach was used for confirmatory factor analysis, and a PLS algorithm was executed to evaluate the model.

Therefore, this research aims to establish higher-order models, or hierarchical component models (HCM), and test second-order constructs that contain two levels of abstraction. One reason for the inclusion of HCM in PLS-SEM is the idea that "broader constructs are better predictors of criterion variables that span multiple domains and periods of time. That is, if the goal is to predict broadly defined behaviours, then higher-order multidimensional constructs may be useful".<sup>42</sup> Thus, it can be concluded that the construct of Ageism has been extensively studied and dimensions within its structure have been identified, making this approach beneficial in avoiding the "fallacy of confusion, which occurs when a single phenomenon is examined separately under the guise of two or more variables with different labels".<sup>42</sup>

Based on the preliminary results, a confirmatory factor analysis of the Group B sample was conducted using the SmartPLS software again, as well as SPSS. In the latter case, varimax rotation was selected to achieve greater interpretability of the data. The use of the principal components method provides stronger support for the factorial analysis conducted. In this way, the maximum variance was extracted using Varimax rotation, as it is the most common method of orthogonal rotation, which aims to minimise the number of variables with high loadings on a factor, thereby simplifying the interpretation of the factors.<sup>43</sup> Finally, IBM SPSS Statistics 27 (Armonk, NY: IBM Corp) was used again for the inferential statistical verification of the study hypotheses, employing the corresponding parametric tests.

**Ethical aspects**

This study adheres to and respects the ethical principles and standards for research involving human subjects as outlined in the Belmont Report<sup>44</sup> and the Declaration of Helsinki.<sup>45</sup> The Ethics Committee "CEIm Área de Salud Valladolid Este" approved this work, with the registration code: PI 22–2813. The survey was conducted anonymously, and no identifiable data were collected. The data were treated collectively and with absolute confidentiality, and will not be used for purposes other than this research.

**Results**

*Sample 1*

*Initial testing and outlier removal*

For Sample 1, the normality of the initial sample was assessed using the Kolmogorov-Smirnov test, along with skewness and kurtosis tests, and potential outliers were examined via a box plot. This process led to the removal of 8 outliers, resulting in a final sample size of 680 participants, reduced from the initial 688.

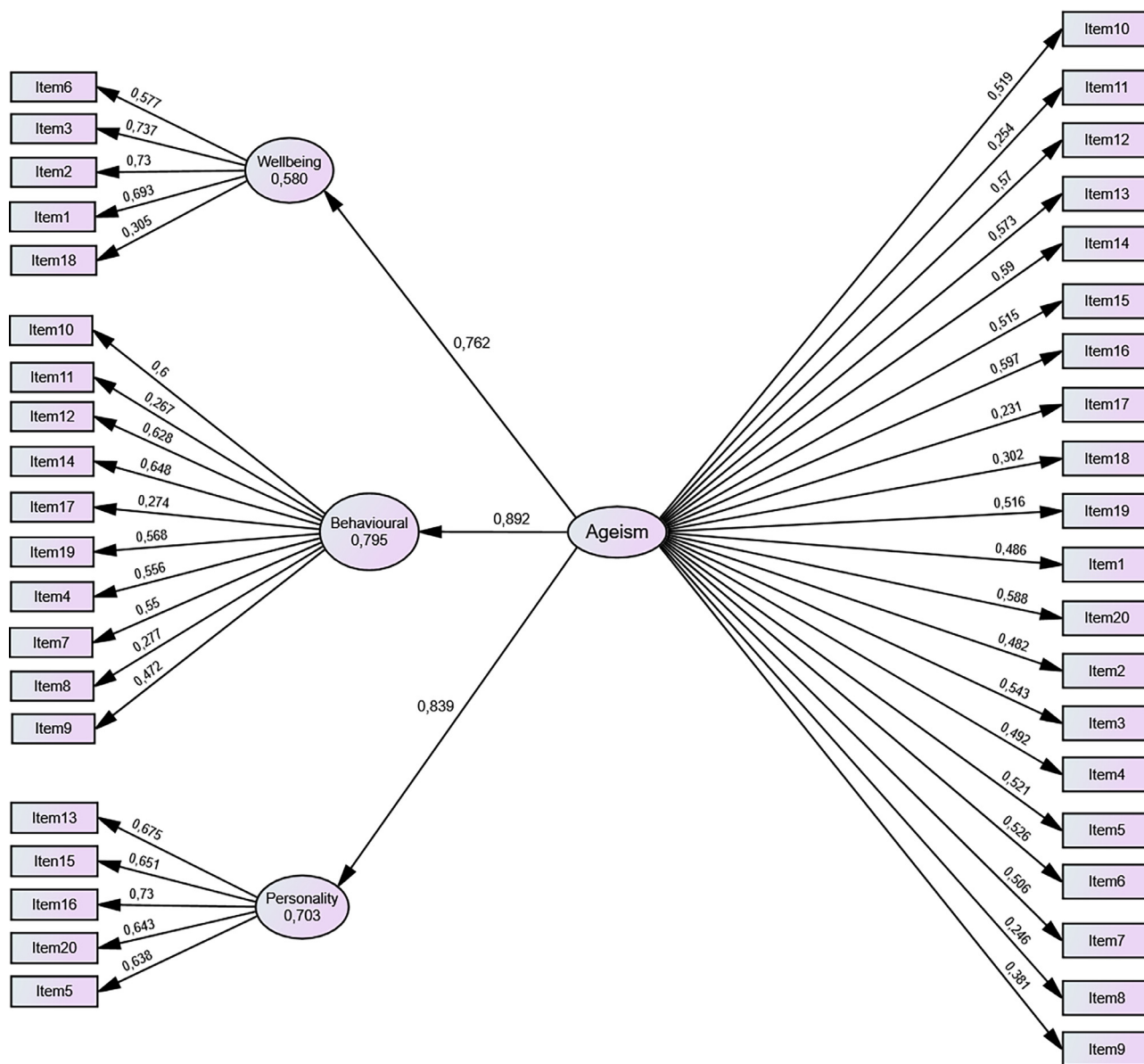
*Confirmatory factor analysis*

A confirmatory factor analysis was performed using a structural equation model with a repeated indicators approach.<sup>42</sup> The first hypothesis was evaluated in the initial sample. This method assigns all indicators of the lower-order constructs (LOCs) to the measurement model of the higher-order construct (HOC). In this study, both the second-order construct, Ageism, and the first-order constructs (Wellbeing, Behavioural, and Personality) were estimated reflectively. Fig. 1 presents the measurement model of the PLS nomogram.

*Reliability and validity testing*

The individual reliability of each item was assessed by examining the loadings or simple correlations of the measures or indicators with their respective construct. Indicator loadings should be greater than 0.707. Following Hair et al., indicators with loadings between 0.40 and 0.70 were only be removed if their elimination leads to an increase in composite reliability.<sup>42</sup> Indicators with loadings below 0.40, as well as those between 0.40 and 0.70 were removed, leading to reanalysis. As presented in Table 2, composite reliability and average variance extracted (AVE) for all constructs improved substantially after removing the lower-loadings indicators. The model was subsequently evaluated in its entirety, considering three dimensions with three indicators each.

Fig. 2 illustrates strong factor loadings between the constructs and their indicators, in line with the recommendations by Carmines and Zeller.<sup>46</sup> The determination coefficients for dimensions A, B, and C reflect the proportion of variance explained by the Ageism construct: 58.3 % for Wellbeing, 60.8 % for Behavioural, and 63.5 % for Personality.



**Fig. 1.** Reflective-reflective hierarchical component model of the ageism construct. Note: Measurement Model: Factor loadings ( $\lambda$ ) or simple correlations between each construct and their indicators are shown. Within constructs A, B, and C, the  $R^2$  values are displayed.

**Discriminant validity**

Discriminant validity was assessed using the Fornell-Larcker criterion and cross-loading factor loading factor values (Tables 3 and 4). According to Fornell and Larcker, the square root of a construct’s AVE should exceed its correlation with any other construct.<sup>47</sup> Additionally, indicators of a latent variable should show higher cross-loadings

**Table 2**

Composite reliability and average extracted variance before and after indicator purification.

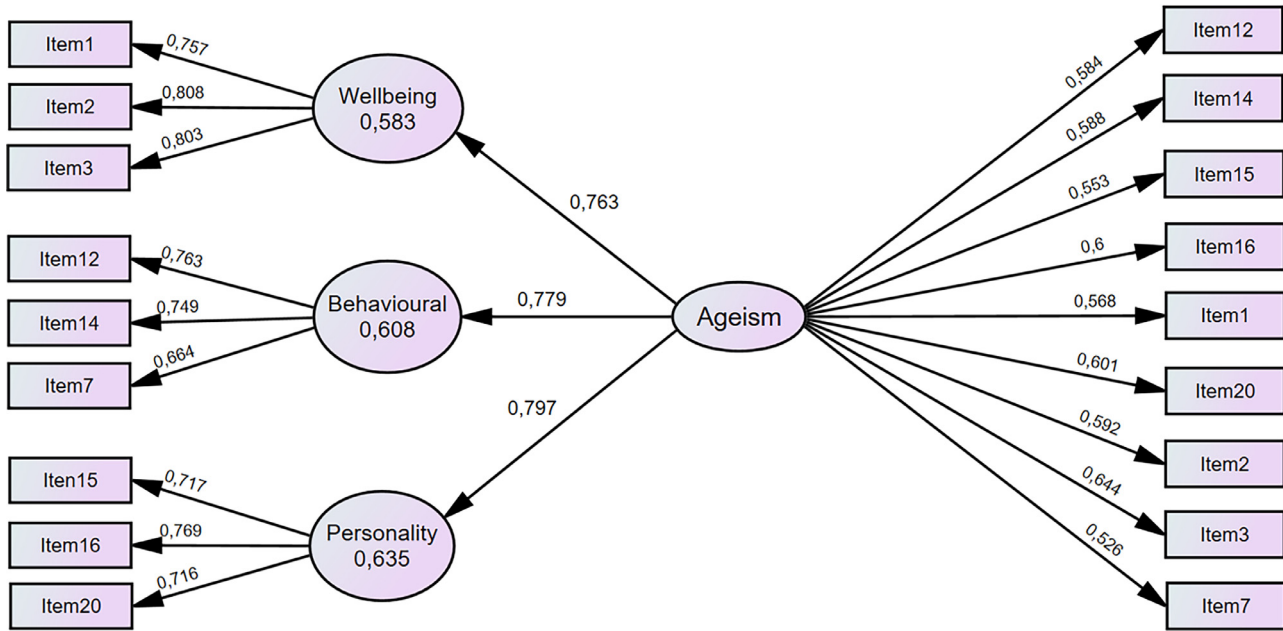
	CR-BP	AVE-BP	CR-AP	AVE-AP
Wellbeing	0.75	0.39	0.83	0.62
Behavioural	0.75	0.25	0.77	0.52
Personality	0.80	0.44	0.78	0.54
AGEISM	0.85	0.23	0.82	0.34

CR-BP: Composite reliability (rho\_c) Before Purification; AVE-BP: Average Extracted Variance (AVE) Before Purification; CR-AP: Composite reliability (rho\_c) After Purification; AVE-AP: Average Extracted Variance (AVE) After Purification.

with their own variable than with others in the model. The Wellbeing, Behavioural, and Personality dimensions, as observed, fulfil the discriminant validity criterion.

**Construct reliability**

Construct reliability was evaluated using Cronbach’s Alpha and composite reliability. Internal consistency reliability, assessed with Cronbach’s Alpha for Wellbeing, Behavioural, and Personality dimensions, was 0.70, 0.55, and 0.58, respectively, while the Ageism construct obtained a value of 0.76. Composite reliability values, presented in Table 2, exceed the criterion of 0.7, indicating that the construct reliability requirement is met.<sup>48</sup> It is worth noting that composite reliability is not influenced by the number of items in the latent variable, whereas Cronbach’s Alpha coefficient may be affected by indicator purification.<sup>49</sup> The construct Ageism demonstrates adequate internal consistency reliability when evaluated holistically.



**Fig. 2.** Reflective-reflective hierarchical component model of the ageism construct after purification of items with reduced factor loadings. Note: Measurement Model: Factor loadings ( $\lambda$ ) or simple correlations between each construct and its indicators are shown. Within the Health, MS, and CP constructs, the  $R^2$  values are displayed.

**Table 3**  
Fornell-Larcker criterion.

	Wellbeing	Behavioural	Personality	AGEISM
<b>Wellbeing</b>	<b>0.790</b>			
<b>Behavioural</b>	0.365	<b>0.727</b>		
<b>Personality</b>	0.386	0.488	<b>0.734</b>	
<b>AGEISM</b>	0.763	0.779	0.797	<b>0.585</b>

Note: In bold, the square root of the AVE of the construct.

**Table 4**  
Cross-loadings.

	A	B	C
Item 12	0.310	<b>0.763</b>	0.313
Item 14	0.242	<b>0.749</b>	0.407
Item 15	0.246	0.337	<b>0.717</b>
Item 16	0.252	0.393	<b>0.769</b>
Item 1	<b>0.757</b>	0.251	0.295
Item 20	0.350	0.343	<b>0.716</b>
Item 2	<b>0.808</b>	0.284	0.265
Item 3	<b>0.803</b>	0.325	0.350
Item 7	0.211	<b>0.669</b>	0.349

**Sample 2**

*Initial testing and outlier removal*

For Sample 2, normality was first assessed. Following the evaluation of the box-and-whisker plot, 14 outliers were removed, reducing the sample size from 659 to 645 participants.

*Confirmatory factor analysis*

Confirmatory factor analysis was performed using a structural equation modelling approach with the repeated indicators method, consistent to Sample 1. This CFA was applied on the brief Ageism scale, which had been psychometrically validated in the previous study. Fig. 3 presents the measurement model of the PLS nomogram.

*Reliability and validity testing*

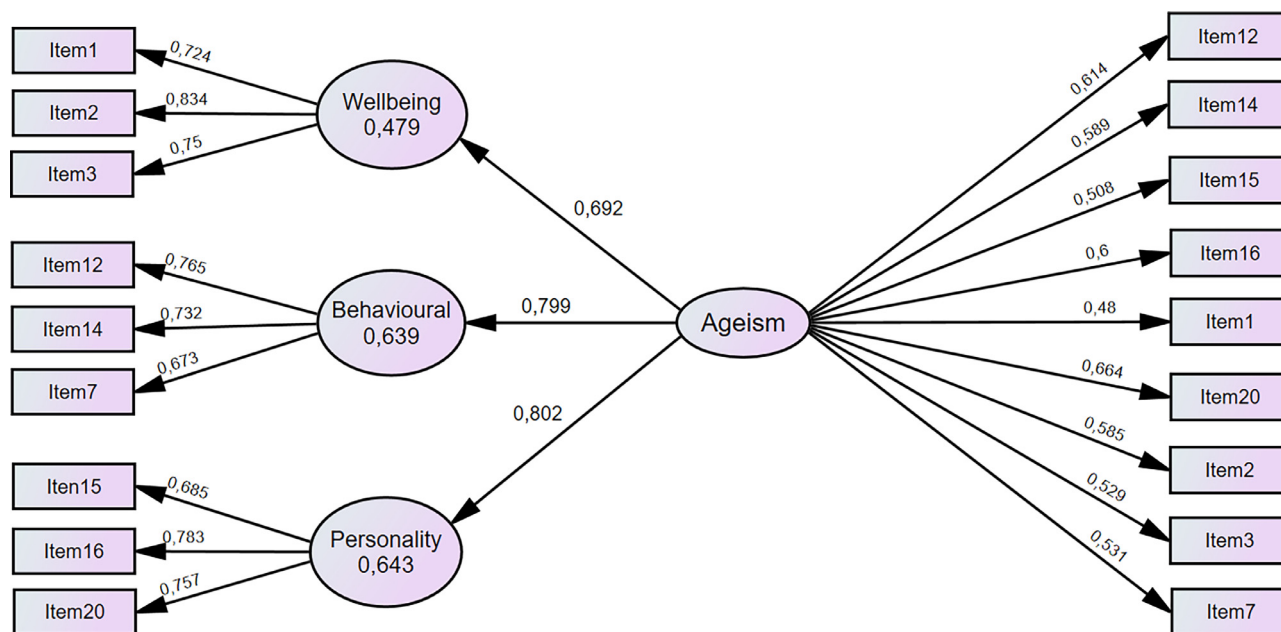
The individual reliability of each item was examined by assessing the loadings or simple correlations of the measures or indicators with their respective constructs. Indicator loadings were expected to exceed 0.707. In this model, loadings between 0.40 and 0.70 were identified, leading to their removal and a subsequent analysis. As presented in Table 5, composite reliability did not increase across all dimensions after removing indicators with lower loadings; therefore, these items were retained to maintain internal consistency reliability.

For the average variance extracted (AVE), values greater than 0.50 were observed for all first-order constructs: Wellbeing (0.59), Behavioural (0.53), and Personality (0.55). However, the Ageism construct exhibited a value of 0.32, similar to the first sample, failing to exceed the 0.50 threshold. The coefficients of determination for the dimensions Wellbeing, Behavioural, and Personality were 47.9 %, 63.9 %, and 64.3 %, respectively.

Discriminant validity was assessed using the Fornell-Larcker criterion and cross-loadings (Tables 6 and 7). According to the Fornell-Larcker criterion, the square root of a construct's AVE should exceed its correlation with any other construct (Table 6). Cross-loadings compare the loadings of indicators of a latent variable with those of other latent variables, ensuring that indicators load more highly on their respective constructs than on others (Table 7).

The dimensions of Wellbeing, Behavioural, and Personality satisfy the criterion for discriminant validity as per the Fornell-Larcker criterion and cross-loadings analysis. Finally, the AFC procedure was conducted using principal components with Varimax rotation, resulting in the extraction of the same number of factors as with the structural equation model, thereby demonstrating that the items converged in a similar manner (Table 8).

The reliability of the construct was assessed through Cronbach's Alpha and composite reliability. Internal consistency reliability, evaluated with Cronbach's Alpha for Wellbeing, Behavioural, and Personality dimensions, was 0.66, 0.55, and 0.60, respectively, while the Ageism construct obtained a value of 0.74. Composite reliability values, as presented in Table 5, exceed the criterion of 0.7, indicating adequate reliability.



**Fig. 3.** Reflective-reflective hierarchical component model of the ageism construct-brief scale. Note: Measurement Model: Factor loadings ( $\lambda$ ) or simple correlations between each construct and their indicators are shown. Within constructs A, B, and C, the  $R^2$  values are displayed.

**Table 5**  
Composite reliability extracted variance before and after indicator purification.

	CR-BP	CR-AP
Wellbeing	0.81	0.805
Behavioural	0.77	0.80
Personality	0.79	0.80
AGEISM	0.81	0.80

CR-BP: Composite reliability ( $\rho_c$ ) Before Purification; CR-AP: Composite reliability ( $\rho_c$ ) After Purification.

**Table 6**  
Fornell-Larcker criterion.

	Wellbeing	Behavioural	Personality	AGEISM
<b>Wellbeing</b>	<b>0.771</b>			
<b>Behavioural</b>	0.320	<b>0.724</b>		
<b>Personality</b>	0.305	0.505	<b>0.743</b>	
<b>AGEISM</b>	0.692	0.799	0.802	<b>0.569</b>

Note: In bold, the square root of the AVE of the construct.

**Table 7**  
Cross-loadings.

	Personality	Behavioural	Wellbeing
Item 12	0.348	<b>0.765</b>	0.293
Item 14	0.395	<b>0.732</b>	0.215
Item 15	<b>0.685</b>	0.353	0.100
Item 16	<b>0.783</b>	0.382	0.186
Item 1	0.188	0.219	<b>0.724</b>
Item 20	<b>0.757</b>	0.389	0.362
Item 2	0.263	0.276	<b>0.834</b>
Item 3	0.250	0.241	<b>0.750</b>
Item 7	0.357	<b>0.673</b>	0.180

**Discussion**

Our results confirm that the Brief Scale on Ageism in University Students (BSAUS) is a valid and reliable tool for measuring ageism among university students. Reducing the items from the

**Table 8**  
Rotated component matrix.

	1	2	3
Item 1	<b>0.748</b>	0.106	0.025
Item 2	<b>0.804</b>	0.033	0.152
Item 3	<b>0.726</b>	0.107	0.154
Item 7	0.067	0.119	<b>0.750</b>
Item 12	0.198	0.115	<b>0.737</b>
Item 14	0.088	0.452	<b>0.497</b>
Item 15	0.051	<b>0.819</b>	0.062
Item 16	0.111	<b>0.754</b>	0.189
Item 20	0.377	<b>0.407</b>	0.308

original Montorio and Izal tool allowed for an appropriate balance between AVE and composite reliability. The removal of items with factor loadings below 0.7 ensures that each item significantly contributes to the construct without negatively impacting convergent validity.<sup>50</sup> This optimisation enabled the definition of three dimensions with a homogeneous number of items, each with high internal consistency: Wellbeing (composite reliability = 0.805), Behavioural (composite reliability = 0.80), and Personality (composite reliability = 0.80). Furthermore, the AVE analysis following item purification yielded values above 0.5 for each dimension, supporting the convergent validity of the items within their respective dimensions.<sup>51,52</sup>

The Ageism construct demonstrates adequate internal consistency reliability when evaluated holistically. For Sample 1, results indicate that ageism can be considered a multidimensional latent variable, supporting the construct's reliability (composite reliability = 0.82) via the proposed questionnaire. For Sample 2, results validate the BSAUS through confirmatory factor analysis, confirming its psychometric robustness (composite reliability = 0.80). These values underscore the robustness of the scale, being equal to or above 0.80,<sup>53</sup> but without exceeding the 0.95 threshold, which would suggest item redundancy.<sup>54</sup> Finally, discriminant validity was confirmed by satisfying the Fornell-Larcker criterion, indicating that each dimension shares more variance with its own items than with any other dimension.<sup>47</sup>

### Renaming the dimensions

The CENVE scale has been used descriptively due to a lack of psychometric validation,<sup>36</sup> while its unconfirmed three-dimensional structure, limit its utility.<sup>55–57</sup> Our results confirm the three-dimensionality of the tool; however, the grouping of items has led us to propose new nomenclature for each dimension: Wellbeing, Behavioural, and Personality.

We have named the first dimension 'Wellbeing' as, according to NANDA-I, well-being encompasses the awareness of normal functioning and the strategies employed to maintain or enhance that state of well-being. We consider this term the most appropriate, given that this dimension includes three items related to the deterioration of individuals—two focused on functional decline and one on memory deterioration. Furthermore, NANDA-I recognises various nursing diagnoses that directly relate to well-being, such as 'Readiness for enhanced healthy ageing,' which reflects an individual's preparedness to engage in health-promoting behaviours.<sup>58</sup> Therefore, we consider this term the most suitable in nursing taxonomy to refer to this dimension.

For the second dimension, we selected the term 'Behavioural', as its three items are related to the perceived lack of vital interests and responsibilities on the older people. The perception of older individuals as burdensome or less capable,<sup>59</sup> often reflect assumptions about their vitality and engagement with life.<sup>60</sup> Assessing of the perception of the older people as unproductive or dependent is essential, as it can affect the healthcare professionals' willingness to engage with this population<sup>61</sup> and to provide them quality care.<sup>62</sup>

Finally, for the third dimension, we have chosen the term 'Personality', as personality traits tend to stabilise with age, often resulting in increased rigidity in negative traits,<sup>63</sup> which may function as a compensatory mechanism.<sup>64</sup> With age, individuals may become less open to new experiences, which can lead to perceptions of being out of touch or resistant to change,<sup>65</sup> thereby increasing neuroticism and reducing agreeableness, ultimately manifesting as irritability.<sup>66,67</sup> Assessing this dimension is important as it can create a vicious cycle, where ageist views foster social isolation and irritability among older adults, perpetuating negative stereotypes.<sup>68</sup> Moreover, this dimension could also reflect the evaluators themselves, as negative personality traits, such as low agreeableness, are correlated with higher levels of ageism, suggesting that individuals exhibiting these traits may be more inclined to harbour negative stereotypes about older adults.<sup>69</sup>

### Considerations on scoring

The original tool by Montorio & Izal utilised an inverse scoring system, where more ageist attitudes resulted in lower scores.<sup>35</sup> However, the CENVE questionnaire, derived from the original, reversed this approach to use a direct scoring system, meaning that more ageist attitudes correspond to higher scores.<sup>36</sup> In our case, we have chosen to retain the inverse scoring of the original questionnaire, recognising that inverse measurement approaches assess ageism by focusing on the absence of ageist attitudes or behaviours. This method can be particularly useful in contexts where individuals may be reluctant to admit to ageist beliefs due to social stigma. Negative associations can thus be more effectively captured through inverse measures,<sup>70</sup> revealing underlying attitudes that may not be immediately apparent through direct scores. In environments where individuals may feel pressured to conform to socially acceptable attitudes—such as in a gerontology nursing subject—inverse measures might yield more accurate reflections of underlying beliefs.<sup>71</sup>

### Strengths and limitations

A key strength of this study is its broad geographical and demographic scope, covering diverse universities and student profiles, strengthens the generalisability of its findings. The scale's application allows assessment of whether training impacts students' perceptions of older adults, particularly in Health Sciences, with potential implications for enhancing the quality of care for the older people. Understanding the dimensions of ageism offers insights into areas for targeted educational interventions and curriculum improvements.

However, limitations include variability in participants' exposure to gerontological education, influenced by discipline and study level, and the potential impact of personal experiences, such as living with older relatives or volunteering with older adults, which can improve perspectives on ageing.<sup>28,72</sup> The absence of a gold-standard comparison and lack of data from an Implicit Association Test (IAT) limit the findings' generalisability and control for acquiescence and social desirability biases associated with ageism.<sup>73</sup>

### Implications for practice

This study underscores the importance of assessing university students' perceptions of ageing. The Brief Scale on Ageism in University Students can serve as a tool to examine ageism within this population and support targeted interventions aimed at preventing ageist behaviours. Such initiatives may enhance the wellbeing and quality of life of older adults by fostering a non-prejudiced view of ageing, promoting quality care, and increasing satisfaction for both professionals and those they serve.

### Conclusion

Despite its limitations, our results confirm that the Brief Scale on Ageism in University Students (BSAUS) is a valid and reliable tool for measuring ageist attitudes within the university population. The results obtained through psychometric analyses, both in terms of factorial structure and internal consistency, support the relevance of this scale for assessing students' perceptions of older adults across three specific dimensions: Wellbeing, Behavioural, and Personality.

The redefinition of these dimensions enables a precise evaluation of different aspects of age-related stereotypes, facilitating the identification of specific needs to design targeted educational interventions and, subsequently, measure their impact. We thus anticipate that the implementation of the BSAUS will make a significant contribution to educational efforts aimed at reducing ageism and promoting respect and understanding towards older adults, in line with the recommendations of the World Health Organisation.

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### Declaration of competing interest

All authors declare that they have no conflicts of interest.

### CRediT authorship contribution statement

**Esther Bahillo-Ruiz:** Writing – original draft, Methodology, Investigation, Conceptualization. **Fernando Urcola-Pardo:** Writing – review & editing, Visualization, Investigation. **Marta Llorente-Alonso:** Writing – original draft, Investigation, Formal analysis. **Carlos Navas-Ferrer:** Writing – review & editing, Investigation. **Fátima María Laborda-Higes:** Writing – review & editing, Investigation.

**Isabel Blázquez-Ornat:** Writing – review & editing, Investigation.  
**Lourdes Jiménez-Navascués:** Investigation, Writing – review & editing, Supervision.

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