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Research

# Psychometric Properties of a Turkish Version of The Psychosocial Needs Inventory; Sampling from Oncology Patients

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ABSTRACT

*Objectives:* This study aimed to assess the reliability and validity of the Psychosocial Needs Inventory (PNI) among Turkish oncology patients.
*Methods:* A methodological study was conducted with 1,547 oncology patients. This validation study was divided into two phases. Phase 1 included translation of the PNI according to World Health Organization recommendations, investigation of content validity by experts, and a pilot study involving 136 participants. Phase 2 included a validity and reliability analysis of the PNI. Data analysis comprised exploratory (EFA) and confirmatory factor analyses (CFA), Cronbach's alpha, test-retest reliability, Hotelling's $T^2$ test and item-total score correlation, and the Content Validity Index (CVI).
*Results:* For the phase 1, the CVI for items and scale were >.75 and .883, respectively. Cronbach's alpha values of the subdimensions ranged between 0.84 and 0.94. The test-retest analyses of the subdimensions showed correlation coefficients based on the pilot test ($p < .001$). For the phase 2, based on the fit indices in confirmatory factor analysis, the structures of the dimensions "Importance" and "Satisfaction" were acceptable. Cronbach's alpha values of the subdimensions ranged between 0.84 to 0.94 in the "Importance" dimension and 0.86 to 0.94 in the "Satisfaction" dimension. As a result of EFA, the Kaiser-Meyer-Olkin, Bartlett's test ($p < 0.001$) and PNI Importance explained at 68.46% and PNI Satisfaction at 70.15% of the total variance by the six-factor structure. CFA showed that the indices and validity, including content validity, convergent validity were satisfactory.
*Conclusion:* The PNI, which was found to be a valid and reliable measurement tool, can be used to determine the psychosocial needs of cancer patients.
*Implications for Nursing Practice:* Health professionals need to use the PNI to measure their importance to cancer patients' psychosocial needs and assess their satisfaction with meeting them to improve holistic care and support.


Globally, cancer is a significant public health concern and a leading cause of mortality and morbidity.[1,2] Despite advances in cancer diagnosis and treatment, patients still struggle with severe psychosocial difficulties.[3,4] The disease, which is often associated with pain and suffering, requires prolonged and demanding treatment.[5] People diagnosed with cancer undergo significant life changes during remission, relapse, and terminal stages, indicating a transformative journey from diagnosis to treatment.[6] In addition to cancer symptoms, new problems, such as hair/weight loss and changes in skin color and texture, may arise as side effects of treatments such as chemotherapy and radiotherapy.[7,8] These changes may lead to the development of anxiety, tension, grief, and sadness for their current condition and psychological distress. Studies have reported that only 30% of oncologists notice patients' psychological distress,[9,10] patients' distress cannot be correctly identified by oncology nurses,[11] or the levels of distress identified are lower than patients' report.[12] Therefore, efforts should be made to recognize and determine patients' psychosocial and physical needs.[13] Identifying the psychological needs of patients and providing care in this context can increase the quality of life and compliance with treatment, reduce physical and psychological morbidity and contribute to reducing the financial burden on the health system.[14,15]

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**Layperson Summary**

**What we investigated and why**

Oncological problems not only cause physiological problems in patients but can also cause psychosocial problems. Therefore, it is necessary to use reliable tools to identify the psychosocial needs of patients. Accordingly, this study aimed to examine the validity and reliability of the Psychosocial Needs Inventory among cancer patients in Turkey.

**How we did our research**

The study was conducted with 1,547 patients with oncological problems. The consistency of the data over time, validity, and reliability were analyzed using statistical methods.

**What we have found**

The results showed that the Psychosocial Needs Inventory is a valid and reliable tool. It effectively measures the psychosocial needs of cancer patients. The reliability of the Psychosocial Needs Inventory was confirmed through strong consistency in the responses and a good fit in the analysis of its structure.

**What it means**

The study's findings suggest that the Psychosocial Needs Inventory is a useful tool for healthcare professionals to identify and understand the psychosocial needs of cancer patients. By using this tool, healthcare providers can provide better, more comprehensive care and support to patients and improve their quality of life.

Effective cancer treatment requires a holistic approach based on the biopsychosocial model, which emphasizes the critical importance of addressing patients' psychosocial needs as well as their physical health problems.[14] This approach significantly improves quality of life by rigorously considering each patient's unique psychological and social circumstances, as well as their personal history and response to the disease.[14-16] Focusing primarily on these psychosocial aspects is vital as they profoundly affect patients' overall health outcomes and their ability to cope with the disease. By integrating these factors, healthcare professionals can provide more comprehensive and empathetic support to people affected by cancer.[16] Psycho-oncology literature emphasizes the need to integrate the psychosocial dimension of health into treatment and care and published consensus reports and algorithms suggest that psychological distress should be considered as the sixth vital sign.[17,18] The psychosocial needs of cancer patients are crucial for their overall well-being and quality of life. These needs include emotional, social, cognitive, spiritual, and role functions.[19] Studies have shown that the fulfillment of these psychosocial needs is associated with reduced emotional distress, anxiety, and depression, improved adherence to treatment, enhanced quality of life, and improved survival rates among cancer patients.[20] In the literature, it is stated that determine psychosocial needs, particularly in areas such as emotional support, information, and psychological care.[14,17,21] Therefore, determining patients' psychosocial needs are essential.[22,23]

Despite the recognized importance of addressing psychosocial needs, there are challenges in the provision of psychosocial support to cancer patients. In particular, current oncology clinical care systems struggle to meet the diverse psychological needs of patients globally.[23,24] Assessing the psychosocial needs of cancer patients is crucial to ensuring comprehensive care. The use of valid and reliable tools is essential in this process. This is important as it helps healthcare providers focus on enhancing the quality and effectiveness of emotional support, information provision, and psychological care, thereby addressing the significant psychosocial challenges faced by many cancer patients. In Turkey, there are measurement tools for assessing the psychological needs of individuals.[25,26] However, these measurement tools assess the needs of healthy individuals, or one of the sub-dimensions of the measurement tools assessing the quality of life of individuals with cancer assesses the psychological needs of patients with cancer.[27,28] Therefore, no measurement assesses the psychological needs of patients holistically; communication, identity, emotional, spiritual, activities of daily living, and interactions with health professionals. Institute of Medicine[25] pointed out that the first step to accurately meet psychosocial needs is to determine these needs using valid and reliable measurement tools. In literature, Thomas et al. (2001) developed the Psychosocial Needs Inventory (PNI) to examine patients' psychosocial needs and measure their level of satisfaction with the determined needs. The PNI is reliable, but validity, explanatory, and confirmatory factor analyses were not performed.[29] Therefore, this study aimed to assess the validity, reliability, explanatory, and confirmatory factor analyses of the Psychosocial Needs Inventory (PNI) for Turkish oncology patients.

## Methods

### *Setting, Sample, and Design*

This research used a methodological design. This study aimed to assess the reliability and validity of the Psychosocial Needs Inventory (PNI) in Turkish oncology patients. The study was conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines.[30] The STROBE guidelines provide a structured approach to reporting observational studies. Steps were followed with a clear title, introduction, methods with study design, setting, participant, data collection tools, data collection procedure, results and conclusions outlined in the guidelines.

The study was conducted between January-August 2018 at 32 hospitals (university: 12, public: 11, private: 9) from 12 regions, which were selected according to Turkey's Statistical Regional Units Classification among patients receiving inpatient settings. [31] The population of the study consisted of a total of 32 hospitals randomly selected from each of the 12 geographical regions according to the Turkey's Statistical Regional Units Classification, including one public, one university and one private hospital. Since there were no private hospitals in Western Marmara, Central Anatolia and Northeastern Anatolia, no private hospitals could be selected from these three regions, and nine private hospitals in the remaining regions that carry out oncology diagnosis and treatment were included in the sample. The sampling frame consisted of patients who received outpatient and inpatient treatment and follow-up for cancer in these 32 hospitals. In the study, patients who received outpatient chemotherapy, radiotherapy treatment and patients who completed their treatment and came to routine doctor control were included.

The inclusion criteria for participants were as follows; being diagnosed with cancer; being over 18 years old; undergoing cancer treatment; being able to understand and speak Turkish fluently and being volunteer participation. The exclusion criteria for participants were as follows; being in the terminal periods; incomplete data collection tool.

Determining the sample size for scale, Tabachnick and Fidell suggest that the participant/item ratio should be 10:1,[32] while Hogarty et al.,[33] suggest this ratio to be 20:1 from an alternative perspective. The evaluation of sample size in scale validity and reliability studies is based on certain criteria: <100: very low; 100 to 200: low; 300: good; and 500 to 1,000: very good. For an effective factor analysis, researchers should target at least 20 participants per item.[34,35] When

this principle is applied to the 48-item PNI, it is aimed to reach at least 960 participants to ensure the robustness of inventory validity and reliability studies. Considering the dropout rate the sample size increases at 20% and it was targeted to reach 1,152 participants. The researchers reached 1,547 patients during January-August 2018 from 32 hospitals.

*Data Collection Tools*

In this study, Patient Introduction Form, the Psychosocial Needs Inventory (PNI), Mental Adjustment to Cancer (MAC) and the European Organization for Research and Treatment of Cancer Core QoL Questionnaire (EORTC QLQ-30) were used for data collection. In this study, we utilized the Psychosocial Needs Inventory (PNI) alongside two established scales—the Mental Adjustment to Cancer (MAC) and the European Organization for Research and Treatment of Cancer Core Quality of Life Questionnaire (EORTC QLQ-30)—to evaluate the convergent validity of the PNI. The MAC scale measures psychological responses to cancer diagnosis and treatment, allowing us to correlate these responses with psychosocial needs as identified by the PNI. Similarly, the EORTC QLQ-30, which assesses the quality of life of cancer patients, helps us understand how the fulfillment of psychosocial needs impacts overall quality of life. By integrating these scales, we aim to provide a more comprehensive assessment of how psychosocial needs influence mental adjustment and quality of life in cancer patients, thereby validating the effectiveness of the PNI in capturing these important dimensions.

Patient Introduction Form: This form consists of questions about the participants' gender, age, educational status, marital status, people they live with (spouse or children), where they live (city, town, or village), employment status, income status, type of cancer, disease duration, stage of the disease, current treatment, and period of illness.

Psychosocial Needs Inventory (PNI): The PNI developed by Thomas et al. (2001) to evaluate psychosocial needs of cancer patients.[29] The inventory consists of 48 items. The PNI was consisted of seven subdimensions as follows; information (nine items; 1, 2, 3, 4, 5, 6, 7, 8, 9), healthcare professionals (10, 11, 12, 13, 14); emotional and spiritual needs (fifteen items; 15, 16, 17, 18, 19, 20, 39, 41, 43, 44, 4, 46, 47, 48), identity needs (five items; 21, 22, 23, 24, 25), needs for maintaining daily living activities (eight items; 26, 27, 29, 30, 31, 32, 33, 40), Practical child (one item; 28), and needs related to support (five items; 34, 35, 36, 37, 38). Cronbach's alpha coefficient for each category was found to be above 0.70.[29] The PNI consists of two dimensions: "Importance" and "Satisfaction." In the first dimension, individuals were asked to select the most appropriate option to the question "How important has this need been to me in the past few weeks?" Responses were rated between 1 and 5 points (1= Not at all important, 2= Not important, 3= Neutral, 4= Important, 5= Very important). In the second dimension, they were asked to similarly respond to the question "How satisfied have I been with this need being met in the past few weeks?" (1= Not at all satisfied, 2= Not satisfied, 3= Neutral, 4= Satisfied, 5= Very satisfied). There are no reverse-scored items or cut-off points in the inventory. The score of each subscale is attained by taking the average of the scores obtained from the relevant items.[26] A high score indicates a high need for the relevant subdimensions. Although Thomas et al.,[29] performed Cronbach's alpha coefficient for each category of the PNI's, the validity, explanatory and confirmatory factor analyses have not yet been conducted. Permission was obtained from Thomas et al. to conduct the validity and reliability analyses of the inventory.

Mental Adjustment to Cancer (MAC): This scale was developed by Watson et al. to determine the reactions of cancer patients.[36] The validity and reliability of the Turkish version was verified by Natan[37] This scale is based on the perspective that individuals' perceptions of cancer determine their attitudes toward the disease.[36] The scale consists of five coping responses: Fighting spirit, helplessness/hopelessness, anxious preoccupation, fatalism, and cognitive avoidance and comprises 40 items.[36] Responses are rated on a four-point Likert-type scale ranging from 1 (Definitely does not apply to me) to 4 (Definitely applies to me). It has no overall score, and none of the items are reverse scored; average scores are calculated for each category. Higher scores indicate that the patient uses the response in that category more frequently. Cronbach's alpha coefficients of the categories vary between 0.58 and 0.72.[37] In this study the Cronbach's alpha coefficient was 0.81.

The European Organization for Research and Treatment of Cancer Core QoL Questionnaire (EORTC QLQ-30): The EORTC QLQ-30 was developed by Aaronson et al.[38]. It is a 30-item questionnaire comprising three categories: Functional Scales, Global Quality of Life Scales, and Symptom Scales. All items, excluding items 29 and 30, are rated on a four-point Likert-type scale, with scores ranging from 1 (not at all) to 4 (very much). Items 29 and 30 of the Global Quality of Life are scored on a seven-point linear analog scale from 1 (very poor) to 7 (excellent). The scale has no reverse-scored items. Functional scales contain items assessing physical functioning, role functioning, cognitive functioning, emotional functioning, and social functioning. The Global Quality of Life scales consist of global health status and quality of life items. The Symptom scales include fatigue, nausea and vomiting, pain, dyspnea, insomnia, appetite loss, constipation, diarrhea, and financial impact. High scores on the Functional scale and Global Quality of Life scale indicate a high or healthy functioning level and a high quality of life, respectively. However, high scores on the Symptom scales indicate poor symptomology and health. The validity and reliability of the Turkish version of this scale were assessed by Güzelant et al. among patients with lung cancer and Cankurtaran et al.[37] among all cancer patients.[28] Cronbach's alpha coefficients of the subscales ranged between 0.70 and 0.89 in Güzelant et al. study and between 0.56 and 0.85 in the Cankurtaran et al. study.[39] Cronbach's alpha coefficients of the subscales ranged between 0.83 and 0.91 in this study.

*Data Collection*

The study was conducted in 32 hospitals distributed among university hospitals, public hospitals, and private hospitals between January and August 2018. The sample included 1547 oncology patients in 32 hospitals in Turkey. For this purpose, the PI researcher first contacted the nursing services managers of each hospital by telephone and gave information about the research. The name and contact information of a nurse who would collect data from that hospital were obtained from each hospital's director of nursing services. Then, 32 nurses who would collect data were reached by the PI and the researcher (KS), and detailed information about the research was given through an online meeting. Afterward, a WhatsApp group was created to ensure continuous communication with the nurses. PI and KS managed questions and problems that nurses may experience during the data collection. In addition, one of the researchers (KS) visited the hospitals where the nurses worked at least twice during the data collection process.

The nurses administered the questionnaires to the patients who were eligible for sampling because they were nurses working in the oncology field of the same hospital; when they came for chemotherapy and radiotherapy treatment or for routine examination, a suitable area was arranged in the hospital, and they applied the questionnaires with the face-to-face interview technique. Nurses supported patients who asked for help in filling out the questionnaire. The participants were informed that the data would be used for this scientific study and that they could leave at any time without giving any reason.

### Ethical Considerations

Ethics approval for this study was obtained from the Ethics Committee of XX University (Decision No: 2016.155.IRB3.086) and permission was obtained from all institutions where the research was conducted. In the first phase of the study, permission was obtained from Professor Thomas to verify the validity and reliability of the PNI. The study was carried out in accordance with the Declaration of Helsinki.

### Translation Process

At the beginning of the study, official permission for the Turkish adaptation and use of the PNI inventory was obtained via e-mail communication. The process of translation followed the World Health Organization guidelines and involved translating the text, conducting a reverse translation, reviewing it with an expert panel, and implementing a pilot study. Two linguists with proficiency in both languages and unfamiliar with the inventory assessed the language validity of the instrument. Subsequently, the Turkish translations were evaluated and revised by the research team and an external expert. The revised inventory was further examined by a Turkish linguist, and to confirm conceptual and linguistic equivalence, the Turkish version was back translated into English by two different linguists following the advocated methodology. This rigorous process ensured the linguistic and conceptual agreement of the inventory for the purposes of this study.

### Content Validity

Content validity reflects how well an instrument includes an appropriate range of items relevant to the concept being assessed and is crucial in developing scales. The content validity index (CVI) is the most commonly used measure in quantitative assessments.[40] There are two kinds of CVI: items content validity index (I-CVI) and scale content validity index (S-CVI). It is recommended by the World Health Organization that this process should be carried out in scale adaptation studies. In this context, we examined I-CVI and S-CVI with expert evaluations as suggested by Polit and Beck after back translation. There are several variations labeling the four ordinal points, but the scale that seems to be used most often is 1= not relevant, 2= somewhat relevant, 3=quite relevant, 4=highly relevant.[40] Then, for each item, the I-CVI is computed as the number of experts giving a rating of either 3 or 4, divided by the number of experts for I-CVI, for S-CVI is computed as the number of the item's experts giving a rating of either 3 or 4. In accordance with the scale study guidelines proposed by Polit et al.[40] and Polit and Beck,[41] it is recommended to consult at least 3 to 20 expert opinions to assess both items content validity index (I-CVI) and scale content validity index (S-CVI).

Experts were identified according to their expertise in psychiatric nursing and psychology working with oncology patients. A total of ten experts, including nine assistant professors in nursing and one measurement evaluation specialist, were involved. All the experts are familiar with concept of the Psychosocial Needs in cancer patients. Nine experts were faculty members working in the field of psycho-oncology. These experts were carefully selected for their expertise in scale validity and reliability studies. These experts, who were carefully selected for their expertise in scale validity and reliability studies, calculated content validity indices (CVI) for each item in the draft. I-CVI of all items were found to be at the desired level ($>$0.75).[41] The S-CVI value calculated based on the experts' opinion for the entire scale was 0.883. These results, which are in line with established standards, indicate unanimous agreement among experts. Revisions were made to the draft following expert recommendations. At this stage, no item was removed from the scale.

### Pilot Test

An initial evaluation was conducted to assess the readability, comprehensibility, and clarity of the draft inventory through expert judgements. In order to ensure homogeneous distribution from the 32 hospitals where the study would be conducted, patients receiving treatment in these hospitals were included in the pilot study. It was planned to include five patients from each hospital. This preliminary phase involved administering the same inventory to these participants twice: at baseline and again after a two-week interval. This approach enabled us to assess the stability of the inventory over time and to ensure its reliability in measuring what it was intended to measure consistently at different time points. Preliminary test were carried out with a total of 136 people with complete pre-test and post-tests. Data from this preliminary study were excluded from analyses of the main sample to maintain the integrity and independence of the validation process. Feedback from this preliminary phase was crucial in making necessary adjustments to the inventory, which helped to finalize it for more extensive use in the main study.

### Data Analysis

The study data were statistically analyzed using SPSS Version 23.0 (IBM Corp., Armonk, NY) and AMOS 22.0 package programs. To assess the content validity, the Item Level Content Validity Index (I-CVI) and the Scale Level Content Validity Index (S-CVI) were calculated using the Davis technique. Agreement between the test-retest measurement results was demonstrated using Pearson's correlation coefficient. Item analysis was performed to determine whether there were any inappropriate items. The distinctiveness of the items was determined using the comparison of upper and lower 27% groups. Cronbach's alpha coefficient was used to assess the internal consistency of the inventory and subdimension. Exploratory (EFA) and confirmatory factor analysis (CFA) were used to determine the consistency of the dimensions and the original structure. For exploratory factor analysis, the Kaiser-Meyer-Olkin test was applied to evaluate sample adequacy, while Bartlett's test was used to evaluate the factorability of the items. Principal components analysis was performed for factor extraction while Varimax method was used for factor rotation. CFA is used to assess whether the factors identified through EFA align with those anticipated based on theoretical grounds. In the context of scale development and when conducting validity and reliability assessments, CFA is essential for validating the structure identified by EFA. In health research studies that involve scale development with a smaller sample size, it is advised to first conduct an EFA and then a CFA on the same dataset. Consistent with these guidelines, our study implemented both EFA and CFA. CFA was evaluated based on the following indices: CMIN/df, goodness of fit index (GFI), adjusted goodness of fit index (AGFI), normalized fit index (NFI), relative fit index (RFI), incremental fit index (IFI), Tucker-Lewis's index (TLI), comparative fit index (CFI), and root mean square error approximation (RMSEA). Since there are no existing measures to determine psychosocial needs, except for PNI, the EORTC QLQ-30 and MAC were used since they were concerned with psychosocial needs. PNI's correlations with the EORTC QLQ-30 and MAC were calculated to demonstrate its convergent validity. Pearson's or Spearman's correlation coefficients were used to determine convergent validity. In addition, sub-group analysis was carried out to assess the validity of the inventory and the relationship between gender, diagnostic group, and age and inventory score was examined. The Mann-Whitney U Test, Kruskal Wallis test, and Spearman's correlation coefficient were used to detect these relationships.

## Results

Of the participants included in the study, 60.9% were female, and the mean age of the participants was 54.0 ± 12.6 years and the mean disease duration was 23.5 ± 35.1 months. About 81.6% were married, 38.2% were elementary school graduates, 41.7% were living with a spouse, 63.2% were living in a province, 47.3% were unemployed, and 52.9% had moderate income. Among the patients, 20.9% had lung cancer, 44.5% had breast cancer, 23.5% had colorectal cancer (or rectal cancer, 9.6% had gastric cancer), 36.9% with cancer detected in the early stage (Stage I-II), 71.9% with patients in advanced stages (Stages III-IV). A total of 89.9% of the patients were receiving chemotherapy, and 46.7% did not need receive help from others for their daily living activities. Most of the (98.1%) of patients had no psychiatric illness, 8.9% had received psychiatric support before treatment, 45.6% had received psychological support from their hospital during cancer treatment.

### *Translation Results*

During the reverse-translation stage, a certified professional translator, who had not seen the original version, translated the reconciled version of the questionnaire back into English. This approach-maintained independence between the original translation and the reverse translation. Discrepancies between the original questionnaire and the back-translated version were identified and corrected. The final draft of the translated instrument was then evaluated against the original scale, leading to the creation of a prefinal version of the PNI.

### *Content Validity Index*

The content validity was assessed using the Content Validity Index (CVI). All items on the PNI had Item-Level CVI (I-CVI) scores ranging from 0.75 to 1.00, indicating high content validity. The Scale-Level CVI (S-CVI) averaged 0.883, showing strong agreement among experts on the items' relevance and clarity for assessing cancer patients' psychosocial needs.

### *Item Analysis of the PNI*

In the assessment of validity, items 12, 17, 18, 19, 31, 41, and 46 exhibited low item-to-total and inter-item correlations according to the analysis performed to determine whether there was an inappropriate item in the “Importance” dimension. These items were excluded from the factor analysis. Similarly, items 12, 17, 18, 19, 31, 41, and 46 exhibited low item-to-total and inter-item correlations in the “Satisfaction” dimension and these items too were excluded from the factor analysis. Item 28 was not included in the factor analysis and was evaluated separately as it was the only item related to childcare needs.

The factor structure of the inventory was found to differ from the original version (Thomas, 2001) because of the factor analysis conducted for construct validity. According to the new factor structure, the factors, and names of the PNI Importance and PNI Satisfaction dimensions are as follows:

Factor 1: Emotional and social needs: 39, 40, 42, 43, 44, 45, 47, 48.
Factor 2: Needs related to interaction with healthcare professionals and receiving information: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14.
Factor 3: Needs related to spiritual identity and self-perception: 15, 16, 20, 21, 22, 23, 24, 25.
Factor 4: Need for support: 34, 35, 36, 37, 38.
Factor 5: Needs related to maintaining daily living activities: 26, 27, 29, 30, 32, 33.
Factor 6: Needs related to childcare: 28.

The naming of the newly extracted dimensions was based on a thorough analysis of the items that loaded significantly on each factor. We ensured that the names accurately reflected the content and psychosocial aspects that the items were intended to measure. For example, the dimensions were named according to the dominant themes of the items, such as “Emotional and Social Needs,” “Healthcare Interaction and Information,” and “Spiritual Identity and Self-Perception.” Each name was chosen to clearly express the essence of the factors to facilitate their understanding and application in clinical settings.

### *Reliability Analysis*

According to the item analyses carried out for the reliability of the "Importance" dimension, it was found that corrected item-total correlations ranged between 0.55 and 0.82, representing a moderate-strong correlation, and Cronbach’s alpha coefficients that occur when the item was removed were found to range between 0.80 and 0.94 (Table 1). It was also determined that Cronbach’s alpha values of the subdimensions ranged between 0.84 and 0.94 and had strong consistency within the scope of internal consistency reliability of the “Importance” dimension (Table 2).

According to the item analyses carried out for the reliability of the "Satisfaction" dimension, it was found that corrected item-total correlations ranged between 0.60 and 0.83, representing a moderate-strong correlation, and Cronbach’s alpha coefficients after the item was removed were found to range between 0.81 and 0.94 (Table 1). Cronbach’s alpha values of the subdimensions ranged between 0.86-0.94 and had strong consistency within the scope of internal consistency reliability of the “Satisfaction” dimension (Table 2).

A test-retest method was applied to determine the reliability of PNI for its invariance over time. The test-retest analyses of the subdimensions of PNI Importance showed correlation coefficients ranging between 0.38 and 0.64 with a $p$-value of $<.001$. The test-retest analyses of the subdimensions of PNI Satisfaction showed correlation coefficients ranging from 0.42 to 0.60 with a $p$-value of $<.001$ (Table 2).

### *Exploratory Factor Analysis*

In the EFA applied to the PNI Importance and PNI Satisfaction dimensions. For PNI Importance Kaiser-Meyer-Olkin was 0.967, Bartlett's test was $\chi 2 = 44750{,}661$, df = 820 and had a $p$-value $<.001$. As a result of factor analysis conducted for PNI Importance, 68.46% of the total variance was explained by the six-factor structure (Table 3). For PNI Satisfaction Kaiser-Meyer-Olkin was 0.969, Bartlett's test was $\chi 2 = 44071{,}331$, df = 820, and had a $p$-value $<.001$. As a result of factor analysis conducted for PNI Satisfaction, 70.15% of the total variance was explained by the six-factor structure (Table 3).

### *Confirmatory Factor Analysis*

PNI Importance and Satisfaction six factors structure was approved with CFA For PNI Importance: CMIN/DF = 5.739, GFI = 0.889, AGFI = 0.865, NFI = 0.923, RFI = 0.911, IFI = 0.935, TLI = 0.925, CFI = 0.935, RMSEA = 0.055. For PNI Satisfaction, the structure was approved since the fit indices were found acceptable (CMIN/DF = 2.425, GFI = 0.890, AGFI = 0.867, NFI = 0.929, RFI = 0.918, IFI = 0.942, TLI = 0.932, CFI = 0.941, RMSEA = 0.054).

### *Convergent Validity*

The relationship between the subdimensions of PNI Importance and the EORTC QLQ-30 and MAC for convergent validity of the scale was determined (Table 4) and showed significant variance between 0.01 and 0.35. Similarly, the correlations of the subdimensions of PNI

**Table 1**
PNI Importance and PNI Satisfaction Item Analysis

| Dimension | Item | PNI Importance | | | PNI Satisfaction | | |
|---|---|---|---|---|---|---|---|
| | | Mean±SD | Corrected item-total correlation | Cronbach's alpha when item deleted | Mean±SD | Corrected item-total correlation | Cronbach's alpha when item deleted |
| Emotional and social needs | 39 | 4.22±0.85 | 0.706 | 0.925 | 4.06±0.83 | 0.710 | 0.927 |
| | 40 | 4.13±0.88 | 0.687 | 0.926 | 3.95±0.87 | 0.660 | 0.931 |
| | 42 | 4.02±0.98 | 0.815 | 0.917 | 3.85±0.95 | 0.827 | 0.918 |
| | 43 | 4.10±0.93 | 0.827 | 0.916 | 3.90±0.92 | 0.830 | 0.918 |
| | 44 | 4.02±0.97 | 0.826 | 0.916 | 3.83±0.95 | 0.830 | 0.918 |
| | 45 | 3.80±1.11 | 0.751 | 0.923 | 3.69±1.01 | 0.762 | 0.924 |
| | 47 | 3.94±0.96 | 0.731 | 0.923 | 3.81±0.91 | 0.763 | 0.923 |
| | 48 | 4.13±0.85 | 0.754 | 0.922 | 3.95±0.86 | 0.738 | 0.925 |
| Needs related to interaction with healthcare professionals and receiving information | 1 | 4.41±0.65 | 0.738 | 0.941 | 4.06±0.86 | 0.699 | 0.941 |
| | 2 | 4.45±0.62 | 0.783 | 0.939 | 4.12±0.82 | 0.746 | 0.940 |
| | 3 | 4.46±0.62 | 0.795 | 0.939 | 4.11±0.81 | 0.760 | 0.939 |
| | 4 | 4.50±0.59 | 0.813 | 0.939 | 4.22±0.74 | 0.805 | 0.938 |
| | 5 | 4.48±0.64 | 0.741 | 0.941 | 4.26±0.71 | 0.758 | 0.939 |
| | 6 | 4.49±0.59 | 0.825 | 0.938 | 4.21±0.74 | 0.824 | 0.937 |
| | 7 | 4.45±0.59 | 0.816 | 0.939 | 4.18±0.76 | 0.817 | 0.938 |
| | 8 | 4.39±0.64 | 0.741 | 0.941 | 4.11±0.79 | 0.784 | 0.938 |
| | 9 | 4.48±0.59 | 0.744 | 0.941 | 4.28±0.69 | 0.754 | 0.940 |
| | 10 | 4.52±0.58 | 0.739 | 0.941 | 4.05±0.91 | 0.669 | 0.942 |
| | 11 | 4.41±0.63 | 0.700 | 0.942 | 4.12±0.81 | 0.694 | 0.941 |
| | 13 | 4.19±0.75 | 0.551 | 0.948 | 3.87±0.90 | 0.623 | 0.944 |
| | 14 | 4.40±0.66 | 0.624 | 0.944 | 4.14±0.80 | 0.638 | 0.943 |
| Needs related to spiritual identity and self-perception | 15 | 4.14±0.89 | 0.758 | 0.915 | 3.93±0.89 | 0.699 | 0.922 |
| | 16 | 4.24±0.83 | 0.739 | 0.916 | 4.01±0.84 | 0.712 | 0.921 |
| | 20 | 4.08±0.86 | 0.743 | 0.916 | 3.86±0.86 | 0.754 | 0.918 |
| | 21 | 3.89±1.02 | 0.689 | 0.922 | 3.80±0.91 | 0.735 | 0.919 |
| | 22 | 4.12±0.83 | 0.789 | 0.913 | 3.90±0.84 | 0.793 | 0.915 |
| | 23 | 4.02±0.96 | 0.748 | 0.916 | 3.86±0.91 | 0.782 | 0.916 |
| | 24 | 4.04±0.92 | 0.811 | 0.911 | 3.86±0.89 | 0.797 | 0.914 |
| | 25 | 4.22±0.79 | 0.725 | 0.918 | 3.99±0.84 | 0.745 | 0.918 |
| Need for support | 34 | 4.53±0.59 | 0.720 | 0.847 | 4.35±0.76 | 0.722 | 0.870 |
| | 35 | 4.39±0.67 | 0.816 | 0.821 | 4.22±0.80 | 0.830 | 0.845 |
| | 36 | 4.23±0.81 | 0.639 | 0.867 | 4.10±0.87 | 0.730 | 0.870 |
| | 37 | 4.44±0.62 | 0.781 | 0.832 | 4.24±0.74 | 0.700 | 0.875 |
| | 38 | 4.33±0.80 | 0.624 | 0.871 | 4.15±0.81 | 0.700 | 0.875 |
| Needs related to maintaining daily living activities | 26 | 4.03±0.96 | 0.583 | 0.833 | 3.84±0.99 | 0.628 | 0.842 |
| | 27 | 4.20±0.85 | 0.659 | 0.813 | 3.83±1.05 | 0.630 | 0.843 |
| | 29 | 4.22±0.77 | 0.698 | 0.807 | 3.94±0.88 | 0.752 | 0.819 |
| | 30 | 4.36±0.67 | 0.570 | 0.831 | 4.04±0.92 | 0.606 | 0.845 |
| | 32 | 4.05±0.87 | 0.613 | 0.823 | 3.94±0.84 | 0.643 | 0.838 |
| | 33 | 4.26±0.70 | 0.681 | 0.812 | 4.02±0.81 | 0.677 | 0.833 |

Satisfaction and EORTC QLQ-30 and MAC showed significant variance of 0.01 to 0.29 (Table 4).

## Discussion

In this study, the validity and reliability of the PNI, originally developed by Thomas et al., were examined and it has been concluded that the PNI is a valid and reliable measurement tool. Content validity was achieved according to the experts' opinions. The fit indices were found to be within the acceptable values noted in the literature[42] or very close to those values for PNI Importance and PNI Satisfaction.

The assessment of the linguistic validity and overall consistency of the article is in line with established guidelines for scale studies, as suggested by Polit et al.[40,41] The I-CVI values calculated for all items exceeded the required level of >0.75, indicating that there was a consensus among the experts about the content validity of each item in the draft. Furthermore, the S-CVI value of 0.883 for the whole scale, which was determined based on expert opinions, indicates a high level of agreement among experts and is in line with established standards. These results are in line with findings in the existing literature, where adherence to rigorous content validity assessments is necessary to ensure the robustness of measurement instruments.[41]

**Table 2**
PNI importance and PNI satisfaction internal consistency and test-retest analysis

| Dimension | PNI Importance | | PNI Satisfaction | |
|---|---|---|---|---|
| | Cronbach's alpha | Test-retest correlation | Cronbach's alpha | Test-retest correlation |
| **Factor 1:** Emotional and social needs | 0.930 | 0.605* | 0.932 | 0.491* |
| **Factor 2:** Needs related to interaction with healthcare professionals and receiving information | 0.945 | 0.556* | 0.944 | 0.474* |
| **Factor 3:** Needs related to spiritual identity and self-perception | 0.925 | 0.480* | 0.928 | 0.442* |
| **Factor 4:** Need for support | 0.874 | 0.384* | 0.891 | 0.427* |
| **Factor 5:** Needs related to maintaining daily living activities | 0.845 | 0.644* | 0.860 | 0.606* |
| **Factor 6:** Childcare-related needs | | 0.587* | | 0.521* |

* $p < .001$.

**Table 3**
PNI importance and PNI satisfaction factor analysis results

| | PNI importance | | PNI satisfaction | |
|---|---|---|---|---|
| | Rate of variances explained by factors | EFA Results | Rate of variances explained by factors | EFA results |
| Factor 1<br>Factor 2<br>Factor 3<br>Factor 4<br>Factor 5<br>Factor 6 | KMO=0.967<br>Bartlett's test,<br>$\chi 2 = 44750{,}661$<br>df = 820<br>$p < 0.001$ | 68.99% | KMO=0.969<br>Bartlett's test,<br>$\chi 2 = 44071{,}331$<br>df = 820<br>$p < 0.001$ | 70.15% |

Item-total correlations ranging from 0.525 to 0.750 for both PNI Importance and Satisfaction dimensions were found satisfactory. In terms of internal consistency, Cronbach's alpha values exceeding 0.80 are considered to be indicative of a very high level of reliability as reported in the literature.[43] In this study, Cronbach's alpha values ranging from 0.84 to 0.94 for PNI Importance and PNI Satisfaction confirmed a high level of internal consistency reliability.[34] To assess the invariance of the inventory over time, test-retest analysis was used, where inter-measurement correlations are ideally expected to exceed 0.7.[43] In our study, the correlation coefficients obtained for PNI Importance and PNI Satisfaction were between 0.384 and 0.644, indicating statistical significance but relatively low invariance over time.[34] This may be attributed to the short interval between test and retest sessions and potential limitations in sample size and suggests caution in interpreting test-retest results.

The results of exploratory factor analysis (EFA) conducted on PNI Importance and PNI Satisfaction dimensions revealed promising findings.[44] The Kaiser-Meyer-Olkin measure of sampling adequacy, which indicates the suitability of the data for factor analysis,[45] yielded high values for both dimensions (0.967 for PNI Importance and 0.969 for PNI Satisfaction). Furthermore, Bartlett's test of sphericity showed statistical significance ($p$-value <.001), further supporting the suitability of conducting factor analyses on the data.[46] In the case of PNI Importance, EFA revealed a six-factor structure that collectively explained 68.99% of the total variance. Subsequent confirmatory factor analysis (CFA) on this modified six-factor structure yielded favorable results with acceptable fit indices, confirming the validity and reliability of the identified factors. Similarly, EFA for PNI Satisfaction revealed a different six-factor structure explaining 70.15% of the total variance. Despite the structural difference between the Importance and Satisfaction dimensions, the decision was made to apply the factor structure of the Importance dimension to the Satisfaction dimension, considering the practical implications. Subsequent CFA confirmed the adequacy of this decision, as the fit indices indicated an acceptable model fit.[47] The original PNI consisted of seven dimensions. In our study, six dimensions under the heading of 'Importance' and six dimensions under the heading of 'Satisfaction' were created. These changes in dimensions may be attributed to cultural differences, the specific psychosocial contexts of the Turkish oncology patient population, and methodological adjustments such as the translation and validation process. Furthermore, differences in the factor structure may be due to differences in the way patients prioritize and experience their psychosocial needs, which may lead to a restructuring of the underlying factor structure.

The convergent validity of the PNI Importance and PNI Satisfaction subdimensions was investigated by examining their correlations with the EORTC QLQ-30[37] and MAC.[28,39] The results revealed significant correlations ranging from 0.01 to 0.35 for the PNI Importance subdimensions and 0.01 to 0.29 for the PNI Satisfaction subdimensions. These findings suggest a significant relationship between psychosocial needs assessed by the PNI and quality of life and coping mechanisms measured by the EORTC QLQ-30[37] and MAC,[28,39] respectively. The significant correlations between the various subdimensions underline the relevance of the PNI in capturing psychosocial aspects that are in line with broader indicators of health-related quality of life and coping strategies among oncology patients. The observed differences in correlations suggest that different aspects of psychosocial needs, both in terms of importance and satisfaction, exhibit different relationships with quality of life and coping measures. This understanding may contribute to a more comprehensive assessment of the multifaceted impact of cancer on patients' psychosocial well-being. Significant correlations with the EORTC QLQ-30[37] and MAC[28,39] scales support the convergent validity of the PNI and confirm its potential as a valuable tool to comprehensively assess the psychosocial needs of oncology patients.

**Table 4**
Relations Between PNI Importance-PNI Satisfaction Dimensions and EORTC QLQ-30 and MAC

| | PNI importance | | | | | | PNI satisfaction | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6 | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6 |
| **EORTC QLQ-30** | | | | | | | | | | | | |
| Global quality of life | -0.008 | 0.082** | 0.004 | 0.058* | -0.005 | -0.059* | 0.154** | 0.175** | 0.174** | 0.187** | 0.151** | 0.071** |
| Physical functioning | -0.082** | 0.063* | -0.068** | 0.021 | -0.106** | -0.062* | 0.033 | 0.104** | 0.059* | 0.091** | 0.047 | 0.023 |
| Emotional functioning | -0.154** | 0.000 | -0.107** | -0.023 | -0.135** | -0.160** | 0.047 | 0.109** | 0.098** | 0.100** | 0.050 | -0.001 |
| General functioning | -0.045 | 0.077** | -0.013 | 0.050* | -0.058* | -0.104** | 0.023 | 0.088** | 0.049 | 0.097** | 0.036 | -0.042 |
| Cognitive functioning | -0.121** | 0.023 | -0.074** | -0.009 | -0.116** | -0.147** | 0.002 | 0.055* | 0.039 | 0.070** | 0.013 | -0.035 |
| Social functioning | -0.100** | 0.002 | -0.039 | 0.015 | -0.093** | -0.157** | 0.089** | 0.119** | 0.125** | 0.126** | 0.101** | 0.019 |
| Pain | 0.097** | -0.043 | 0.055* | 0.007 | 0.098** | 0.073** | -0.015 | -0.118** | -0.067** | -0.069** | -0.026 | 0.007 |
| Nausea-vomiting | 0.079** | -0.005 | 0.079** | 0.018 | 0.077** | 0.089** | -0.010 | -0.109** | -0.053* | -0.068** | -0.026 | 0.023 |
| Fatigue | 0.098** | 0.033 | 0.071** | 0.045 | 0.134** | 0.067* | -0.045 | -0.103** | -0.106** | -0.072** | -0.060* | -0.024 |
| Dyspnea | 0.041 | -0.091** | 0.039 | -0.059* | 0.035 | 0.012 | -0.035 | -0.105** | -0.029 | -0.093** | -0.052* | -0.039 |
| Sleep disturbance | 0.099** | -0.045 | 0.058* | -0.003 | 0.079** | 0.104** | -0.033 | -0.112** | -0.064* | -0.089** | -0.054* | 0.011 |
| Appetite loss | 0.060* | -0.033 | 0.046 | -0.015 | 0.058* | 0.029 | -0.013 | -0.080** | -0.061* | -0.063* | -0.035 | -0.007 |
| Constipation | 0.058* | -0.028 | 0.043 | 0.002 | 0.058* | 0.037 | 0.002 | -0.053* | -0.034 | -0.055* | -0.014 | -0.005 |
| Diarrhea | 0.062* | -0.065* | 0.029 | -0.021 | 0.027 | 0.073** | -0.009 | -0.073** | -0.034 | -0.081** | -0.019 | 0.030 |
| Financial impact | 0.087** | -0.039 | 0.024 | -0.024 | 0.091** | 0.110** | -0.078** | -0.071** | -0.090** | -0.132** | -0.095** | -0.041 |
| **MAC** | | | | | | | | | | | | |
| Fighting spirit | 0.238** | 0.358** | 0.256** | 0.345** | 0.276** | 0.064* | 0.224** | 0.260** | 0.241** | 0.298** | 0.194** | 0.063* |
| Helplessness/Hopelessness | 0.030 | -0.176** | 0.016 | -0.123** | -0.032 | 0.091** | -0.040 | -0.199** | -0.093** | -0.153** | -0.076** | 0.000 |
| Anxious preoccupations | 0.205** | 0.074** | 0.219** | 0.131** | 0.158** | 0.125** | 0.062* | -0.034 | 0.037 | 0.037 | 0.016 | 0.016 |
| Fatalism | 0.087** | 0.035 | 0.126** | 0.053* | 0.121** | 0.086** | 0.007 | -0.032 | 0.028 | -0.002 | 0.037 | 0.032 |
| Avoidance/Denial | 0.055* | -0.129** | 0.030 | -0.071** | -0.035 | 0.090** | -0.078** | -0.205** | -0.146** | -0.119** | -0.116** | -0.016 |

** $p < 0.01$.
* $p < 0.05$.

*Limitation*

This study has several limitations that should be considered. Firstly, most of the patients who agreed to participate in this study were being treated for solid cancer, thus limiting the generalizability of our findings to hematological malignancies. Secondly, most of the patients were in the advanced stages of their disease. The difference between the needs of advanced stage patients and early-stage patients may have affected the results. Thirdly, differences in treatment protocols, patient demographics and healthcare settings between different institutions may have been confounding variables in the analyses. Fourtly, the information form could have been improved to include common symptoms experienced by participants, such as pain or other physical symptoms. Failure to include these specific symptoms may have limited our ability to fully understand and address the wider range of experiences and needs of participants. Lastly, it is important to recognize that the PNI has been developed and used for over 20 years. Consequently, this long time since its inception suggests a potential need for comparisons with other validated versions of the instrument. These may limit the generalizability of the results.

*Implications for Practice*

The findings of this study have important clinical implications for the care and well-being of oncology patients. The validity and reliability of the PNI were analyzed and found to be appropriate for the Turkish population. The PNI may contribute to the implementation of more targeted and patient-centered interventions by enabling healthcare professionals, including oncologists, nurses, and psychologists, to gain deeper insight into the unique challenges faced by patients. The PNI can be very instructive for healthcare providers in monitoring patients' evolving psychosocial needs throughout their cancer journey. The fact that the PNI has both importance and satisfaction dimensions may enable healthcare professionals to efficiently interpret and integrate the results into patient care plans and provide a more holistic approach that addresses the nuanced psychosocial aspects of each individual.

## Conclusion

In this study, it was determined that the PNI, which can be used to evaluate the psychosocial needs of adult cancer patients and their satisfaction with these needs, is a valid and reliable measure and can be used in other studies and in clinical practice. The dimensions of the PNI were classified into six factors: emotional and social interaction with healthcare professionals and receiving information, spiritual identity and self-perception, support, maintaining daily living activities, childcare. Incorporating the PNI into routine clinical practice could contribute to more personalized and effective psychosocial support and ultimately improve the overall experience of care for oncology patients.

## Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

## CRediT authorship contribution statement

**Perihan Güner:** Writing – review & editing, Writing – original draft, Visualization, Validation, Supervision, Software, Resources, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Data curation, Conceptualization. **Nazmiye Kocaman Yıldırım:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Figen İnci:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **Kadriye Sancı:** Writing – review & editing. **Remziye SEMERCİ:** Writing – review & editing, Writing – original draft, Visualization, Validation, Software, Resources, Methodology, Formal analysis.

## Availability of Data and Material

Identified data supporting this study's findings are available. upon publication to researchers who provide a methodologically sound proposal for use. Proposals should be submitted to the corresponding author. The data is not publicly available due to privacy or ethical restrictions.

## Ethics Approval

Ethics approval for this study was obtained from the Ethics Committee of Koc University (Decision No: 2016.155.IRB3.086), and permission was obtained from all institutions where the research was conducted. In the first phase of the study, permission was obtained from Professor Thomas, the developer of the original scale, to verify the validity and reliability of the PNI. The study was carried out in accordance with the 1964 Declaration of Helsinki.

## Consent to Participate

Verbal and written consent was obtained from all participants after they were informed about the study, ensuring they understood the details.

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