International Journal of Sustainable Development Goals

www.ijsdg.org
eISSN: 3080-5023

Modified Cultural Awareness Scale: Measuring the Psychometric Properties for Use in Undergraduate Nursing Education in Ireland

Nipuna Thamanam[1,2*], Daniela Lehwaldt[1], Mary Rose Sweeney[3]

[1] School of Nursing, Psychotherapy and Community Health, Dublin City University, Ireland
[2] School of Nursing, Midwifery and Health Systems, University College Dublin, Dublin, Ireland
[3] Faculty of Nursing and Midwifery, Royal College of Surgeons in Ireland, Dublin, Ireland.

ARTICLE INFO

Article history:
Received 10 June 2025
Received in revised form 18 October 2025
Accepted 20 December 2025
Available online 30 December 2025

Keywords:

Cultural Competence; Cultural Awareness Scale; Nursing Education; Psychometric Validation; Health Equity; Inclusive Learning; Sustainable development goals

ABSTRACT

Cultural awareness underpins equitable, patient-centered care and is vital for nursing students' professional development. Existing scales require validation across diverse contexts. This study evaluates the psychometric properties of a Modified Cultural Awareness Scale (mCAS) for undergraduate nursing students in Ireland. A cross-sectional survey was conducted with 414 nursing students using an online 32-item mCAS on a 7-point Likert scale. Exploratory factor analyses assessed scale validity, while Cronbach's alpha tested reliability. Factor analysis confirmed a four-factor structure. The mCAS demonstrated internal consistency and good model fit indices, supporting its validity and reliability. The mCAS can be used as a general tool for assessing cultural awareness in Irish nursing education. Its adoption can support SDG 3 (Good Health and Well-Being), SDG 4 (Quality Education), and SDG 10 (Reduced Inequalities) by fostering culturally competent practitioners who deliver inclusive care. Future research should explore its use in interprofessional settings and longitudinal outcomes.

1. Introduction

High-quality nursing education must prepare practitioners to deliver culturally competent care, a cornerstone of equitable health systems and Sustainable Development Goal 3 (Good Health and Well-Being). Cultural awareness, an essential component of cultural competence, enables nurses to recognise and respect diverse patient backgrounds, thereby reducing health disparities (SDG 10: Reduced Inequalities). While several instruments measure cultural awareness, their validity across different regions remain underexplored [24].

This study validates a Modified Cultural Awareness Scale (mCAS) among undergraduate nursing students in Ireland, contributing to SDG 4 (Quality Education) by ensuring robust assessment tools for developing inclusive healthcare professionals. This study aimed to measure the psychometric properties of the modified cultural awareness scale (mCAS) for use in undergraduate nursing education in Ireland. A growing body of literature recognised that culturally competent care is

* *Corresponding author.*
E-mail address: nipuna.thamanam@ucd.ie

https://doi.org/10.59543/ijsdg.v1i.14637

important when encountering diversity in a healthcare setting [2, 15, 16, 18, 19]. Diversity in healthcare is mainly due to the enormous magnitude of the global migration of people and the global nurse migration because of nurse shortages in certain countries. This presents difficulties for nurses caring for patients whose views and practices may diverge from their own [3]. Internationally, nurses and nursing students faced challenges meeting the multicultural needs of diverse populations [4, 13]. Therefore, in countries such as the USA, UK, Australia, and many others countries, cultural awareness, and cultural competence are deemed important skills not only in nursing education but also in higher education within the health and social care fields [9].

Cultural competence was defined as an ongoing process in which the health care provider continuously strives to achieve the ability to work effectively within the cultural context of the client, individual, family, community; [2]. Cultural competence is considered an essential skill in nursing education [5], [21]. However, the first step toward acquiring cultural competence was cultural awareness, followed by cultural knowledge, cultural skill, cultural encounters and cultural desire (to be effective) [1, 2, 8, 19]. Ireland's Central Statistics Office (CSO) released its most recent Population and Migration Estimates in April 2022. Of the 5.12 million people living in Ireland, 703,700 were non-Irish nationalities, making up 13.8% of the country's total population. According to Markey et al. [12], the increase in the cultural and ethnic diversity of the Irish population brought with it both benefits and challenges. In particular, the healthcare sector faced challenges, both for the workers and for the people seeking to avail themselves of healthcare services, according to both Markey et al. [12] and a March 2002 paper authored by the National Consultative Committee on Racism and Interculturalism (NCCRI) and the Irish Health Services Management Institute (IHSMI). The paper was posted on Lenus, The Irish Health Repository (2023), titled Cultural Diversity in the Irish Health Care Sector: Towards the Development of Policy and Practice Guidelines for Organisations in the Health Sector (Lenus, The Irish Health Repository, 2002). Although it seemed prudent to investigate nursing students ' level of cultural awareness in different countries.

No study has been undertaken in Ireland to measure undergraduate nursing students' cultural awareness, which is identified as a gap. Therefore, to measure the cultural awareness of nursing students, it is important to ensure the tool used is valid and reliable. Hence, this study aimed to measure the psychometric properties of a modified cultural awareness scale (mCAS) for use in undergraduate nursing education.

1.1 Literature Review

The researcher looked for literature that used the original cultural awareness scale (CAS) [23], [24]. To our knowledge, nine research studies used the scale, either in the original English language, modified it, or translated it. In date order, the following list indicates the broad and recent use of the CAS: Krainovich-Miller et al. [8] USA, Rew et al [23] USA, Heeseung et al [6] Korea, Oh et al. [17] Korea, Hadziabdic et al. [5] Sweden, İz and Temel [7] Turkey, McElroy et al. [14] USA, Safipour et al. [25] Sweden, Kumlien et al. [9] Sweden and Hong Kong, Ličen et al. [11]) Slovenia. Rew et al. [23] developed the original CAS after recognising the need for a valid and reliable way to measure outcomes. The objective was to promote multicultural awareness among nursing faculty and students in one of the nursing schools in the USA. Two phases of the study were conducted with 72 students in the first phase and 118 students in the second phase. The final scale (CAS questionnaire) consisted of 36 items intended to demonstrate the validity and reliability of the scale. A factor analysis revealed a factor 54 loading of five factors using principal components analysis with Varimax rotation (n=159). However, the limitation of the study was that it used a small sample size for factor

analysis, and students belonged to a single university. Therefore, the findings were not generalisable to all nursing students. It was suggested that an instrument be tested with a larger, more diverse population. Krainovich-Miller et al. [8] conducted a pilot study and replicated the second phase of the Rew et al. [23] study. A cross-sectional design was used, and the CAS questionnaire was distributed to 236 nursing students in three nursing programmes at the baccalaureate, master's, and doctoral levels, during their initial and final courses. Cronbach's alpha for the total instrument was 0.869. This indicated the CAS questionnaire had internal consistency. Internal consistency meant that the items proposed to measure the same construct produced similar scores. However, Krainovich-Miller et al. [8] recommended further research in the form of psychometric testing of the CAS. Therefore, Rew et al. [24] conducted a reanalysis of the CAS to determine the construct validity and differences in cultural awareness among students of varying educational levels and experiences. Confirmatory analysis yielded three factors, and Cronbach's alpha ranged from 0.70 to 0.89. The findings of the study support the validity of the CAS and its applicability to research studies of cultural awareness in nursing.

Unlike the above studies that used the English version of the CAS, Hadziabdic et al. [5], used the Swedish version of the CAS for measuring cultural awareness with 158 Swedish nursing students and tested it for validity and reliability. The results indicated that one item (#13) caused weak reliability and validity and therefore it was removed. The results demonstrated the validity and reliability tests of the Swedish version of the CAS for the 35 items were valid and reliable for use with Swedish nursing students. Safipour et al. [25] measured cultural awareness among three universities in Southern Sweden. A cross-sectional quantitative study with 215 students participated in this study. The results indicated moderately high cultural awareness among nursing students related to their general education, cognitive awareness, comfort with interaction, clinical practice and patient care. No statistically significant correlation was identified between the socio-demographic factors (sex, age, experience of living abroad). However, being a first-generation immigrant was significantly associated with increased cultural awareness in terms of patient care and clinical issues. Ličen et al. [11] used a non-experimental cross-sectional design on a purposive sample of 149 undergraduate nursing students in Slovenia. The results demonstrated that the 55 nursing students had a moderately high level of cultural awareness for all CAS subscales (M=194.0). However, no statistically significant differences were seen between the student's demographic (gender or age) and other data (year of study or religion) as related to the overall CAS score. The results obtained from the study seemed to be satisfactory, but the author stated that the transcultural nursing contents and various strategies for teaching cultural competencies should be carefully evaluated.

The study's limitations included the fact that it only looked at one of Slovenia's eight nursing faculties. As a result, generalising the findings to all nursing students in the country or elsewhere was impossible. There was no comparison provided for students' cultural awareness prior to the study. The authors, at the time of publication, had planned to repeat the study within the next five years with both undergraduate and postgraduate nursing programs with a focus on transcultural nursing. They suggested that the Slovenian version of the CAS be psychometrically validated. Başalan İz and Bayık Temel [7] undertook a methodological study to analyse the psychometric properties of the Turkish language version of the cultural awareness scale to determine possible similarities between the compositions of the Turkish version and the original scale. A total of 197 undergraduate nursing students took part in the study. The Turkish version of the scale included 36 items similar to the original scale but under four different subscales, unlike the original scale which had five different factors. The scale was found to be highly valid and reliable and could be used in various healthcare disciplines. Heeseung *et al*. [6] tested the reliability and validity of a Korean version of the Cultural

Awareness Scale (K-CAS) on a total of 515 nursing students. The 26-item K-CAS exhibited good reliability. The confirmatory factor analysis also demonstrated the same factor structure as the original CAS.

Similar testing of the original CAS was undertaken by Oh *et al*. [17], the translated Korean version of CAS-K, to evaluate the cross-cultural applicability and psychometric properties of the CAS-K, specifically its reliability and validity. A convenience sample of 495 nursing students from four levels of nursing education within four universities in the city of Daejeon, South Korea, demonstrated satisfactory validity and reliability. Kumlien *et al*. [9], with a modified version of the CAS, conducted psychometrically testing using cross-sectional data on a total of 191 undergraduate students from different health and social care undergraduate programs in Sweden and Hong Kong. The results demonstrated the modified CAS provided a four-factor measure of cultural awareness. It possessed satisfactory internal consistency. Results also supported the use of the modified CAS as a generic tool to measure cultural awareness among students in higher education within the health and social care fields. McElroy *et al*. [14] used a modified CAS in a cross-sectional descriptive study to assess cultural awareness of registered (RNs), nursing assistants (NAs) and clinical support technicians (CSTs) working at a magnet-designated, academic medical centre in the southeastern United States. The results demonstrated that the modified scale had good reliability and validity among the student population. Most nursing staff exhibited a moderate to high level of cultural awareness and held positive opinions about nursing leadership and the work environment about cultural issues.

Both qualitative studies and quantitative studies [11, 14, 25] demonstrated that nursing students had moderately high levels of cultural awareness. Studies that utilized the original CAS developed by Rew *et al*. [23], including Krainovich-Miller *et al*. [8] and Rew *et al*. [24] and the modified CAS [9, 14]; or translated version of the CAS [5, 6, 7, 11, 17, 25], were psychometrically tested and the results demonstrated satisfactory reliability and validity. The authors recommended further use with nursing populations and other healthcare workers. To the best of this researcher's knowledge, no research of this kind was undertaken in Ireland, which was identified as a gap in the literature.

2. Methodology

The study aimed to measure the psychometric properties of a modified version of the CAS (mCAS) for use in undergraduate nursing students in Ireland. It was performed in two stages. Stage 1 involved modifying the questionnaire, and stage 2 involved psychometrically testing it using cross-sectional data.

2.1 Original Cultural Awareness Scale

The culture awareness scale was designed initially for nursing students in the English language. The scale consisted of 36 items, which were graded on a seven-point scale (from "strongly disagree" to "strongly agree"). Furthermore, "does not apply" constitutes an extra potential response. Higher scores indicate a greater level of cultural awareness, whereas lower scores indicate a lesser level of cultural awareness. The bare minimum of cultural competency is regarded as cultural awareness. Consequently, nursing students' success on the initial phase of cultural competence development is assessed by the CAS [23]. In the United States, undergraduate and graduate nursing students participated in the initial testing of the scale. The obtained content validity index was 0.88, with an internal consistency range of 0.94 – 0.71. Five subscales emerged from an exploratory factor analysis: “general educational experience,” “cognitive awareness,” “research issues,” “behaviours/comfort with interactions,” and “patient care/clinical care” [23]. These five factors explained 51 percent of the variation in scale scores. However, after reanalysing the CAS, Rew et al.

(2014) found evidence for a viable three-factor solution ("general attitudes," "research attitudes," and "clinical experience"), and the reanalysis validated the reliability of the Cultural Awareness Scale (CAS).

Permission was sought from the author to use the Cultural Awareness Scale (CAS) and to modify it accordingly. The development process was conducted in two stages. A modified version of the CAS (mCAS) was developed in stage 1, and psychometric testing of the modified scale was conducted in stage 2 using cross-sectional data from 414 undergraduate nursing students in a national survey.

2.1.1 Stage One

In the first stage, the CAS [24] questionnaire was carefully reviewed for its relevance to undergraduate nursing students. The subscale (research issues), which consisted of four questions, was not relevant to nursing students at the undergraduate nursing level; therefore, the four questions were deleted. The remaining 32 questions were carefully reviewed again for their wording. The term 'instructors' was changed to the term 'lecturers' throughout the questionnaire, as the former was a more common term in Ireland. The 32 questions of the modified CAS were used to collect data from the students.

2.1.2 Stage Two

In stage two, empirical testing of the mCAS was done using a cross-sectional national survey conducted at eight HEIs in Ireland.

2.2 Study Sample

A total of 414 undergraduate nursing students from eight higher educational institutions studying in Ireland from September 2022 to January 2023 participated in the national study.

2.3 Data Collection

Ethical permission was granted by the Dublin City University Ethics Committee. Permission was sought from the heads of the eight HEIs. The head of the school appointed a gatekeeper who distributed the online and manual (paper and pen) surveys to nursing students. All participants were informed about the study and their participation was voluntary. Participants' information leaflets and the consent form were sent to students. Students who were willing to participate in the online survey and manual survey were asked to participate after the consent forms were filled. Consent to participate in the study was mandatory for both means.

3. Results

3.1 Construct Validity

An exploratory factor analysis was conducted to test the construct validity (n=414) using principal components analysis with Varimax Rotation. Before conducting principal component factor analysis, the suitability of the data for factor analysis was assessed. The Kaiser-Meyer-Olkin [KMO] measured sampling adequacy and the appropriateness of continuing the factor analysis (KMO > 0.60) (Pett et al., 2003). The KMO value in the current study was 0.799, exceeding the recommended value of 0.6. Bartlett's (1954) test of sphericity was performed (see Table 1) to analyse the overall

significance of correlations within a matrix (p-value <0.001) (Pett et al., 2003). Nine components showed an eigenvalue >1.0, explaining 59% of the total variance.

Table 1

KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy	0.799
Bartlett's Test of Sphericity Approximate Chi-Square	2926.378
df	0.496
Sig.	0.000

3.2 Narrowing to 27 Questions, Scree Plot.

A scree plot determined the optimal number of factors to retain. When an analysis of the Scree Plot was performed, Figure 1, a clear cut was seen at four factors, and four was determined to be the optimal number of factors to retain. All of the questions were loaded into the four factors.

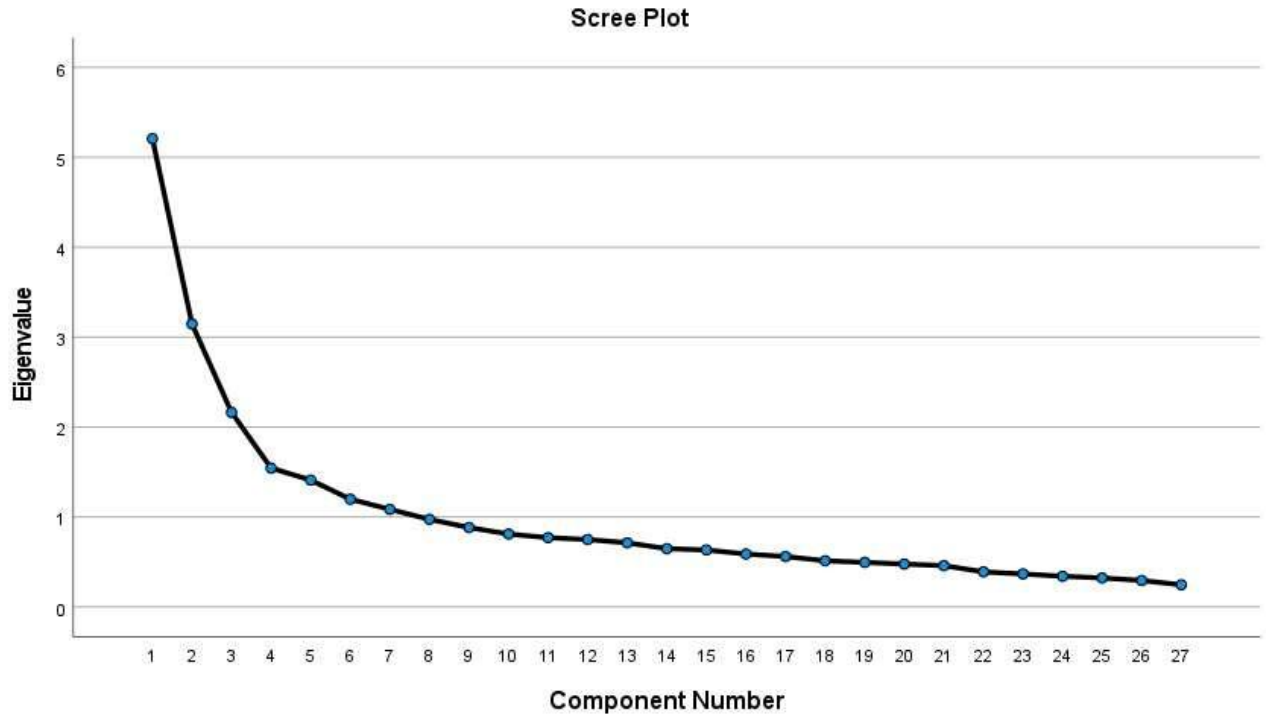

Fig. 1. Scree Plot

A principal component factor analysis with Varimax rotation was performed to analyse the four-factor model. Factor loadings >0.30 were considered acceptable (Pett et al., 2003), although factor loadings >0.50 were recommended. The four-factor model revealed five items with less than 0.3 factor loading, and therefore they were deleted (questions 9.6, 9.7, 10.3, 10.5, 11.5). This left 27 items on the mCAS.

3.3 The Final Four.

The final four-factor model was constructed, comprising the following factors: Factor 1, general education and experience at my school; Factor 2, general awareness and attitude; Factor 3, nursing classes and clinical instruction; and Factor 4, clinical practice and behaviours (Table 2). Table 1 illustrates the Kaiser-Meyer-Olkin (KMO) Measure of Sampling and Bartlett's Test of Sphericity. Table 2 illustrates the factor loadings of the modified cultural awareness scale (n = 414). Standard abbreviations shown include "df" for degrees of freedom and "Sig." for significance.

3.4 Component Factor Analysis.

A component factor analysis (Table 2) was re-run with Varimax rotation. It was recommended that each item or question on the mCAS load on only one factor. However, eight items (10.4, 10.2, 10.6, 10.15, 10.9, 10.7, 11.3, 10.10) loaded on more than one factor, and these items/questions were then placed in the most relevant factor groups. The four factors explained 44.67% of the total variance, with component one contributing to 19.2%, component two contributing to 11.6%, component three contributing to 8.0% and component four contributing to 5.7% of the variance, respectively. Table 2 illustrated the factor loading of a modified cultural awareness scale (mCAS).

Table 2

Factor loading of the modified cultural awareness Scale (N = 414)

Rotated Component Matrix[a]				
	Component			
	1.General education/ experiences at my school	3.Nursing classes/ training	4.Clinical practice and behaviours	2.General awareness and attitude
Q8.2 General Experiences at my School of Nursing | This nursing school provides opportunities for activities related to multicultural issues.	.738			
Q8.3 General Experiences at my School of Nursing | Since entering this school of nursing, my understanding of multicultural issues has increased.	.730			
Q8.1 General Experiences at my School of Nursing | The lecturers at my nursing school adequately address multicultural issues in nursing.	.709			
Q8.4 General Experiences at my School of Nursing | My experiences at my nursing school have helped me become knowledgeable about the health problems associated with various racial and cultural groups.	.660			
Q10.4 Nursing Lecturers / Clinical | In my nursing classes, my lecturers have engaged in behaviours	.486			-.407

that may have made students from certain cultural backgrounds feel excluded.			
Q10.2 Nursing Lecturers / Clinical | During group discussions or exercises, I have noticed the lecturers make efforts to ensure that no student is excluded.	.374	.365	
Q10.13 Nursing Lecturers / Clinical | I feel that my nursing school's lecturers respect differences in individuals from diverse cultural backgrounds.		.627	
Q10.6 Nursing Lecturers / Clinical | My educators at my nursing school seem comfortable discussing cultural issues in the classroom.	.481	.592	
Q10.12 Nursing Lecturers / Clinical | My clinical placements at this nursing school have helped me become more comfortable interacting with people from different cultures.		.544	
Q10.15 Nursing Lecturers / Clinical | The nursing lecturers at my nursing school use examples and/or case studies that incorporate information from various cultural and ethnic groups.	.345	.534	
Q10.14 Nursing Lecturers / Clinical | The nursing lecturers at my nursing school model behaviours that are sensitive to multicultural issues.		.510	
Q10.11 Nursing Lecturers / Clinical | I feel comfortable discussing cultural issues in the classroom		.505	
Q10.9 Nursing Lecturers / Clinical | I believe the classroom experiences at my nursing school help our students become more comfortable interacting with people from different cultures.	.489	.501	
Q10.7 Nursing Lecturers / Clinical | My nursing educators seem interested in learning how their classroom behaviours may discourage students from certain cultural or ethnic groups.	.302	.476	
Q11.1 Clinical Practice | I respect the decisions of my patients when they are influenced by their culture, even if I disagree.			.685
Q11.2 Clinical Practice | If I need more information about a patient's culture, I would use resources available on site (for example, books, videos, internet, etc.).			.616
Q9.5 General Awareness and Attitudes | I am less patient with individuals of certain cultural backgrounds.			.603
Q9.4 General Awareness and Attitudes | When I have an opportunity to help someone, I offer			.573

assistance less frequently to individuals of certain cultural backgrounds.				
Q9.8 General Awareness and Attitudes | I typically feel somewhat uncomfortable when I am in the company of people from cultural or ethnic backgrounds different from my own.			.551	
Q11.4 Clinical Practice | If I need more information about a patient's culture, I would feel comfortable asking the patient or a family member.			.533	
Q11.3 Clinical Practice | If I need more information about a patient's culture, I would feel comfortable asking people I work with.		.444	.480	
Q9.2 General Awareness and Attitudes | I think my behaviours are influenced by my culture.				.759
Q9.1 General Awareness and Attitudes | I think my beliefs and attitudes are influenced by my culture.				.705
Q9.3 General Awareness and Attitudes | I often reflect on how culture affects beliefs, attitudes, and behaviours.				.577
Q10.8 Nursing Lecturers / Clinical | I think the cultural values of the lecturers influence their behaviours in the clinical setting.				.514
Q10.10 Nursing Lecturers / Clinical | I believe that some aspects of the classroom environment at my nursing school may alienate students from some cultural backgrounds.	.388		.356	-.451
Q10.1 Nursing Lecturers / Clinical | I have noticed that the lecturers at my nursing school call on students from minority cultural groups when issues related to their group come up in class.			.314	-.412
Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalisation.				

a. Rotation converged in 10 iterations

3.2 Reliability Analysis

The Reliability or Internal Consistency of the Scales.

Table 3 illustrates the average item scores and Cronbach's alpha reliabilities for CAS and its subscales. Cronbach's alpha coefficients for the modified cultural awareness scale (mCAS) for the 27-item questionnaire was **0.782**. The Cronbach's alpha for the sub-scales of the mCAS was, for factor 1= 0.76, factor 2 = 0.65, factor 3 = 0.76, and factor 4 = 0.67 (see Table 4).

3.3 **Cultural Awareness Scale**

The Cronbach's alpha coefficient for the modified cultural awareness scale (MCAS) is 0.782 for the 27-item scale.

Table 3

Reliability Statistics

Reliability Statistics	
Cronbach's Alpha	N of Items
.782	27

Table 4

Average Items Score and Cronbach's Alpha Reliabilities for the Culture Awareness Scale and Subscales

Question No	**General education/experience at your school**	**General awareness/ Attitude**	**Nursing classes and clinical**	**Clinical practise**
	8.1	9.1	10.6	9.4
	8.2	9.2	10.7	9.5
	8.3	9.3	10.9	9.8
	8.4	10.8	10.11	11.1
	10.2		10.12	11.2
	10.4		10.13	11.3
	10.10		10.14	11.4
			10.15	10.1
Total- 27 Deleted -5 9.6,9.7,10.3,10.5,11.5	7	4	8	8
Cronbach's Alpha	**0.76**	**0.655**	**0.766**	**0.678**

Table 5

Intercorrelations between the sub-scales of the mCAS

Correlations					
		General Experience	General Awareness/Attitude	Nursing classes and Clinical	Clinical Practice
General Experience	Pearson Correlation	1	-.089	.552**	.217**
	Sig. (2-tailed)		.071	<.001	<.001
	N	413	413	412	412
General Awareness/Attitude	Pearson Correlation	-.089	1	.032	-.198**
	Sig. (2-tailed)	.071		.522	<.001

	N	413	414	413	413
Nursing Classes and Clinical Instruction	Pearson Correlation	.552**	.032	1	.234**
	Sig. (2-tailed)	<.001	.522		<.001
	N	412	413	413	413
Clinical Practice	Pearson Correlation	.217**	-.198**	.234**	1
	Sig. (2-tailed)	<.001	<.001	<.001	
	N	412	413	413	413
****. Correlation is significant at the 0.01 level (2-tailed).**					

The four subscales showed significant intercorrelations between the four sub-scales, “general experience,” “general awareness/attitude,” and “nursing classes and clinical instruction” and clinical practice”. (Table 5). General experience correlated with nursing classes/clinical instruction and clinical practice. It showed positive correlation. General awareness/attitude correlated with clinical practice, which is negative correlation. Nursing classes and clinical instruction correlated with general experience and clinical practice. This is a positive correlation. Clinical practice correlated with all three subscales, however general awareness and attitude showed negative correlation to clinical practice.

4. Discussion

The results show that the mCAS be used as a generic tool to measure cultural awareness among undergraduate nursing students in Ireland. It is a 27-item scale grouped into four factors. It shows satisfactory reliability and validity. This finding suggests that unlike the original CAS which consisted of the 31 items (post removal of the research section), this mCAS consisted of only 27 items. 5 items were deleted as it was difficult to obtain reliable items in a scale when dealing with sensitive and complex subjects such as culture awareness as in the current study.

The factor analysis supported a four-factor structure after removal of one factor (research issues) in the study. Hence it can be argued that the results closely represent the original CAS [23]. However, the confirmatory factor analysis conducted by Rew et al. [24] provided evidence of three factor measure of culture awareness. The five factor structure was confirmed in the Swedish version, Hadziabdic *et al*. [5] and Koren version, Oh *et al.* [17]). The four factor structure was seen in Kumlien *et al.*[9]and Başalan İz & Bayık Temel. (7) a Turkish version of the CAS. However, the items in the studies loaded slightly different from the present study. From all these studies it can be argued that the construct validity is ongoing and emphasises the importance of measuring the psychometric properties of established tools before further use in other cultural settings or target populations as discussed in Kumlien et al., [9]. Conducting a construct validity is important when measuring complex topics such as culture awareness.

In the current study, eight items (10.4,10.2, 10.6,10.15,10.9,10.7.11.3,10.10) loaded on more than one factor, and these items/questions were then placed into the most relevant factor groups (Pett et al., 2003). Similarly pattern was seen in Kumlien et al., [9], where five items loaded on multiple factors and also seen in Turkish version and [7] and [8]. However, in studies such as the original scale [23], and the Swedish version [5] and the Korean version [17], there were no cross loading of any of the items.

The Cronbach's alpha coefficients for the modified cultural awareness scale (mCAS) in the current study was **0.782**. The Cronbach’s alpha for the sub-scales was, for factor 1= 0.76, factor 2 =

0.65, factor 3 = 0.76, and factor 4 = 0.67. The internal consistency in all other studies showed moderate to excellent for all the subscales and the total CAS and modified scales [8, 9, 23, 24].

The intercorrelations between the four subscales showed significant positive and negative correlations between the sub scales. These results were seen in the previous studies [5, 17, 23].

5. Conclusion

The findings from the mCAS supported the validity and reliability of the original CAS, as the 27-item scale was tested on a national study with 414 participants in Ireland at eight HEIs. The mCAS was proven to be valid and reliable. The mCAS demonstrated acceptable psychometric qualities and is a suitable general instrument for assessing cultural awareness in undergraduate nursing students. So, the modified scale might help assess how well curricula and educational interventions work to increase students' cultural awareness in the classroom and clinical settings.

Strengths and Limitations

The study had a good representation of the students, with a total of 414 nursing students participating in the study. However, further psychometric testing is needed with a larger sample size of students from diverse geographical areas.

Author Contributions

All the authors have made equal contributions to this paper

Funding

This study received PhD funding from the School of Nursing, Psychotherapy and Community Health, Dublin City University, Ireland. The funding source did not influence this study.

Data Availability Statement

Data can be made available upon request from the author.

Conflict of Interest

The author(s) declared no potential conflicts of interest concerning this article's research, authorship, and /or publication.

Acknowledgements

The authors would like to thank all the students from eight Higher Education Institutions (HEIs) who participated in the study.

Abbreviations

CAS: Cultural Awareness Scale
KMO: The Kaiser-Meyer-Olkin
mCAS: Modified Culture Awareness Scale

References

[1] Campinha-Bacote, J. (2011). Coming to know cultural competence: An evolutionary process. *International Journal for Human Caring*, *15*(3), 42–48. https://doi.org/10.20467/1091-5710.15.3.42

[2] Campinha-Bacote, J. (2002). The Process of Cultural Competence in the Delivery of Healthcare Services: A Model of Care. *Journal of Transcultural Nursing*, *13*(3), 181–184. https://doi.org/10.1177/10459602013003003

[3] Douglas, M. K., Rosenkoetter, M., Pacquiao, D. F., Callister, L. C., Hattar-Pollara, M., Lauderdale, J., Milstead, J., Nardi, D., & Purnell, L. (2014). Guidelines for Implementing Culturally Competent Nursing Care. *Journal of Transcultural Nursing*, *25*(2), 109–121. https://doi.org/10.1177/1043659614520998

[4] Hart, P. L., & Mareno, N. (2014). Cultural challenges and barriers through the voices of nurses. *Journal of Clinical Nursing*, *23*(15–16), 2223–2233. https://doi.org/10.1111/jocn.12500Lac

[5] Hadziabdic, E., Safipour, J., Bachrach-Lindström, M., & Hultsjö, S. (2016). Swedish version of measuring cultural awareness in nursing students: Validity and reliability test. *BMC Nursing*, *15*, 1–9. https://doi.org/10.1186/s12912-016-0146-6

[6] Heeseung, C., Chang, P., Jisun, P., Fernandez, E., & Eunyoung, S. (2015). Reliability and Validity of a Korean Version of the Cultural Awareness Scale (K-CAS). *Korean Journal of Adult Nursing*, *27*(4), 472–479. https://doi.org/10.7475/kjan.2015.27.4.472

[7] İz, F. B., & Temel, A. B. (2016). Cultural awareness scale: Psychometric properties of the Turkish version. *Collegian*, *24*(5), 499–504. https://doi.org/10.1016/j.colegn.2016.08.010

[8] Krainovich-Miller, B., Yost, J. M., Norman, R. G., Auerhahn, C., Dobal, M., Rosedale, M., Lowry, M., & Moffa, C. (2008). Measuring Cultural Awareness of Nursing Students: A First Step Toward Cultural Competency. *Journal of Transcultural Nursing*, *19*(3), 250–258. https://doi.org/10.1177/1043659608317451

[9] Kumlien, C., Bish, M., Chan, E. A., Rew, L., Chan, P. S., Leung, D., & Carlson, E. (2020). Psychometric properties of a modified cultural awareness scale for use in higher education within the health and social care fields. *BMC Medical Education*, *20*(1), 406. https://doi.org/10.1186/s12909-020-02326-8

[10] Lenus, The Irish Health Repository. (2023). *Irish Association for Palliative Care: Directory of specialist palliative care services in Ireland.* https://www.lenus.ie/bitstream/handle/10147/575070/IAPCspecialistservicesdirectory.pdf;jsessionid=BE6EF4301B52705AA81B8135C9E8C503?sequence=1

[11] Ličen, S., Karnjuš, I., & Prosen, M. (2021). Measuring Cultural Awareness Among Slovene Nursing Student: A Cross-Sectional Study. *Journal of Transcultural Nursing*, *32*(1), 77–85. https://doi.org/10.1177/1043659620941585

[12] Markey, K., Tilki, M., & Taylor, G. (2012). Strategies to surmount the potential barriers to providing anti-discriminatory care in Irish healthcare settings. *Contemporary Nurse*, *40*(2), 269–276. https://doi.org/10.5172/conu.2012.40.2.269

[13] Markey, K., Tilki, M., & Taylor, G. (2017). Understanding nurses' concerns when caring for patients from diverse cultural and ethnic backgrounds. *Journal of Clinical Nursing*, *27*(1–2), 259–268. https://doi.org/10.1111/jocn.13926

[14] McElroy, J., Smith-Miller, C., Madigan, C., & Li, Y. (2016). Cultural Awareness Among Nursing Staff at an Academic Medical Center. *JONA: The Journal of Nursing Administration*, *46*, 146–153. https://doi.org/10.1097/NNA.0000000000000315

[15] National Social Inclusion Office (2012). *First National Intercultural Health Strategy, 2007-2012.* https://www.tusla.ie/uploads/content/Publication_Intercultural_Health_Strategy.pdf

[16] National Social Inclusion Office. (2019). *Second National Intercultural Health Strategy 2018-2023*. https://www.hse.ie/eng/about/who/primarycare/socialinclusion/intercultural-health/second-national-intercultural-health-strategy.html

[17] Oh, H., Lee, J., & Schepp, K. G. (2015). Translation and Evaluation of the Cultural Awareness Scale for Korean Nursing Students. *International Journal of Nursing Education Scholarship*, *12*(1), 64–73. http://dx.doi.org.dcu.idm.oclc.org/10.1515/ijnes-2014-0067

[18] Osmancevic, S., Großschädl, F., & Lohrmann, C. (2023). Cultural competence among nursing students and nurses working in acute care settings: A cross-sectional study. *BMC Health Services Research*, *23*(1), 105. https://doi.org/10.1186/s12913-023-09103-5

[19] Papadopoulos, I., Tilki, M., & Lees, S. (2004). Promoting cultural competence in healthcare through a research based intervention in the UK. *Diversity Health and Social Care, 1*(2), 107-115.

[20] https://diversityhealthcare.imedpub.com/promoting-cultural-competence-in-healthcare-through-a-research-based-intervention-in-the-uk.pdf
[21] Prosen, M. (2015). Introducing Transcultural Nursing Education: Implementation of Transcultural Nursing in the Postgraduate Nursing Curriculum. *Procedia - Social and Behavioral Sciences*, *174*, 149–155. https://doi.org/10.1016/j.sbspro.2015.01.640
[22] Rabie, G. H., Rabie, T., & Dinkelmann, M. (2020). Developing a competency profile for newly graduated registered nurses in South Africa. *BMC Nursing*, *19*(1), 1–16. https://doi.org/10.1186/s12912-020-00453-7
[23] Rew, L., Becker, H., Cookston, J., Khosropour, S., & Martinez, S. (2003). Measuring Cultural Awareness in Nursing Students. *Journal of Nursing Education*, *42*(6), 249–257. https://doi.org/10.3928/0148-4834-20030601-07
[24] Rew, L. (2014). The influence of culture on nursing practice and research. *Journal for Specialists in Pediatric Nursing*, *19*(1), 1–2. https://doi.org/10.1111/jspn.12058
[25] Safipour, J., Hadziabdic, E., Hultsjö, S., & Bachrach-Lindström, M. (2016). *[PDF] Measuring nursing students' cultural awareness: A cross-sectional study among three universities in southern Sweden | Semantic Scholar*. https://www.semanticscholar.org/paper/Measuring-nursing-students%27-cultural-awareness%3A-A-Safipour-Hadziabdic/c7fd31ec7bfa6609452b404d66a24036573ecf29