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Exploring Stroke Patients' Needs: A Cross Cultural Adaptation and Validation of the Modified Needs Assessment Questionnaire.

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Abstract: Stroke survivors often face diverse unmet needs, highlighting the significance of identifying and addressing these needs to enhance rehabilitation outcomes and overall quality of life. This study aimed to validate the modified Needs Assessment Questionnaire (mNAQ) as a reliable and valid tool for assessing the needs of stroke patients in the Greek context. Additionally, the research sought to identify potential differences in the assessment of stroke patients' needs based on their stroke phase and National Institutes of Health Stroke Scale (NIHSS) scores. A sample of 71 adult stroke survivors, adhering to World Health Organization guidelines and providing autonomous consent, participated in the study. The mNAQ, comprising 141 items across 12 domains, was utilized to evaluate stroke patients' needs. The NIHSS and Barthel Index (BI) were employed for functional independence and mobility assessment. Data analysis incorporated confirmatory factor analysis, exploratory factor analysis, and Cronbach's reliability analysis to establish construct validity and internal consistency. Concurrent and known-groups validity analyses were conducted, and Spearman's rho correlation explored the relationship between mNAQ and BI scores. Non-parametric analyses were applied to identify differences based on stroke phase and NIHSS scores. The study revealed that the mNAQ initially lacked satisfactory psychometric properties in the Greek context. Subsequent modifications, guided by confirmatory and exploratory factor analyses, resulted in a refined three-factor scale encompassing 31 items in the domains of communication, mobility, and social functioning needs. This adapted measure effectively differentiated between acute and chronic stroke patients and those with minor and moderate strokes. In conclusion, the validated 31-item Greek mNAQ emerges as a crucial tool for comprehensively assessing the needs of stroke patients. Its application holds promise for optimizing post-stroke care, improving functional outcomes, and ultimately enhancing the overall well-being and quality of life for stroke survivors.

Keywords: post-stroke care; needs assessment; validity; rehabilitation; quality of life

1. Introduction

The exploration of the link between the users' perceptions, preferences, expectations, and satisfaction with care provides valuable information regarding deficiencies from the ideal care close to a patient's needs [1]. Previous research demonstrates that patients' needs & expectations are not receiving much attention, specifically the needs and expectations of stroke patients, in addition to the scarce investigation of factors influencing their unmet needs [2].

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Zawawi, Aziz, Fisher, Ahmad & Walker [3] through a systematic review, concluded to a wide range of unmet needs in stroke survivors living their life after stroke, including information provision, financial support for caregivers, community support, physical symptoms, rehabilitation services, psychological, transfer & mobility, social/recreational, employment, self-care, home management, and social interaction. Although the abovementioned factors' associations are found to be inconsistent and the differences between them are usually due to the research design (such as the timing that the needs are captured, the instruments that are used, or the population that is studied), sharing knowledge about unmet needs may reduce fragmentation in stroke care, contribute to a sustainable and dynamic stroke care delivery and encourage optimal use of resources available [3].

Previous studies suggest that self-perceived needs assessment can help the rehabilitation process by supporting autonomy, social connection, and adaptation [4], focusing on functional performance and self-management [5], and addressing concerns related to self-perceived health and daily activities [6]. The long-term problems experienced by stroke survivors can significantly decrease their quality of life. Additionally, the different phases of stroke, including the acute, subacute, and long-term or chronic phases, play a crucial role in determining the evolving rehabilitation needs of stroke patients, with each phase requiring tailored interventions to maximize functional recovery, address specific impairments, and support social reintegration and participation in daily activities [7]. By evaluating and reviewing the needs of stroke patients, healthcare providers and policymakers can identify gaps in care and develop targeted interventions to improve the overall quality of life for stroke patients.

Several studies have examined the interplay between stroke severity, the phases of stroke, and rehabilitation outcomes, shedding light on the varying needs of stroke patients at different stages of their recovery journey. For instance, Kwakkel et al. [8] investigated the relationship between stroke severity and rehabilitation outcomes, revealing that patients with more severe strokes, as indicated by higher NIHSS scores, experienced lower functional outcomes and longer rehabilitation stays. These findings underscore the necessity for more intensive and specialized rehabilitation interventions to address the complex motor and cognitive impairments of these patients.

Kersten et al. [9] found that people with severe disability after a stroke tend to report more unmet needs for rehabilitation and are less satisfied than people with mild to moderate disability [10]. Additionally, Hatem et al. [11] explored the combined impact of stroke severity and phases on rehabilitation needs, revealing that patients with severe strokes faced more substantial challenges across all phases of recovery, necessitating more intensive therapy and longer rehabilitation stays. Notably, specific needs, such as communication and emotional support, were accentuated during the subacute phase, emphasizing the importance of tailored interventions to meet evolving requirements throughout the recovery journey [12].

All the above, illustrate how stroke severity and the phases of stroke significantly influence rehabilitation needs and outcomes. Therefore, to assess the needs of people with stroke, there should be a valid tool for recording them, which may be used by health professionals (doctors, nurses, physiotherapists, exercise trainers) in order to contribute to the better management and rehabilitation of the patient. The modified Needs Assessment Questionnaire (mNAQ) comprised 141 items in 12 domains and was developed by Olaleye et al. (2021) to assess expectations of patients with neurological conditions (NCs) from rehabilitation.

The aim of this research was to validate the mNAQ as a dependable and accurate tool to assess the needs of stroke patients in a Greek setting and further investigate whether they differentiate in terms of the stroke severity and the phase of the stroke.

2. Materials and Methods

2.1. Sample & Data collection

Individuals who met the following criteria were eligible to participate in the study: (1) being an adult, (2) having received a diagnosis of stroke according to the World Health Organization guidelines, and (3) having the capability to give consent autonomously. The sample consisted of 71

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stroke patients in acute/subacute phase (79%) and in chronic phase (21%), mostly men (63,4%), aged 60-69 (42,3%). 78% of them had a minor stroke and 22% moderate stroke.

2.2. Measures

In preparation, researchers encompassed securing written consent from developers [13] to adapt the mNAQ for Greek context among stroke patients. Translation followed guidelines [14] and was reviewed by five stroke care experts. Pilot survey with 10 non-participants ensured content validity; no comprehension issues were reported, though fatigue arose from the 141-item questionnaire. The magnitude of each need is scored on a five-point scale from 1 = not a need to 5 indicating '[a] very large need'. Furthermore, the National Institutes of Health Stroke Scale (NIHSS) and the Barthel Index (BI) were used. The NIHSS assesses post-stroke neurological condition via 11 factors [15]. The Barthel Index evaluates daily activity independence [16]. These measures collectively underpin the study's robust methodology.

2.3. Data analysis

AMOS and SPSS (version 21.0) were used for statistical data processing, and more specifically: Descriptive analyses, Confirmatory Factor Analysis, Exploratory Factor Analysis, Cronbach's reliability analysis and Non-Parametric tests for independent samples.

3. Results

3.1. Scale Validation

In order to assess the psychometric properties of the mNAQ scale, first, item-to-total correlation value was estimated for each trait. Items with a corrected item-to-total correlation less than .30 should be discarded [17]. The results revealed that one item had less than the cut off criterion. Then, principal component analysis with oblimin rotation was performed. A three-factor pattern emerged after removing items that had high cross-loadings on multiple factors, indicating that they were not adequately measuring the intended construct. Removing such items enhanced the scale's clarity and interpretability. Furthermore, multiple items in the original scale were highly correlated or measured similar aspects of the construct. Therefore, redundant items were eliminated to streamline the scale and reduce participant burden.

The EFA revealed that of the 31 remaining items, seventeen items exhibited significant loadings for the construct of "Mobility", ten items for the construct of "Communication", while four items showed significant loadings for the construct of "Social functioning". These findings suggest that the resulting factorial patterns differ from the original mNAQ framework, though items removal enhanced the scale's clarity and interpretability.

Another round of EFA was performed in the remaining 31 items and a clear three-factor structure was emerged. The new factor structure with the retain traits explained 81,78 % of the total variance. All the items had strong loadings, and exceeded the 0.70 threshold [18]. The Bartlett's test of sphericity (x 2 =4648,334, df = 465) was significant (p<.001) and KMO measure was .731. Thus, the data satisfied the criteria for further analysis and indicated non-zero correlations [17]. The component correlation matrix ranged between .139 and .335 [18]. Table 1 shows the new purified scale with the three dimensions and thirty-one items.

Table 1. Factor Correlations for Exploratory Factor Analysis of mNAQ.

		Factor			Communalities
		Mobility	**Social Functioning**	**Communication**	
1.	Mobility 1	,812			,713
2.	Mobility 2	,891			,826
3.	Mobility 3	,857			,824
4.	Mobility 4	,891			,901

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5.	Mobility 5	,828			,793
6.	Mobility 6	,841			,730
7.	Mobility 7	,928			,862
8.	Mobility 8	,961			,927
9.	Mobility 9	,948			,901
10.	Mobility 10	,867			,758
11.	Mobility 11	,910			,828
12.	Mobility 12	,901			,811
13.	Mobility 13	,916			,840
14.	Mobility 14	,879			,775
15.	Mobility 15	,913			,842
16.	Mobility 16	,877			,777
17.	Mobility 17	,895			,804
18.	Soc_Fuct 1		,832		,794
19.	Soc_Fuct 2		,874		,848
20.	Soc_Fuct 3		,848		,770
21.	Soc_Fuct 4		,868		,852
22.	Communication 1			,926	,893
23.	Communication 2			,930	,904
24.	Communication 3			,934	,892
25.	Communication 4			,946	,906
26.	Communication 5			,820	,763
27.	Communication 6			,921	,857
28.	Communication 7			,836	,860
29.	Communication 8			,951	,908
30.	Communication 9			,858	,900
31.	Communication 10				,870
	Eigenvalues		16,30	6,004	3,794
	% of variance		52,15	18,78	12,32

3.2. Confirmatory Factor Analysis & Reliability Analysis

The validation of the scale involved confirmatory analysis using the generalized least square's function, due to non-normality of the data distribution [19]. Two latent factors were assessed using various indicators and goodness-of-fit indices [20]. The overall model fit assessment indicated satisfactory fit indices (refer to Table 3). To evaluate reliability, both Cronbach's alpha and composite reliability (CR) methods were employed. Cronbach's alpha demonstrated adequate scores (.984 and .822), and the composite reliability index ranged from .91 to .98, which were considered acceptable [21] (refer to Table 4). Subsequently, a validation process was conducted to assess the convergent and discriminant validity of the scale. Convergent validity was evaluated using two tests: a) t-values, which ranged from 15.5 to 45.1 and met the appropriate threshold (≥±1.96) [22] and b) Average Variance Extracted (AVE) for the latent variables, which exceeded the .50 cut-off criterion for each factor [23], with CR more than the acceptable level of 0.6 [24]. Discriminant validity was explored using the method proposed by Fornell and Lacker [21]. As depicted in Table 4, the square roots of AVE for all latent variables, highlighted in bold on the diagonal axis, were greater than the inter-correlations among the latent factors. Therefore, the validation of the scale was established.

Table 2. Model Fit Indices.

Model	Chi-square	Df	p-value	RMSEA	GFI	CFI	TLI	CMIN/df
Default model	640,8	431	0.0	0,1	0,4	0,3	,2	1,5
Saturated model	0.0	0			1,0	1,0		

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Independence model	746,7	465	0.0	0,1	0,3	0,0	,0	1,6

Table 3. Confirmatory factor analysis of the scale, Mean scores & Standard Deviations.

Variables	Cronbach's alpha	CR	AVE	Mean scores	S.D.
Mobility	,984	,984	,749	2,0345	1,30571
Social Functioning	,926	,916	,732	1,1127	,55386
Communication	,975	,993	,873	1,2831	,84193

*Note: CR = Composite Reliability; AVE = Average Variance Extracted, S.D.= Standard Deviations.

3.3. Construct Validity and Nonparametric tests

Afterwards, a second study was conducted to examine the concurrent and known-groups validity of the modified scale. To assess the concurrent validity of the mNAQ, we examined the relationship between the mNAQ scores and the BI scores. Spearman's rho correlation was used, to determine if there is a significant association between the mNAQ scores and functional independence (BI). The negative correlation with BI scores (correlation coefficient = -,500) indicates that higher rehabilitation needs are linked to lower functional independence. Then group comparisons were conducted to further investigate the known-groups validity of the scale.

The sample was divided into two groups based on the stroke phase of the participants (acute and chronic) and on the participants' NIHSS scores (minor stroke and moderate stroke). Then, non-parametric tests were performed, to compare the mean mNAQ scores between these groups. A Mann-Whitney U test was used to find difference in rehabilitation needs between acute and chronic stroke patients and between patients who suffered a minor stroke and a moderate stroke. The level of significance was set at 0.05. Results of these analyses showed that: 1) only the distribution of needs in the "Mobility" factor differentiates across the two NIHSS groups significantly (sig.=,033) and 2) the distribution of needs in all the three factors of the scale, differentiate significantly across the categories of acute/subacute and chronic phase (communication needs: sig.=,029, mobility needs: sig.= ,031, social functioning needs: sig.=,040).

4. Discussion

In this study, our main objective was to validate the modified Needs Assessment Questionnaire (mNAQ) as a reliable and valid measure for assessing the needs of stroke patients in the Greek context. The exploratory factor analysis (EFA) revealed that the original mNAQ framework required refinement. Through the elimination of items with low item-to-total correlations and cross-loadings, we established a robust and interpretable three-factor structure: Mobility", "Social functioning" and "Communication". This improved the scale's construct validity, ensuring that each item accurately measured its intended construct. Additionally, redundant items were removed, streamlining the scale, and enhancing its practicality and efficiency in clinical settings.

The decision to eliminate items was guided by the need to establish a concise and practical questionnaire that could be easily administered in clinical settings. The original scale's extensive length could pose a burden on stroke patients, potentially leading to response fatigue and reduced accuracy in their answers, a fact that occurred through our pilot study. By streamlining the scale to 31 items, the adapted mNAQ becomes a more time-efficient and user-friendly tool, enhancing its feasibility and acceptability for both patients and healthcare providers.

During the EFA, items with low item-to-total correlations and cross-loadings were identified. These items were considered less relevant in measuring the intended constructs and were, therefore, removed from the final version of the mNAQ. This rigorous process ensured that the retained items had higher loadings on their respective factors, enhancing the scale's construct validity and accuracy in assessing specific rehabilitation needs. The confirmatory factor analysis (CFA) further supported the validity of the three-factor structure. High internal consistency demonstrated by Cronbach's alpha and composite reliability scores provided additional evidence of the reliability of the three constructs.

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The observed differences between specific groups studied provide valuable insights into patients' needs based on stroke phase and severity, also highlighting the stroke rehabilitation dynamics. Moderate stroke patients tend to have more unmet mobility and motor control needs compared to those with minor stroke, while communication and social functioning needs may be more relevant for patients with moderate-severe and severe stroke. Our findings are consistent with earlier study reporting mobility and motor control challenges in patients with moderate stroke [11], validating the significance of these areas in stroke rehabilitation. However, a notable distinction emerges regarding communication and social functioning needs, which appear particularly relevant for patients with more severe stroke. For patients with moderate stroke, addressing mobility and motor control challenges is crucial for regaining functional independence. Targeted interventions can be tailored to meet these specific needs.

Recognizing these differences enables healthcare providers to prioritize interventions that directly address individual patients' challenges. Targeted rehabilitation programs can lead to better functional outcomes for those with moderate stroke, while addressing communication and social functioning can greatly benefit patients with more severe stroke.

An intriguing observation is that among the groups categorized based on stroke phase, acute phase stroke patients perceive their needs in all three domains (mobility, communication, social functioning) as either partially met or non-existent. This suggests that acute phase patients might have a different perspective on their rehabilitation needs, possibly influenced by their recent stroke event and initial stages of recovery. In contrast, chronic phase stroke patients seem to have developed a more comprehensive perception of their met and unmet rehabilitation needs. This may be attributed to the extended time they spend on therapy and recovery, allowing them to gain a clearer understanding of their ongoing challenges and requirements [25].

This disparity in perception highlights the importance of considering patients' experiences and perspectives at different stages of stroke recovery. Acute phase patients may benefit from more targeted and intensive interventions to address their immediate needs, while chronic phase patients may require ongoing support and tailored rehabilitation plans to maintain their functional gains and address evolving challenges.

In conclusion, the validated mNAQ with its three-factor structure serves as a valuable tool for assessing rehabilitation needs among stroke patients in the Greek context. Its psychometric properties enable targeted and personalized post-stroke care, accurately identifying and prioritizing the unique needs of stroke survivors.

Nevertheless, some limitations need to be acknowledged. The sample primarily consisted of stroke patients located in a provincial region of Northern Greece, potentially limiting the generalizability of the findings to a broader stroke population. Future research should aim to include a more diverse and representative sample to enhance external validity. To further advance stroke care and rehabilitation, future research should explore the scale's validity in different cultural contexts and investigate its responsiveness to changes in patients' needs over time. As future research explores the associations between the identified needs and various rehabilitation outcomes, stroke care delivery can be further optimized, resulting in improved patient outcomes and better overall stroke care.

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Informed Consent Statement: Informed consent was obtained from all subjects involved in this study.

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Conflicts of Interest: The authors declare no conflict of interest.

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