



Original Article

## Nurses' professional values scale–three: Validation and psychometric appraisal among Saudi undergraduate student nurses

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### المخلص

**أهداف البحث:** نظراً لأن القيم المهنية في التمريض قد حظيت بالاهتمام كمعيار رئيسي لرعاية تمريضية ذات جودة عالية، فقد تم قياسها باستخدام مقياس القيم المهنية التمريضية-3. ونظراً لعد توفر هذا المقياس باللغة العربية فنههدف إلى التحقق من صحة المؤشرات السيكومترية للنسخة العربية من مقياس القيم المهنية التمريضية-3 لاستخدامه بين الممرضين والممرضات السعوديين.

**طرق البحث:** جندت هذه الدراسة المنهجية طلاب وطالبات التمريض من كلياتين رئيسيتين للتمريض في المملكة العربية السعودية. تم رجوع 438 استبانة صالحة للتحليل من أصل 500 استبانة موزعة (معدل الاستجابة: 87.6%). تم ترجمة الاستبانة إلى اللغة العربية. تم التحقق من الصدق الظاهري وصدق المحتوى والصدق العملي وصدق المفهوم باستخدام تحليلات العوامل الاستكشافية والتأكدية. كما تم تقييم الصدق التقاربي والتمييزي. تم تقييم ثبات المقياس باستخدام معامل ألفا كرونباخ ومعامل أوميغا.

**النتائج:** تم التحقق من الصدق الظاهري حيث تراوح مؤشر صدق المحتوى من 1 إلى 0.96، بينما كان للمقياس العام أسفر تحليل العامل الاستكشافي عن مقياس يحتوي على 28 عنصراً بنموذج ثلاثي العوامل، موضحاً 74.5% من إجمالي التباين. كما أكد تحليل العامل التأكيدي أن النموذج ثلاثي العوامل كان له نتائج مقبولة. تم التحقق من ثبات المقياس عن طريق معامل ألفا كرونباخ، حيث كانت نتائجه كالتالي: 0.89، 0.90، و0.90 لكل من عوامل النشاط، الرعاية، والمهنية، وكان معامل ألفا كرونباخ للمقياس العام 0.96.

**الاستنتاجات:** تم الكشف عن مستويات كافية من الصدق والثبات للنسخة العربية من مقياس القيم المهنية التمريضية-3، مما يشير إلى ملاءمة استخدام هذا المقياس

لتقييم القيم المهنية بين الممرضين والممرضات السعوديين وغيرهم من الطلاب وطالبات التمريض الناطقين باللغة العربية.

**الكلمات المفتاحية:** القيم المهنية؛ ممرض؛ ممارسة؛ تقييم؛ تصميم منهجي؛ مقياس القيم المهنية التمريضية

### Abstract

**Objectives:** Since the nursing professional values have garnered attention as a principal criterion for safe-quality nursing practice, it was measured using the Nurses Professional Values Scale–three. We aimed to validate and ascertain the psychometric indicators of the Arabic version of the Nurses Professional Values Scale –three among Saudi student nurses.

**Method:** This methodological study recruited student nurses using convenience sampling from two nursing colleges at KSA. About 438 valid questionnaires were returned out of 500 questionnaires which were distributed over students in a formal day class time; representing a response rate of 87.6%. A 2-fold cross-validation process was adopted. A transcultural process was conducted. Face, content, and construct validity using exploratory and confirmatory factor analyses were used. Convergent and discriminant validity were also assessed. The reliability of the scale was assessed using Cronbach's alpha.

**Results:** Face validity was achieved. The content validity of items ranged from .83 to 1.00, while it was .96 for the overall scale. The exploratory factor analysis yielded a scale containing 28 items with a three-factor model, explaining 74.5% of the total variance. Confirmatory factor analysis confirmed that three-factor solution had

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an adequate model fit (CMIN/ $df$  = 1.98; RMSEA = .065; SRMR = .039, CFI = .972, and GFI = .968). Convergent validity and discriminant validity were achieved. Cronbach's alpha values were .89, .90, .90, and .96 for activism, caring, professionalism, and the overall scale, respectively.

**Conclusion:** Adequate levels of reliability and validity of the Arabic version of the Nurses Professional Values Scale–three were established, indicating the appropriateness of using this version to assess the professional values among Saudi and other Arabic-speaking nurses.

**Keywords:** Methodological design; Nurses; Nurses' professional values scale–three; Professional values; Practice; Validation

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## Introduction

Values are the objectives and beliefs that determine which decision can be established in order to provide actions. Professionals are usually guided by values that serve as a standard of action to evaluate their behaviors.<sup>1</sup> In health care setting, there are innumerable ethical challenges,<sup>2</sup> which make the development of professional values among healthcare professionals as a crucial concept to impart quality healthcare services. Professional values in healthcare settings are code of ethics and conduct norms that serves as basis for judging practice and actions.

Currently, nurses form the largest share of manpower in healthcare organizations<sup>3</sup> and their ever-increasing professional decisions and practices could lead to difficult dilemmas<sup>4</sup> and ethical concerns.<sup>1</sup> Primarily, the nursing profession is grounded in ethics and professional values that shape its performance.<sup>5</sup> Furthermore, professional nursing practice is provided by nurses who are equipped with professional values.<sup>6</sup> According to Aktaş and Karabulut,<sup>7</sup> values in nursing encompass not only what is considered important for the care recipients, but also provides an appreciation for what is considered important for professional nurse. Additionally, nursing professional values (NPVs) are associated with patient safety and positive patient experiences.<sup>8</sup> Consequently, these values have arisen as criteria for nurses' recruitment in many Western countries and KSA.

Since the NPVs have garnered attention as a principal criterion for safe-quality nursing practice, it was measured primarily using the Nurses Professional Values Scale (NPVS) developed by Weis and Schank.<sup>9</sup> The NPVS was conceptualized based on a critical review of the nursing codes of ethics and professional value development among nurses.<sup>9</sup> Later, the NPVS was amended and anchored to the 2001 American Nursing Association's<sup>10</sup> code of ethics and developed into the Nurses Professional Values Scale–Revised<sup>11</sup> (NPVS–R). However, the NPVS–R has been

culturally validated in several languages and is popularly used.<sup>12</sup> Although the NPVS–R showed excellent psychometric indicators, Weis and Schank<sup>1</sup> declared that it is not a robust measure. Hence, in accordance to the adjustments made for the 2015 Code of Ethics for Nurses,<sup>13</sup> Weis and Schank<sup>1</sup> updated the NPVS–R and developed the Nurses Professional Values Scale–Three (NPVS–3). Currently, the NPVS–3 is the only tool used to investigate the NPVs of nurses in education and practice contexts. It assesses three domains of NPVs: caring, activism, and professionalism. Caring refers to the commitment of nurses to provide holistic care and protection for all types of patients without discrimination. Activism focuses on nurses' activities to support the profession and improve public and global health. Professionalism reflects nurses' professional development through continuous self-evaluation and life-long learning.

However, the implementation of these NPVs into the nursing practice continues to be challenging.<sup>2</sup> Empirical evidence has reported that many nurses are unaware of these NPVs.<sup>5,14</sup> Despite the registered nurses' clinical expertise, there was no significant increase in their NPV mean scores compared to the nursing students.<sup>4</sup> However, these studies argued that the reason behind this gap is the paucity of a valid and reliable tool that is linguistically and culturally adapted.<sup>2,4</sup> Alabdulaziz et al.,<sup>2</sup> justified that nursing students' NPVs in KSA and other Arab countries are seldom studied due to the lack of validated and culturally adapted Arabic versions that measure NPVs among nurses. Although Weis & Schank<sup>1</sup> recommended further validation of the NPVS–3 in different cultures to ensure its applicability and reliable results, it has not been validated in Italy<sup>15</sup> and Indonesia.<sup>4</sup> Additionally, the NPVS–3 was validated in KSA using limited techniques.<sup>2</sup> This study published only the factor structure of the NPVS–3 and recommended confirmatory factor analysis (CFA) for future studies to confirm the latent variable structure of the NPVS–3. However, since its factor structure is not robust and is usually affected by sample bias, further validation studies are required to ensure the robustness of the cross-validated measure.<sup>16,17</sup> Therefore, this study aimed to bridge this gap by evaluating the psychometric indicators and confirming the latent variable structure of the Arabic version of the NPVS–3 among Saudi student nurses.

## Materials and Methods

### *Design and sample*

This methodological study conducted throughout the cross-sectional period of March 2020 to April 2020. Nursing students were recruited using convenience sampling from two academic institutions. Students were included if they were enrolled in the second (third level) to fifth academic year (tenth level). We excluded students who were in the introductory year. Although there has been a protracted debate about the appropriate sample size for factor analysis (FA), some evidence exists based on the subject-to-variable (STV) ratio, ranging from 5:1<sup>18,19</sup> to 30:1.<sup>17,20</sup> Others have argued that 150 participants are an absolute minimum for FA.<sup>21</sup>

However, for an instrument with 28 items, 150 participants were determined as the absolute minimum sample size.

Consistent with the best practice for a psychometric appraisal, we adopted a 2-fold cross-validation process through random splitting of the sample into two equal halves to conduct exploratory factor analysis (EFA) on the first half and validate the model on the second half to confirm the model rather than the data.<sup>22</sup> Therefore, we aimed to collect a sample of more than 300 participants. However, the study protocol was approved by institutional review board of King Saud University [KSU-HE-20-71], dated (10/3/2020). Written informed consents were obtained from the respondents prior to their participation.

### Measures

The original NPVS-3 was used along with a socio-demographic sheet that inquired the participants' backgrounds and asked their informed consent. Items on the socio-demographic sheet included age, gender, academic year, and a closed-ended (Yes/No) question on whether the nursing specialty was the first academic choice or not. Initially, the NPVS-3 was developed by Weis and Shank<sup>1</sup> and was designed to measure NPVs among nursing students. Typically, the NPVS-3 is a self-administered questionnaire that comprises 28 items rated on a 5-point Likert scale and requires participants to indicate their responses over five categories for each item, ranging from A (not important) to E (most important). The NPVS-3 encompasses three factors: caring (10 items), activism (10 items), and professionalism (8 items), resulting in a total score ranging from 28 to 140, with high scores indicating a high level of professional values. Concerning the construct, the three-factor structure of the NPVS-3 is frequently supported.<sup>1,2,4,15</sup> A written permission to validate this scale into Arabic language was obtained through an email on 14/10/2019.

### Translation and cultural adaptation process

The transcultural adaptation process of the NPVS-3 was guided by the proposed guidelines for the transcultural adaptation process of self-report measures.<sup>23</sup> In stage I, we recruited two bilingual translators, whose native language was Arabic, to create individual Arabic translations of the NPVS-3. One of the forward translators was a Saudi academic professor in nursing who lived and graduated from the United States of America (USA) with a distinct background in instrument construction. The other was naïve to the instrument content and concepts. The forward translators had in-depth knowledge of colloquial phrases and jargon in both languages. This stage generated two Arabic versions: NPVS-3<sub>AR1</sub> and NPVS-3<sub>AR2</sub>. In Stage II, we compared NPVS-3<sub>AR1</sub> and NPVS-3<sub>AR2</sub> using a third bilingual translator whose native language was Arabic. The suggested modifications were discussed, and a common Arabic translation was obtained. This stage synthesized a common Arabic version of the NPVS-3, named NPVS-3<sub>AR12</sub>. In Stage III, we executed a blind backward translation of the NPVS-3<sub>AR12</sub> using only one bilingual translator, as shown adequate in this stage.<sup>23</sup> The native language of the backward translator was English,

and he was neither aware nor informed of the instrument's intent. This stage aimed to ensure conceptual equivalence and clarity. This stage generated an English-translated version of the NPVS-3 named NPVS-3<sub>BA</sub>. However, NPVS-3<sub>BA</sub> was found to be highly similar to the original NPVS-3. In Stage IV, we invited a panel comprising of four bilingual translators (forward and backward), two students, and a statistician in addition to the principal investigator of this study in a ZOOM session to compare the NPVS-3<sub>AR12</sub> and NPVS-3<sub>BA</sub> with the original NPVS-3 and then develop a valid pre-final NPVS-3<sub>AR</sub> that is understandable by the equivalent of a 12-years old individual. Additionally, semantic, idiomatic, experiential, and conceptual equivalences were ascertained between the original and pre-final versions.<sup>23</sup> In this stage, a pre-final NPVS-3<sub>AR</sub> was synthesized. In Stage V, once a valid pre-final version was generated, it was evaluated using 20 nursing students. The students were asked to identify their perceptions of the scale's items in terms of suitability, relatedness, and clarity. No further modifications were required based on respondents' feedbacks. Thus, the final NPVS-3<sub>AR</sub> was prepared and subjected to further validity and reliability tests to ensure its robustness.

### Statistical analysis

IBM® SPSS® Statistics<sup>24</sup> for Windows v.25 was used for data processing and statistical interpretation. Descriptive and inferential statistics were used to describe the frequency, mean, standard deviation (SD), and significant correlations among the variables. Significant results were inferred at  $p \leq .05$ . Cases were screened for missing data and treated according to the data management that proposed by Mertler et al.,<sup>25</sup> and Newman.<sup>26</sup> These criteria suggested that if cases with missing data were less than 5% of the whole sample, listwise deletion was appropriate.<sup>25,26</sup>

### Multivariate normality and outliers

Since a univariate normal distribution does not necessarily reflect a multivariate normal distribution,<sup>27</sup> we evaluated the multivariate normal distribution using Royston's *H* test and Mardia's test considering Mardia's coefficient  $>8$  as an indicator of kurtosis violation.<sup>27</sup> Multivariate outliers were assessed using the Mahalanobis distance.<sup>28</sup> The Mahalanobis distance indicates that cases with probability  $>.001$  would be a cause for concern.<sup>29</sup>

### Validity assessment

The validity of the NPVS-3<sub>AR</sub> was assessed and confirmed through face validity, content validity, and construct validity. Additionally, researchers have argued that when a plausible measurement model fit is assumed, convergent and discriminant validity assessments are necessary to conclude about the construct validity.<sup>16,17</sup> Hence, we evaluated convergent and discriminant validity to support the construct validity assessment of the NPVS-3<sub>AR</sub>.

*Face and content validity.* To ensure the face validity of the NPVS-3<sub>AR</sub>, we asked a panel of six academicians in the field of nursing education to confirm that the NPVS-3<sub>AR</sub> measures NPVs. Those experts have in-depth knowledge and

contributions in instrument construction in addition to their expertise in nursing profession. The expert panelists also evaluated the content validity of the NPVS-3<sub>AR</sub> using the Content Validity Index (CVI) for both items (I-CVI) and the overall scale (S-CVI). The panelists were asked to rate each item of the NPVS-3<sub>AR</sub> according to its relevance to the NPVs on a 4-point Likert scale (1 = not relevant, 2 = somewhat relevant, 3 = quit relevant, 4 = very relevant) to prevent neutral or ambivalent responses.<sup>30</sup> Then, the I-CVI was obtained by dichotomizing the results of the 4-point relevance scale into two values: '1' for relevant (including scores 3 & 4) and '0' for irrelevant (including scores 1 & 2). Then, each item score was divided by six, i.e., the number of experts in the panel, resulting in the I-CVI. The S-CVI was calculated using the average method (S-CVI/Ave), in which the sum of the I-CVI was divided by six, i.e., the number of experts. For a panel of six raters, the minimum acceptable indices for the I-CVI and S-CVI/Ave were as  $\geq .78$  and  $\geq .90$ , respectively.<sup>30</sup>

**Construct validity.** The construct validity of the NPVS-3<sub>AR</sub> was established through EFA, followed by confirmatory factor analysis (CFA). For EFA, assessments of sample size adequacy and data factorability were checked using the Kaiser-Meyer-Olkin (KMO) and Bartlett's test of sphericity. A significant Bartlett's test with KMO value ranging from .60 to 1.00 indicates that EFA would yield reliable factors.<sup>31</sup> In EFA, the data of the first half of the sample ( $n = 219$ ) were subjected to extraction and rotation methods to identify a plausible pattern underlying our dataset. For extraction purposes, we decided to use the Kaiser-Guttman rule and a scree plot. To extract factors with 100% accuracy, we incorporated parallel analysis (PA) with the Kaiser-Guttman rule and scree plot to extract factors.<sup>32</sup> For the rotation procedure, we employed an oblique rotation using the Promax technique with Kappa power ( $\kappa = 4$ ) to obtain theoretically meaningful factors.<sup>16,17</sup> Furthermore, we used a criterion of factor loadings value  $> .40$  for retaining items.<sup>16,17</sup>

However, after the theoretical framework of the NPVS-3<sub>AR</sub> became understandable, we utilized CFA on the second half of the sample ( $n = 219$ ) to assess how well dataset fit the hypothesized model. IBM® SPSS® AMOS<sup>33</sup> for Windows v.26 was used to perform the CFA. We evaluated our model using the difference chi-square test ( $\chi^2$ ) and its associated  $p$  value. Additionally, we evaluated several other descriptive indices, including  $\chi^2$  goodness-of-fit index per degree of freedom<sup>34</sup> (CMIN/df;  $< 3$ ), root mean square error of approximation (RMSEA;  $< .08$ ), and standardized root mean square residual<sup>35</sup> (SRMR;  $< .10$ ). Furthermore, we evaluated additional comparative model measures, including the normed fit index<sup>35</sup> (NFI;  $> .90$ ), Tucker-Lewis Index<sup>36</sup> (TLI;  $> .95$ ), comparative fit index<sup>35</sup> (CFI;  $> .95$ ), and goodness-of-fit index<sup>37</sup> (GFI;  $> .90$ ).

The convergent validity of the NPVS-3<sub>AR</sub> was evaluated using the Fornell & Larcker's criterion<sup>38</sup> which requires that average variance extracted (AVE) for each construct must be greater than .50. For discriminant validity, we used the average variance extracted versus shared variance<sup>38</sup> (AVE-SV) and heterotrait-monotrait (HTMT) ratio correlations.<sup>39</sup> To achieve discriminant validity, each construct's squared AVE must be greater

than the correlation involving the construct.<sup>38</sup> Whereas to use HTMT as a criterion, we compare the value of HTMT to a predefined threshold, and when the value is below the threshold, the discriminant validity of the measurement model is considered as achieved. In this study, we decided to use the value of .85 as the threshold (HTMT<sub>.85</sub>).

#### Reliability assessment

Since the assumptions of Cronbach's  $\alpha$  are rarely met,<sup>40,41</sup> we utilized an alternative coefficient, omega coefficient<sup>42</sup> ( $\omega$ ) (McDonald, 1999), to support the conclusion about the test's reliability.<sup>41</sup> McDonald<sup>42</sup> argued that even if the scale yields tau-equivalent items and follows a unidimensional model,  $\omega$  yields the same coefficient value as coefficient  $\alpha$ .<sup>42</sup> Concomitantly, composite reliability (CR) has been found appropriate when the items composing the scale are unit-weighted creating the total test score,<sup>43</sup> the same as the NPVS-3<sub>AR</sub>. Therefore, the  $\omega$  coefficient and CR of the factors were assessed using the bare minimum value of .707 for good reliability.<sup>16,44</sup>

## Results

### Sample description

About 444 questionnaires returned out of 500 distributed questionnaires. Cases were screened for missing data and yielded 6 cases with partial responses. Since the cases with partial responses (1.35%) constituted less than 5% of the whole sample, listwise deletion function was adopted and resulted in 438 valid cases; representing a response rate of 87.6%. Table 1 presents the frequencies and percentages of the sample's background characteristics. Females comprised more than half of the sample ( $n = 246$ ; 56.2%). The majority of the students (39.5%;  $n = 173$ ) were aged 22–24 years, followed by those aged 20–22 years (25.1%). Most of the students (29.1%) were enrolled in the 4th academic year, followed by the 2nd, 5th, and 3rd academic

**Table 1: Selected demographic characteristics of participants.**

Variable	Participants (n = 438)	
	F	%
<b>Gender</b>		
• Male	192	43.8%
• Female	246	56.2%
<b>Age groups</b>		
• 18–<20 years	94	21.5%
• 20–<22 years	110	25.1%
• 22–<24 years	173	39.5%
• $\geq 24$ year	61	13.9%
<b>Academic year</b>		
• 2nd year	108	24.7%
• 3rd year	98	22.4%
• 4th year	132	30.1%
• 5th year	100	22.8%
<b>Was nursing your first academic choice?</b>		
• Yes	266	60.7%
• No	172	39.3%



years. Of the total sample, 266 students (60.7%) reported that nursing specialty was their first academic choice, and 172 students reported it as an alternative academic choice.

#### Multivariate normality and outliers

Multivariate normality was violated as the result of Royston's  $H$  test, which was significant ( $H_{438} = 534.421$ ,

$p = .006$ ). An evaluation of the Mahalanobis distance indicated no outliers.

#### Face and content validity

The panelist looked at the NPVS-3<sub>AR</sub> and attested its ability to measure the attributes of NPVs. All items of the NPVS-3<sub>AR</sub> were retained as their I-CVI values ranged from

**Table 2: Summary of exploratory factor analysis results ( $n = 219$ ).**

No.	Item	Subscale			$h^2$
		Factor 1	Factor 2	Factor 3	
24	Confront practitioners with questionable or inappropriate practice	.93			.76
25	Promote mutual peer support and collegial interactions to ensure quality care and professional satisfaction	.91			.75
23	Actively promote health of populations	.88			.76
12	Establish collaborative partnerships to reduce healthcare disparities	.81			.70
10	Advance the profession through active involvement in health-related activities	.79			.71
17	Participate in nursing research and/or implement research findings appropriate to practice	.78			.71
11	Recognize the role of professional nursing associations in shaping health policy	.75			.74
13	Assume responsibility for meeting health needs of diverse populations.	.74			.65
26	Take action to influence legislators and other policy makers to improve health care	.73			.62
27	Engage in consultation/collaboration to provide optimal care	.72			.73
15	Protect moral and legal rights of patients		.83		.74
14	Accept responsibility and accountability for own practice		.80		.67
2	Respect the inherent dignity, values, and human rights of individuals		.79		.74
21	Protect rights of participants in research		.77		.73
22	Practice guided by principles of fidelity and respect for person		.76		.72
16	Act as a patient advocate		.75		.64
19	Safeguard patient's right to confidentiality and privacy		.70		.69
3	Protect health and safety of the patient/public		.66		.72
18	Provide care without bias or prejudice to patients and populations		.63		.66
20	Participate in professional efforts to advance global health		.55		.59
6	Establish standards as a guide for practice			.96	.83
5	Participate in peer review			.86	.84
7	Promote and maintain standards where planned learning activities for students take place			.84	.87
9	Seek additional education to update knowledge and skills to maintain competency			.81	.81
8	Initiate actions to improve environments of practice			.80	.80
4	Assume responsibility for personal well-being			.79	.83
1	Engage in on-going self-evaluation			.75	.64
28	Recognize professional boundaries			.63	.69
	<b>Eigenvalues from actual data</b>	<b>16.08</b>	<b>1.96</b>	<b>1.34</b>	
	<b>Eigenvalues from simulative data</b>	<b>1.93</b>	<b>1.22</b>	<b>.97</b>	
	<b>% of variance</b>	<b>61.85</b>	<b>7.54</b>	<b>5.15</b>	

.83 to 1.00. The S-CVI/Ave was calculated and yielded a good content validity value of .96.

### Construct validity

Assessments of the data's factorability showed convincing results. The correlation matrix was subjectively scanned and showed no weak coefficients. The KMO statistic was .96, which falls within the range of "Marvelous".<sup>45</sup> Bartlett's test was significant ( $\chi^2 = 6685.47$ ,  $df = 378$ ,  $p < .001$ ), suggesting that the dataset was factorable.<sup>46</sup> Initial EFA using principal axis factoring (PAF) was performed due to the violation of multivariate normality.<sup>47</sup> Oblique rotation was utilized using the Promax technique on the 28 items. Table 2 presents three factors with eigenvalues well above the Kaiser's criterion of one. The scree plot (Figure 1) showed leveling out at the 4th factor, suggesting a three-factor solution. Additionally, PAF was utilized using a specialized syntax<sup>48</sup> for SPSS®. Consequently, the eigenvalues of the first three factors in the actual data were greater than those in the simulative data, while the 4th factor's eigenvalue shifted to be greater, verifying the three-factor solution. The 1st factor explained the highest variance in data and included 10 items that theoretically represented the Activism construct (factor

loadings ranged between .72 and .93). The 2nd factor represents caring and comprised 10 items with factor loadings ranging between .55 and .83. Furthermore, eight items with factor loadings ranging between .74 and .95 were clustered on the 3rd factor which reflects the professionalism construct (see Table 3). Collectively, the three factors explained 74.5% of the variance in NPVs among nursing students, suggesting excellent construct validity.<sup>31</sup>

Next, CFA was used on the second half of the sample ( $n = 219$ ) to cross-validate the factor structure of the NPVS-3<sub>AR</sub> obtained from EFA. Based on the proposed model information, the number of estimating parameters was less than the number of covariances and variances, suggesting that our model was overidentified.<sup>49</sup> Considering the non-normal property of our dataset, we utilized maximum-likelihood estimation with robust standard errors (MLR) as an estimator.<sup>31,49</sup> The initial three-factor CFA indicated that the empirical data did not fit our hypothesized model:  $\chi^2 (347) = 849.65$ ,  $p = .004$ , CMIN/ $df = 3.12$ , RMSEA (90% CI) = .098 (.081–.12), SRMR = .13, NFI = .874, TLI = .913, CFI = .928, and GFI = .883. To better understand this model misfit, we inspected the factor loadings, correlational residuals, and modification indices<sup>22</sup> (MI). Particularly, redundant items

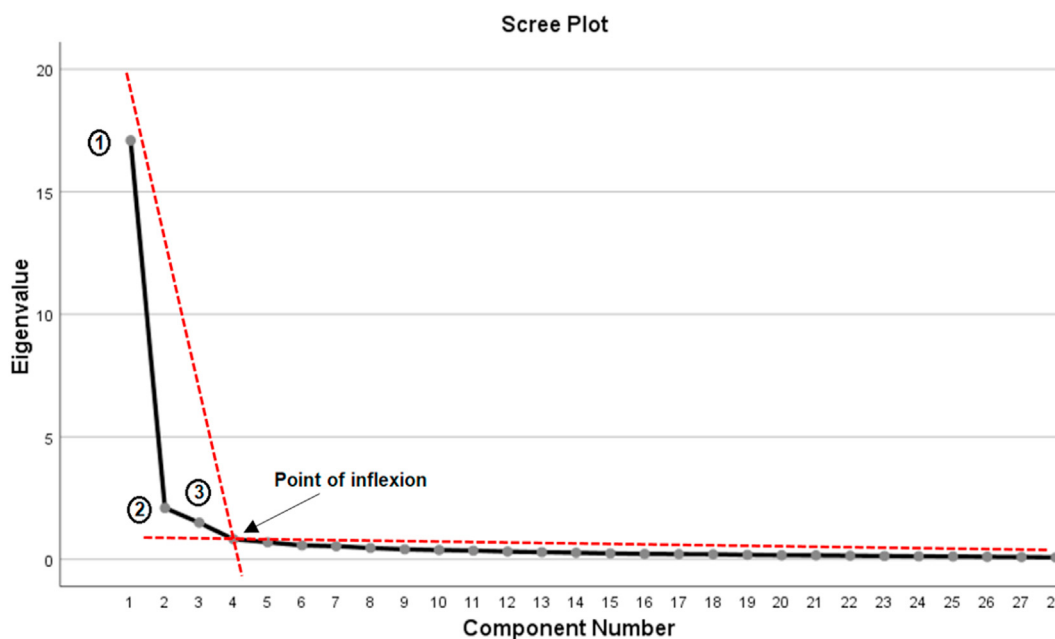


Figure 1: Scree plot of NPVS-3<sub>AR</sub> showing a three-factor solution.

Table 3: Reliability and validity indexes results.

Factor	a. Reliability indexes			b. Validity indexes				c. HMTM <sub>.85</sub> analysis		
	$\alpha$	$\omega$	CR	AVE	Activism	Caring	Prof.	Activism	Caring	Prof.
Activism	.89	.93	.92	.70	<b>(.84)</b>					
Caring	.90	.91	.94	.69	.762	<b>(.83)</b>		.768		
Prof.†	.90	.94	.95	.69	.774	.82	<b>(.89)</b>	.786	.828	
Overall scale	.96									

$\alpha$ , Cronbach' alpha coefficient;  $\omega$ , McDonald Omega coefficient; CR, construct reliability; (AVE), average variance extracted; HTMT, Heterotrait–Monotrait ration correlation; †, professionalism factor.

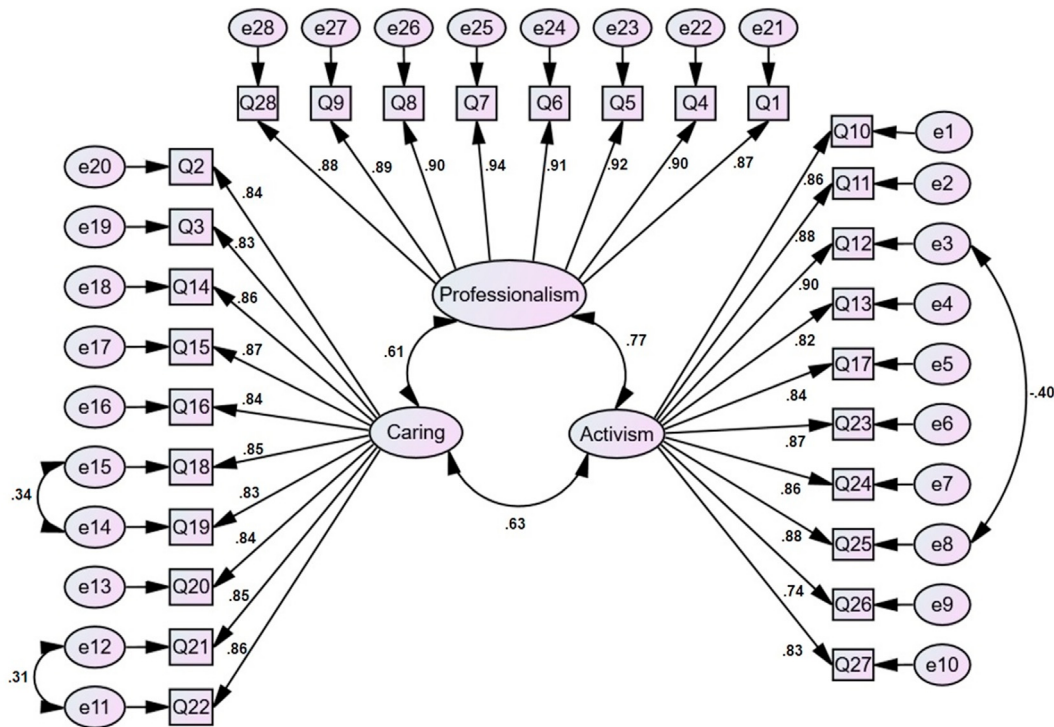


Figure 2: CFA result of a three-factor solution with standardized estimates.

were presented as indicated by modification indices (MI > 15): e14–e15 (23.328), e11–e12 (22.451), and e3–e8 (20.961). Thus, we set them as free parameter estimates.<sup>20</sup> However, a revised model was created after the modifications (see Figure 2). Consequently, the model fit indices of the revised model improved considerably, as follows:  $\chi^2(266) = 510.235$ ,  $p = .003$ ,  $\text{CMIN}/df = 1.98$ ,  $\text{RMSEA} (90\% \text{ CI}) = .065 (.056-.073)$ ,  $\text{SRMR} = .039$ ,  $\text{NFI} = .963$ ,  $\text{TLI} = .971$ ,  $\text{CFI} = .972$ , and  $\text{GFI} = .968$ , assuming an adequate model fit. The highest correlation was found between activism and professionalism (.77).

After the model fit, we investigated convergent validity by assessing the constructs' AVE and CR values. As shown in Table 3, the AVE values of the activism, caring, and professionalism constructs were .70, .69, and .69, respectively, indicating that the model's variance is overwhelmingly explained by its constructs. In addition, all values of CR ranged from .92 to .95, implying that the individual items are adequately representative of their particular constructs. Overall, the convergent validity of the NPVS-3<sub>AR</sub> model was well achieved. For discriminant validity, the HTMT<sub>.85</sub> criterion and AVE-SV were used. Table 3 shows that all values of HTMT<sub>.85</sub> analysis were below the value of .85, indicating that the constructs in the model are empirically distinct. Additionally, in Table 3, squared AVE measures for the three constructs are much larger than the correlation involving the particular construct, indicating further evidence of discriminant validity.

#### Reliability assessment

Standard deviations were considerably different from one to another, suggesting that items had different true scores

and error variances<sup>50</sup>; thus, the assumption of a tau-equivalent model was violated. Hence, we utilized the  $\omega$  coefficient to support the  $\alpha$  coefficient. The coefficient  $\alpha$  values, as shown in Table 3, were .89, .90, .90, and .96 for activism, caring, professionalism, and the overall scale, respectively. Concerning the construct, the coefficient  $\omega$  values were .93, .91, and .94, respectively, for the three factors. Additionally, the CR values for the three factors were .92, .94, and .95, respectively.

#### Discussion

This study established the psychometric properties of the Arabic version of the NPVS-3, which assesses NPVs among nursing students. The most common guidelines of the transcultural validation process for the self-report test proposed by Beaton et al.<sup>23</sup> were followed to establish the NPVS-3<sub>AR</sub>. The NPVS-3<sub>AR</sub> was rigorously subjected to validity and reliability evaluations to provide a robust version. Its validity was ascertained through various evaluation techniques, including face validity, content validity, and construct validity with convergent and discriminant assessments. In the content validity assessment, a panel of six experts evaluated I-CVI for the scale's items and the S-CVI for the whole scale based on its relevance to NPVs. The CVIs of the NPVS-3<sub>AR</sub> showed favorable content validity when compared to the cutoff values<sup>26</sup> and was also congruent with the results of other NPV studies.<sup>2,4,15</sup>

Our data were factorable and followed a non-normal distribution; hence, we subjected it to the PAF extraction method.<sup>47</sup> Therefore, it yielded a three-factor solution, which is consistent with the original<sup>1</sup> NPVS-3, the Italian version<sup>15</sup> of the NPVS-3, and the Indonesian version<sup>4</sup> of

the NPVS-3. Additionally, rotation of 28 items on the three-factor solution showed fair factor loadings without cross-loaded items, similar to the Indonesian study's results<sup>4</sup> and contrary to the findings of the Saudi study, which showed several cross-loaded items on two factors.<sup>2</sup> Compared to the original NPVS-3, the rotated items clustered on three factors: activism, caring, and professionalism.<sup>1</sup> Although the number of clustered items on activism and caring constructs were equal, the activism construct explained the highest share of the variance in NPVs among nurses, followed by the caring and professionalism constructs. These results are congruent with the validation study<sup>2</sup> of the NPVS-3. In the Indonesian and Italian validation studies of the NPVS-3, the caring factor explained the highest share of the variance in NPVs.<sup>4,15</sup>

Notably, this study accounted for the highest shared variance of NPVs compared to other NPVS-3 validation studies.<sup>2,4,15</sup> On the other hand, the activism construct reflects the last three provisions of the 2015 code of ethics for nurses.<sup>1,13</sup> It reflects the activist position of professional nurses in political and health policies, global and community health, and leadership positions in the healthcare systems. The second extracted construct was the caring factor, which explained 7.54% of the variance in NPVs. It reflects the first three provisions of the 2015 code of ethics for nurses.<sup>1,13</sup> The last extracted factor was the professionalism, which explained 5.15% of the variance in nurses' NPVs. This factor represents the fourth through sixth code provisions and focuses on nursing boundaries and standards.<sup>13</sup> However, the strongest correlation was found between the professionalism and caring constructs. This supports the evidence that professionalism is fundamental to Saudi nurses' care practices.<sup>51</sup>

However, EFA is known as a data-driven technique that has the ability to extract the latent variables from the observed data, while CFA is a theory-driven technique that requires a prior hypothesis to be tested to determine whether the observed data fits the proposed model. Therefore, we utilized CFA after the EFA was conducted to confirm the latent variable model and assess the validity and reliability of the NPVS-3<sub>AR</sub>. The CFA indices assume that our revised model is adequate. The same latent variable structure was confirmed in the original, Indonesian, and Italian studies<sup>1,4,15</sup> of the NPVS-3.

To the best of our knowledge, this study is the only study that assessed convergent validity and discriminant validity through rigorous procedures to support the construct validity of the NPVS-3<sub>AR</sub>. For convergent validity, the constructs' AVE and CR values were assessed, and implied that a large share of the model's variance was explained by its factors. We used the criterion HTMT<sub>85</sub>, as it provides a relatively high violation detection rate and a low false positive rate.<sup>52</sup> Additionally, we used the AVE-SV procedure to ascertain discriminant validity. However, the results supported the discriminant validity of the NPVS-3<sub>AR</sub>. Concerning reliability, the NPVS-3<sub>AR</sub> showed high internal consistency coefficients for both, whole scale and constructs. These results have been yielded in other NPVs' studies.<sup>2,4,15</sup>

This study had several limitations. First, the sample of this study was recruited from only two academic institutions

and consequently underrepresented nursing students enrolled in other Saudi academic institutions, thus; limiting the generalizability of the findings. Second, since we recruited students with different academic levels, some of whom may or may not have been exposed to clinical experience and may, therefore, have heterogeneous experiences in professional values that might have affected the validity of the results. Third, we were unable to conduct a test-retest reliability procedure due to chronological and logistical challenges. Future studies should ascertain test-retest reliability, including a large sample, to strengthen the present findings.

The study's findings have several implications for nursing education. The NPVS-3<sub>AR</sub> allows nursing educators to investigate NPVs and the associated situations among nursing students to ascertain how those students perceive and develop NPVs. Additionally, it can be used to equip nursing graduates with effective professional values that help fulfill organizational and patient needs. Concomitantly, in nursing practice, it can be used as a post-intervention evaluation tool to assess the impact of related programs on the reinforcement of NPVs among registered nurses.

## Conclusion

The development of NPVs among undergraduate nursing students is crucial for ensuring safe and high-quality patient care. These values have arisen as criteria for nurses' recruitment in KSA. In this study, adequate levels of reliability and validity of the NPVS-3<sub>AR</sub> were established, indicating the appropriateness of using this version to assess the NPVs among Saudi and other Arabic-speaking nursing students and registered nurses.

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## Conflict of interest

The authors have no conflict of interest to declare.

## Ethical approval

Ethical approval was obtained from an institutional review board of King Saud University with a reference number [KSU-HE-20-71], dated (10/3/2020). Written informed consent was obtained from the students to participate in the study. Additionally, all students were instructed about the anonymity and confidentiality of the data and voluntary participation. This study was consistent with the ethical principles of the Declaration of Helsinki.

## Authors contributions

Conceptualization: AMA and FAA; literature review: AEA and YMA; design: AMA and AEA; data collection: FAA and YMA; data curation: AMA and AEA; interpretation: AEA and YMA; writing—original draft preparation:



FAA and AMA; writing—review and editing: AMA, AEA, FAA, and YMA; funding acquisition: AEA; project administrator: AMA. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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