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# Sustainability attitudes in nursing survey: A cross-cultural adaptation and validation study[1]

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**Abstract**

**Research aim:** The aim of this study was to cross-culturally adapt the Sustainability Attitudes in Nursing Survey into Turkish and evaluate its validity and reliability among Turkish speaking nursing students.

**Methods:** This methodological study was conducted with 400 nursing students, selected using a simple random sampling method from students studying at a state university in Turkey. Sociodemographic Characteristics Questionnaire and Sustainability Attitudes in Nursing Survey were used for data collection. The linguistic content validity analysis and Confirmatory Factor Analysis were performed to determine the validity of the survey. Test-retest reliability and Cronbach Alpha coefficient were determined for reliability of the survey.

**Findings:** The Content Validity Index of the Turkish version of the Sustainability Attitudes in Nursing Survey was found to be 0.91. In the Confirmatory Factor Analysis, the survey was confirmed as a single-factor model. The Cronbach Alpha coefficient of the survey was determined to be 0.76 and the intra-class correlation was 0.81 as a result of the test-retest.

**Conclusions:** The Turkish version of the survey has sufficient validity and reliability to evaluate sustainability attitudes of nursing students in the Turkish culture. It is recommended to conduct international comparative studies to identify nursing students' sustainablity attitudes.

**Keywords**: Attitude; nursing; nursing students; survey; sustainability

## Introduction

Sustainability is a multidimensional concept that emphasizes the connection of human life with the environment. In the Bruthland report published by the United Nations' World Commission on Environment and Development in 1987, the concept of sustainability came to the fore with the definition of "development that meets the needs of the present without compromising the ability of future generations to meet their needs" (Brundtland, 1987; Nyholm et

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al., 2018). The 2030 Sustainable Development Goals adopted by the United Nations in 2015 have made sustainability an increasingly important concept in the development of health and well-being (Edwards et al., 2020; United Nations, 2015). Nurses, who constitute the largest workforce in healthcare and focus on holistic care, have an important position to be able to achieve sustainable development goals and improve health in many areas such as clean water, air and energy resources, and poverty (International Council of Nurses, 2021; Jasemi et al., 2017; MacNeill et al., 2021). However, sustainability in healthcare is not sufficiently emphasized (Nyholm et al., 2018). For nurses to be able to use the understanding of sustainability in their care practices, the process of nursing education should provide them with knowledge, attitudes and skills related to sustainability.

Furthermore, global climate change has been identified as the biggest health threat of the 21st century (Brand et al., 2021; Intergovernmental Panel on Climate Change, 2022). The health and climate change global report of the World Health Organization (WHO, 2021) states that the preparedness of health institutions for the effects of climate change on the health system is insufficient. In addition, it is emphasized that health professionals do not have a sufficient level of understanding of the relationship between climate change and health. In the literature, it has been recommended that climate change and sustainability issues are integrated into formal education processes so that health professionals can make a connection between climate change and the care process. It is important that health professionals gain global health competencies before graduation with the integration of relevant subjects into the curriculum. One of these competencies is to have knowledge, attitudes and skills towards sustainable healthcare (Alvarez-Nieto et al., 2022; Huss et al., 2020; McLean et al., 2020; Schwerdtle et al., 2020; Torres-Alzate et al., 2020).

Sustainable healthcare competence requires a systemic perspective (Chen & Price, 2020; Edwards et al., 2020). Nursing, which is based on four basic paradigms of human, environment, health and nursing, has been using this systemic perspective for many years in the care process (Suarez-Baquero & Walker, 2021; Van Der Cingel & Brouwer, 2021). This perspective enables nurses to understand the necessity to protect and improve human health by maintaining natural resources in the environment. Moreover, nurses who perform the most basic initiatives in healthcare using many natural resources are responsible for knowing the sustainability and effects on the environment of their own care practices (Gallagher & Dix, 2020; Polivka & Chaudry, 2018). This requirement is clearly stated by the International Council of Nursing as an ethical principle in the Code of Ethics for Nurses (International Council of Nurses, 2021). Also, the Earth Charter, which is an international declaration, forms the basis for the ethical principles adopted by nurses for a more just, sustainable and peaceful global society in the 21st century (Earth Charter, 2000).

The change towards sustainable nursing care practices can become a part of the clinical field with nurses who have knowledge and positive attitudes about sustainability. Therefore, it is important to determine the sustainability attitudes of nursing students, each of whom will become a healthcare professional, and to decide on educational strategies that will develop positive attitudes (Alvarez-Nieto et al., 2022). However, there has been no study examining the attitudes of nursing students towards sustainability in Turkey, and there is no measurement tool that can be used. This study will provide a measurement tool for Turkish society to measure the attitudes of nursing students towards sustainability. This tool is internationally accepted and has been adapted for six different languages (Arabic, Dutch, German, French, Swedish and Spanish) (Richardson et al., 2019). Therefore, this study will enable Turkish nursing students to be included in international comparative studies (Alvarez-Nieto et al., 2022; Richardson et al., 2021). The data that can be collected at multicenter with different countries will help to reveal the need to improve the sustainability attitudes in nursing, to monitor the current situation and to shape the international learning contents for the nursing curriculum.

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## Methods

### Aim and Design

The aim of this methodological study was to cross-culturally adapt the Sustainability Attitudes in Nursing Survey into Turkish and evaluate its validity and reliability among Turkish speaking nursing students.

### Settings and Samples

The study population consisted of 824 undergraduate nursing students who studying at a state university in the spring semester of the 2021-2022 academic year in Turkey; 219 in the first class, 212 in the second class, 185 in the third class, and 208 in the fourth class.

In the literature, it is recommended to select a sample equivalent to 5 to 10 times the number of scale items in methodological studies (Esin, 2014, p.193-232). Since the Sustainability Attitudes in Nursing Survey (SANS-2) contains 9 items, 100 students were selected by simple random sampling method using a simple random numbers table via each class lists. Thus 400 students formed the sample group. Also, the randomly determined 40 students (10 students from each class) who undertook the pilot study were not included in the sample. To examine the reliability of the survey in terms of change over time, 25% of students participating in the first measurement from each class (total 100 students randomly selected from among sample group) completed the test again after 2 weeks. The data collection process was completed between 01-30 April 2022.

### Data Collection Tools

***Sociodemographic Characteristics Questionnaire:*** This form comprised 10 questions to elicit sociodemographic characteristics of the students such as age, gender, class, place of residence for the longest time, and the status of being educated about sustainability. The form was prepared by the authors based on the literature (Cruz et al., 2018; Richardson et al., 2019; Shaw et al., 2021).

***Sustainability Attitudes in Nursing Survey (SANS-2)***: This survey was developed by Richardson et al (22) to measure the sustainability attitudes of nursing students. The survey consists of 9 items under unidimension. Items are scored with 7-point Likert-type responses ranging from "Strongly disagree" to "Strongly agree". There are no reverse coded items and no cut-off point. The average of the item scores is calculated and a higher total score indicates a better attitude towards sustainability in nursing. The Cronbach's alpha value of the original scale was reported to be from 0.82 to 0.86 (Richardson et al., 2016; Richardson et al., 2019).

### Data Collection Process

The adaptation and psychometric evaluation of the Turkish version of the SANS-2 was carried out based on the guidelines proposed by Sousa and Rojjanasrirat (2011) and Beaton et al (2000). The first stage started with the linguistic equivalence (forward translation, synthesis of forward translation, backward translation), cross-cultural adaptation of the original English version of the survey into Turkish and the evaluation of content validity by experts. The second stage was the evaluation of face validity via pilot study, and the third stage was psychometric evaluation of the Turkish SANS-2 via Confirmatory Factor Analysis (CFA) and reliabilitty analysis.

#### *First Stage: Linguistic equivalence, cultural adaptation and content validity*

Firstly, permission to use the survey was obtained via e-mail from Professor Janet Richardson and the original version of the survey was reached. Then the survey was translated into Turkish by 5 experts in the field of English language and literature. The translations were compiled by an expert in public health nursing by determining the most suitable translation for each item. The compiled survey was sent to an expert in the field of Turkish language and literature and the

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Turkish survey was given its final form. The Turkish survey was translated back into English by a certified translator, and this version was sent to Janet Richardson for her opinion. The Turkish version of the survey was finalized in line with the opinion of Janet Richardson.

After the linguistic equivalence, the Turkish survey was sent to 10 experts working on issues such as environmental health, climate change and sustainability for content validity (4 in the field of fundamentals of nursing, 5 in public health nursing, and 1 in the field of landscape architecture). The content validity index was calculated using a 4-point Likert structure with the options of 1: Inappropriate, 2: Somewhat appropriate (item needs to be revised), 3: Appropriate (small changes are needed), and 4: Definitely appropriate. The experts evaluated the clarity and comprehensibility of the survey items, the suitability of the items to measure the sustainability attitude, and the appropriateness of the 7-point Likert type measurement structure of the survey. The experts were asked to submit suggestions for any items evaluated as 1, 2, or 3. After completion of the consultation process with the 10 experts, the Content Validity Index (CVI) was calculated for each item and the scale total by using Davis technique. For the CVI calculation of the items, the number of experts who evaluated the item at levels 3 and 4 was divided by the total number of experts. Survey items with a CVI of 0.80 and above were considered eligible. In the CVI calculation for the total of the scale, the CVI average of the items was taken (Davis, 1992; Lynn, 1986).

### *Second Stage: Face validity*

The pilot study was performed with randomly determined 40 students (10 students from each class) to determine the readability and comprehensibility of survey items, areas that students did not understand, and average response times. The students evaluated the survey items as understandable and responsed the survey in 10 minutes. The data obtained from pilot study were not included in the study.

### *Third Stage: Psychometric Evaluation*

In the original correlation matrix of the survey, one or two components recovered %58 and 70% of the variance respectively in the principal component analysis. The Richardson et al. elected to move forward with the unidimensional model because of the second component only explained 12% of the variance (Richardson et al., 2016; Richardson et al., 2019). Therefore, the unidimensional model of the survey was tried to be verified in this study.

The Kaiser-Meyer-Olkin (KMO) and Bartlett's sphericity test were applied to evaluated the adequacy of the sample size, and the original unidimensional model proposed by the SANS-2 was analyzed CFA. For CFA, The Chi-square test for Normality (NC), Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Tucker-Lewis Index (TLI), Incremental Fit Index (IFI), and Standardized Root Mean Square Residual (SRMR) were examined.

For the reliability of the survey, the Cronbach Alpha internal consistency coefficient as measure of the uniformity of the scale items and test-retest reliability as an indicator of consistency in measurements were examined.

## Limitations of the Research

In the study, Exploratory Factor Analysis was not utilized because the model of the original survey was tried to be validated in Turkish society. In addition, the differentiation of physical and technological infrastructures and geographical locations of nursing education institutions may have different results on nursing students' sustainability attitudes.

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### The Generalizability of the Research

Within the scope of this study, the survey, which is adapted to the Turkish society, will reveal the sustainability attitudes of Turkish nursing students in national and international studies. The data to be obtained from the studies can contribute to the development of nursing education about sustainability.

### Ethical Considerations

Permission was obtained from Janet Richardson via e-mail for the use of the survey. Written permission was obtained from the the Scientific Research and Publication Ethics Committee (decision number: 2022/18, decision date: 27.01.2022) and the Department of Nursing of the university where the study was conducted. The students selected with simple randomization were first informed about the study, and written consent was obtained from the students who wanted to participate with an informed consent form. The study was carried out in accordance with the principles of the Declaration of Helsinki.

### Data Analysis

IBM SPSS Statistics for Windows version 23.0 (IBM Co, Armonk, NY) and IBM Amos software version 24.0 for Windows programs were used to analysis the data. Whether the data showed normal distribution or not was examined with the assumption of multiple normality. Descriptive statistical methods (mean, standard deviation, frequency) were used to calculate descriptive features and survey scores. Confirmatory Factor Analysis (CFA) was applied to determine whether the original form and factor structure of the survey could be validated in a Turkish population. Cronbach's Alpha analysis was used for the reliability results and Pearson correlation analysis for the item-total correlation. The paired-sample t-test and intraclass correlation coefficient (ICC) were used for test-retest reliability. The level of statistical significance was set at $p<0.05$.

## Results

### Participant Characteristics

When the descriptive characteristics of the nursing students participating in the study were analysed, it was determined that the mean age was 20.85±1.49 years, 75.5% were female and 58.8% were living in the city centre. About half of the respondents (52.0%) did not previously heard of the concept of sustainability and majority of them (95.8%) had not received any training about the concept. Also, 99% of the students stated that they had not participated in activities such as seminars or conferences related to sustainability in the last year, and all the students stated that they did not have membership of any organization related to sustainability. 95.8% of the students stated that they did not follow on social media any individual, institution, etc., interested in sustainability, and 1.5% of the students followed an individual, institution, etc., on social media.

### Content Validity

In line with the evaluation of the 10 experts who examined the Turkish survey, it was determined that the content validity indexes of the survey items varied between 0.90 and 1.00, and the content validity index of the total survey was 0.91.

### Construct Validity

Before the construct validity, whether the sample size was sufficient or not was determined by Kaiser-Meyer-Olkin (0.74, $p<0.001$) and Bartlett's Test (1214.96, $p<0.001$). KMO value >0.50 and Bartlett's sphericity test <0.05 indicated the data was suitable for factor analysis. The Chi-square test for Normality (NC), Root Mean Square Error of Approximation (RMSEA),

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Comparative Fit Index (CFI), Goodness of Fit Index (GFI), Tucker- Lewis Index (TLI), Incremental Fit Index (IFI), and Standardized Root Mean Square Residual (SRMR) were used as fit indices for the single factor model in the Turkish survey, and their values are shown in Table 1. After modifications made between items 1 and 2, 6 and 7, 7 and 8, 6 and 8, it was determined that the model's goodness-of-fit indices were at the level of a good fit (Table 1). The data on the path diagram of the validated model and factor loadings were shown in Figure 1. Path coefficients for all the items were found to be statistically significant ($p<0.001$) (Table 2).

**Table 1. Confirmatory factor analysis of the Turkish Sustainability Attitudes in Nursing Survey**

| Fit Indices | Value |
|---|---|
| NC ($\chi 2=121.707/df=23$) | 5.29 |
| RMSEA | 0.10 |
| CFI | 0.91 |
| GFI | 0.93 |
| TLI | 0.87 |
| IFI | 0.91 |
| SRMR | 0.07 |

$\chi 2$: chi-square Test; df: degrees of freedom

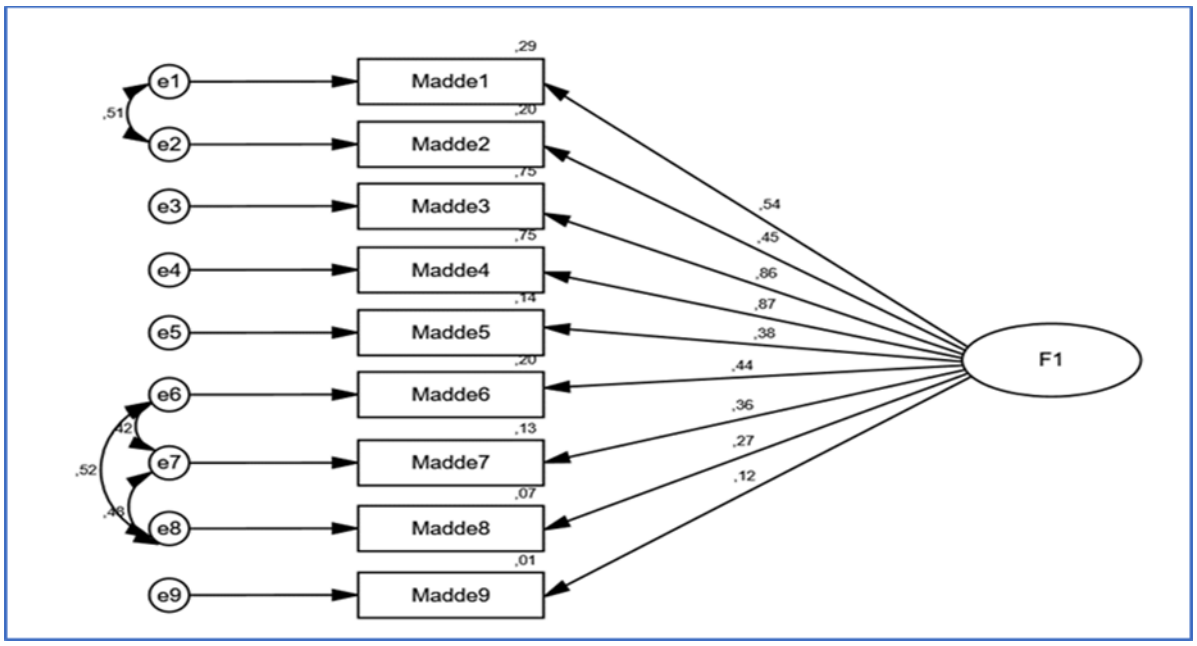


**Figure 1. Path diagram and factor loads**

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**Table 2. Road coefficients of survey items**

| Items | | Factor | $\beta^1$ | $\beta^2$ | Standart deviation | Test value | p |
|---|---|---|---|---|---|---|---|
| Item 1 | <--- | F1 | 0,537 | 1 | | | |
| Item 2 | <--- | F1 | 0,449 | 0,886 | 0,086 | 10,296 | <0,001 |
| Item 3 | <--- | F1 | 0,864 | 1,43 | 0,134 | 10,707 | <0,001 |
| Item 4 | <--- | F1 | 0,867 | 1,513 | 0,141 | 10,708 | <0,001 |
| Item 5 | <--- | F1 | 0,377 | 0,682 | 0,107 | 6,366 | <0,001 |
| Item 6 | <--- | F1 | 0,443 | 0,789 | 0,109 | 7,221 | <0,001 |
| Item 7 | <--- | F1 | 0,359 | 0,715 | 0,117 | 6,098 | <0,001 |
| Item 8 | <--- | F1 | 0,266 | 0,506 | 0,108 | 4,697 | <0,001 |
| Item 9 | <--- | F1 | 0,119 | 0,232 | 0,106 | 2,195 | 0,028 |

$\beta^1$: Standardized beta coefficient, $\beta^2$: Unstandardized beta coefficient

**Internal Consistency and Item Analysis**

The item analysis results of the survey were given in Table 2. The Cronbach's Alpha value of the survey was determined to be 0.76, which indicates high reliability. With the exception of item 9, the item-total correlations of all the items were > 0.30. When item 9 was removed from the survey, there would not be a significant increase in Cronbach's Alpha value, so the analyses were continued without removing item 9, so as not to disrupt the original structure of the survey (Table 3).

**Table 3. Item analysis results of the Turkish Sustainability Attitudes in Nursing Survey**

| | Mean | Standart deviation | Item-total correlations | Alpha-if-item-deleted scores | Cronbach's Alpha |
|---|---|---|---|---|---|
| Item 1 | 4.89 | 1.50 | 0.51 | 0.73 | 0.76 |
| Item 2 | 4.12 | 1.58 | 0.37 | 0.75 | |
| Item 3 | 5.46 | 1.33 | 0.59 | 0.72 | |
| Item 4 | 5.09 | 1.40 | 0.62 | 0.72 | |
| Item 5 | 3.94 | 1.45 | 0.45 | 0.74 | |
| Item 6 | 4.36 | 1.43 | 0.54 | 0.73 | |
| Item 7 | 3.95 | 1.60 | 0.48 | 0.74 | |
| Item 8 | 3.82 | 1.53 | 0.41 | 0.75 | |
| Item 9 | 3.32 | 1.56 | 0.11 | 0.79 | |

**Test-Retest Reliability**

In line with the test-retest conducted to evaluate the reliability of the survey in terms of change over time, no statistically significant difference was determined between the two measurements of the mean scores. A high level of statistically significant correlation was determined between the two measurements (Table 4).

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**Table 4. Test-retest results of the Turkish Sustainability Attitudes in Nursing Survey**

| | Mean±SD | Test value | p | ICC | P |
|---|---|---|---|---|---|
| Test | 4.58 ± 0.90 | t=1.029 | 0.306 | 0.81 (0.72 – 0.87) | **<.001** |
| Re-test | 4.50 ± 0.92 | | | | |

t: Paired samples t test, ICC: Intraclass correlation coefficient

## Discussion

Professional nurses should integrate sustainability, which is an increasingly important concept in the development of health and well-being, in nursing care. There is a need for valid and reliable measurement tools that will reveal the need for the integration process by evaluating the attitude towards sustainability in nursing. The SANS-2, developed by Richardson et al. is the only widely accepted measurement tool used for this purpose in the world (Richardson et al., 2019). In this study, the Turkish version was obtained by adapting SANS-2 in order to determine the nursing students' sustainability attitudes in a Turkish sample. The results demonstrated that the Turkish version of SANS-2 can be considered equivalent to the original survey and is a valid and reliable measurement tool.

### Validity

The measurement tools to be adapted for a different society should be tested for language equivalence, content and construct validity. In order to ensure the language equivalence of Turkish SANS-2, the CVI calculated as 0.91 in line with the expert opinions showed that the scale items were suitable for language and content validity. A value of at least 0.80 for CVI has recommended (Esin, 2014, p.193-232).

In the CFA conducted to examine the relationship between the items of the Turkish version of the SANS-2, the single-factor structure of the Turkish version of the survey was confirmed, similar to the original study, without removing any item from the survey. Although it is recommended that the factor loads of the items belonging to the measurement tools be 0.30 and above (Çapık, 2014), removing an item from the survey does not significantly change internal reliability (Richardson et al., 2019). In this study, the increase in Cronbach's Alpha coefficient was only 0.028 when item 9 was removed from the survey, which is the only item with a correlation below 0.30. Therefore, item 9 was not removed from the Turkish survey so as not to disrupt the original survey structure. The fit indices (SRMR, CFI, GFI, IFI) of the validated single-factor Turkish survey were found to be at the values accepted as good fit. In the literature, it has been stated that values of 0.90 and above for CFI, GFI, TLI and IFI, 5 and below for NC, and below 0.08 for RMSEA and SRMR indicate good fit (Ainur et al., 2017; Çoklu et al., 2018, p.271; Schumacker & Lomax, 2010). At the same time, it is known that fit indices are alternatives to each other, such as using the GFI value instead of the NC value or the CFI value instead of the GFI value (Çoklu et al., 2018, p.271; Schumacker & Lomax, 2010). As a result, the fit indices showed that the model in the Turkish version of SANS-2 had acceptable fit.

### Reliability

The Cronbach's Alpha value of the Turkish version of SANS-2 was determined to be 0.76. The Cronbach's Alpha value is 0.86 for the original SANS-2 (Richardson et al., 2019), and the value ranges between 0.73 and 0.83 in the process of adapting the survey to other languages (Richardson et al., 2016). A measurement tool is considered unreliable when Cronbach's Alpha value is lower than 0.40, weak between 0.40-0.50, low between 0.50-0.60, adequate between 0.60-0.70, high between 0.70-0.90 and as perfectly reliable for values above 0.90 (Özdamar, 2016). Therefore, it is recommended that the Cronbach's Alpha value is 0.70 and above (Cho & Kim, 2015). The

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Cronbach's Alpha value obtained in this study was close to the value reported for the original survey, showing that the Turkish version of SANS-2 is a highly reliable measurement tool.

As a result of the test-retest analysis performed to test the reliability of the survey in terms of change over time, it was determined that the ICC between the first measurement and the retest was 0.81. The ICC value may be between 0 and 1, and the closer the value is to 1, the higher the consistency (Koo & Li, 2016). In this study, taking consistent measurements from the survey at different times showed that the Turkish SANS-2 is reliable as a measurement tool.

## Conclusion

It is extremely important for the sustainability of healthcare that nurses who use many resources in the care process have sustainable healthcare knowledge, attitudes and skills. In the nursing education process for the training of professional nurses, the evaluation of students' attitudes towards sustainability in nursing is possible with valid and reliable measurement tools. In this study, the validity and reliability of the Turkish version of SANS-2, which is the only widely accepted measurement tool that deals with sustainability in nursing, was examined. The results demonstrated that the Turkish version of the SANS-2 is equivalent to the original survey and it is a valid and reliable measurement tool that can be used to measure the sustainability attitudes of nursing students. The survey adapted to Turkish can be used in nursing education, practice and research. The data to be obtained with this survey in Turkey will be able to accelerate the international scientific studies needed for sustainability in nursing. Therefore, with the integration of sustainability into nursing education, opportunities may arise for the development of standard educational content, effective teaching methods, etc.

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## Conflict of interest

Researchers have no conflict of interest regarding this research.

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