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ORIGINAL RESEARCH

Cross-cultural validation of the educational needs assessment tool into Chinese for use in severe knee osteoarthritis

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Background: Patient education is an integral part of the management of osteoarthritis. The educational needs assessment tool (ENAT) was developed in the UK to help direct needs-based patient education in rheumatic diseases.

Aim: The aim of the study was to adapt and validate the ENAT into Chinese, for use in severe knee osteoarthritis (KOA).

Methods: This cross-cultural validation study took two phases: 1) adaptation of the ENAT into Chinese (CENAT) and 2) validation of the CENAT. The Construct validity was determined using factor analysis and criterion-related validity by comparing data from CENAT with data from different self-efficacy scales: patient–physician interactions scale (PEPPI-10), self-efficacy for rehabilitation outcome scale (SER), and the self-efficacy for exercise scale (SEE).

Results: The sample comprised 196 patients, with mean age 63.6±8.7 years, disease duration was 11.5 years, and 57.1% were female. The CENAT was found to have high internal consistency. The CENAT had weak correlations with the Chinese versions of PEPPI r=0.40, SER r=0.40, and SEE r=0.39. There were no correlations with age r=–0.03 or disease duration r=–0.11.

Conclusion: The ENAT translated well into Chinese and has evidence of validity in KOA. Future studies will further inform its usefulness in clinics, community, and online settings.

Keywords: assessment, educational needs, knee osteoarthritis, instrument validation

Introduction

Knee osteoarthritis (KOA) is a common disease of the knee joint, which leads to long-term joint pain, limited movement, and poor quality of life in the affected patients.[1] In the US, >27 million adults suffer from KOA.[2] It is estimated that 10% of people older than 55 years have disabling knee symptoms due to KOA in the UK.[3] In China, the incidence of KOA is 13.2% in 40–70-year age group.[4]

Patient education is an important aspect of the management of osteoarthritis. The management guidelines for patients with osteoarthritis point out that "patients should receive patient education on their first consultation with health providers".[5–7] The purpose of patient education is to help patients manage their diseases and improve their life quality.[6–8] However, research findings have shown that routine patient education struggles to achieve long-term impact on patients;[9] therefore, individualized, needs-based educational programs that put the patient at the center are advocated.[10] Understanding the patients' needs for education is a prerequisite in the development of an effective patient-centered education, and some studies have proposed the development of individualized self-management programs for people with osteoarthritis to improve their health status.[11,12] The European League Against Rheumatism has

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developed evidence-based recommendations, which provide guidance on the delivery of nonpharmacologic interventions of people with hip or KOA.[13] These include individualized treatment and patient education regarding lifestyle changes, exercise, and other aspects of disease management.

Research on patients' educational needs in patients with arthritis is lacking in China. In the UK, the educational needs assessment tool (ENAT) was developed over 10 years ago[14] and has been validated in various disease groups.[15] The ENAT has been shown to help nurses' direct needs-based patient education for people with rheumatoid arthritis (RA).[16] The ENAT is a simple 39-item questionnaire used to assess educational needs of people with arthritis. It consists of seven domains: pain management (six items), activity (five items), feeling (four items), arthritis course (seven items), treatment (seven items), self-care measure (six items), and support system (four items). Each item has a five-point Likert scale, scored as 0 =not important, 1 =a little important, 2 =fairly important, 3 =very important, and 4 =extremely important, thus directly reflecting the patients' educational needs.[14] In the Netherlands, the Dutch version ENAT has been used to determine educational needs of patients with RA, systemic lupus erythematosus, and systemic scleroderma (SSc).[17–19] In Poland, the Polish version of the tool was validated and used to summarize the educational needs of patients with RA and SSc.[20–22] The ENAT has been validated for use in osteoarthritis in Austria, the Netherlands, Norway, Portugal, and the UK.[15,23]

Nurses spend a lot of time in patient education, and providing needs-based patient education ensures that this important activity is effective.[6,7] The ENAT is the tool with which this can be achieved. In China, research on educational needs of patients with arthritis is at an infancy stage and no tools are available for assessment of patients' educational needs. The aim of this study was to adapt the ENAT into Chinese (CENAT) and validate it for use in KOA.

Methods

Study design

This was a cross-sectional study that involved two phases: 1) adaptation of the original (English) ENAT into Chinese by researchers from two hospitals in Beijing and Tianjin, between January and February 2016; and 2) testing the validity of the CENAT in patients with KOA.

In Phase II, we included patients who were hospitalized for KOA of Kellgren–Lawrence grade IV by X-ray[22] and had the ability to complete the questionnaire independently. We excluded patients who were not able to complete the questionnaire, such as those who were unconscious, with severe mental disorders, cognitive dysfunction, or other serious illnesses. Two family doctors oversaw the integrity of the study and three orthopedic surgeons supervised patient recruitment.

The adaptation of the ENAT into Chinese

The ENAT was translated into Chinese according to an established cross-cultural adaptation methodology described by Beaton et al,[24] which consists of five stages: initial translation, synthesis of these translations, back-translation, expert committee assessment, and field testing. First, the ENAT was first translated into Chinese by two senior translators, one is a professional bilingual translator and the other is a bilingual translator with medical educational background. Each translator worked out a report (T1 and T2). Second, two translators with medical educational background joined the team to discuss T1 and T2, and then they revised, edited, and summarized the third translation report (T3). Third, translation report (T3) was back-translated by two translators who lived and studied in America for a long time generating two back-translated versions, respectively (BT1 and BT2). Fourth, the expert committee comprising all translators, clinicians, and a methodologist met for discussion and reached a consensus on all translated items. Following this meeting, five patients with severe KOA were recruited to help in a preliminary test to determine the readability and feasibility of the CENAT. The patients evaluated the specific contents of the scale, and in discussion with the staff, they produced a draft CENAT ready for psychometric testing (Table S1).

Validation of the CENAT

Following the cross-cultural adaptation, the CENAT was given to patients with KOA, and the data were used to test for different types of validity: 1) construct validity using factor analysis; 2) internal consistency; and 3) concurrent validity, assessed by comparing the CENAT data with self-efficacy data (the self-efficacy for exercise, the self-efficacy for rehabilitation, and perceived efficacy in patient–physician interactions [PEPPI]).

While the CENAT data were used for testing its construct validity (using factor analysis) and internal consistency, the concurrent validity testing involved data from other questionnaires, namely the self-efficacy for exercise scale (SEE), the self-efficacy for rehabilitation outcome scale (SER), and the PEPPI scale (PEPPI-10). Patients who consented were given the CENAT and the other questionnaires to complete independently and return to the investigators.

The SEE is used to measure self-efficacy for exercise.[25] The English version has a high internal consistency (Cronbach's α coefficient=0.92). The Chinese version SEE is validated and used in clinical studies.[26] The Cronbach's α coefficient of the Chinese version SEE is 0.75. The SER is validated for measuring the patients' confidence in functional exercise after hip and knee replacement surgery.[27] The Chinese version SER is validated and used in clinical research.[28] The tool consists of 12 items, and the Cronbach's α coefficient of the Chinese version SER is 0.94. The 10-item PEPPI-10 is used to test patients' confidence level in patient–physician interactions.[29] The Chinese version of the PEPPI-10 is validated and has been shown to have Cronbach's α coefficient of 0.91.[30] The ENAT has been validated in seven rheumatic diseases including osteoarthritis[31] and this study validated its Chinese version (CENAT).

Once returned, the data from the questionnaires were anonymized and entered into a spreadsheet for data cleaning and analysis. The senior author (WL) who was not involved in the data collection undertook the statistical analysis. The statistical tests are detailed in the next section.

Statistical analysis

In this study, factor analysis was used to validate the Chinese version of ENAT, that is, to find representative factors of the scale.[32] Kaiser–Meyer–Olkin test assesses the adequacy of the sample for factor analysis, and a value between 0.8 and 1 suggests that the sample is adequate. Principal component analysis and maximum variance method were adopted in this study to extract the main factors that met the requirements (Eigen value component matrix was rotated by maximum variance method, and the rotated matrix variable score was >0.60, which was within the factor's range). Cronbach's α coefficient was used to evaluate the internal consistency of the Chinese ENAT. Cronbach's α coefficient of >0.7 indicates that the measured scale has good internal consistency.[33]

The correlations between the CENAT and SER, SEE, and PEPPI were also measured to assess the criterion-related validity of the CENAT. If the data had been normally distributed, the correlations of the three variables were determined by Pearson's correlation coefficient; otherwise, the Spearman's correlation coefficient was used with values of 0.20–0.39, 0.40–0.59, 0.60–0.79, and 0.80–1.0 representing weak, moderate, strong, and very strong correlations, respectively.[34] In RA population, needs-based patient education had an effect on self-efficacy;[15] therefore, it is plausible to expect that the educational needs would be correlated with self-efficacy (convergent validity) and not correlated with age or disease duration (divergent validity).

Statistical analyses were performed using SPSS 19.0, IBM Corporation, Armonk, NY, USA; 2010. Structural validity was assessed using confirmatory factor analysis with LISREL 8.7, Scientific Software International, Lincolnwood, IL, USA.

Ethical approval

All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. All patients signed an informed consent form and the study was approved by Tianjin Hospital ethics committee.

Results

Patient characteristics

Overall, 200 participants were recruited and four were excluded from the analysis because of missing responses to items in the CENAT. The evaluable population comprised 196 patients with mean age 63.6±8.7 years, mean disease duration was 11.5 years, and 57.1% were women. Other patient characteristics are summarized in Table 1.

Results of the adaptation phase

During the adaptation process of the ENAT, the researchers encountered unclear concepts, grammar, and idioms that

Table 1 Patient characteristics (N=196)

Characteristics	Mean±SD or number (%)
Age (years)	63.1±8.7
Sex, female	112 (57.1)
Disease duration (years)	11.5
Education[a]	
Low	47 (24.0)
Medium	117 (59.7)
High	32 (16.3)
PEPPI (range, 0–100)	74.98±20.1
SEE (range, 0–90)	62.11±18.4
SER (range, 0–120)	90.34±23.4
ENAT (range, 0–156)	88.69±29.1

Notes: [a]Low = none, primary school, lower-level vocational training, lower-level secondary general education; medium = middle-level vocational training, higher-level secondary general education; high = higher-level vocational training, academic certification.

Abbreviations: ENAT, educational needs assessment tool; PEPPI, perceived efficacy in patient–physician interactions; SEE, self-efficacy for exercise scale; SER, self-efficacy for rehabilitation.

were influenced by an English cultural background. Through discussion, the members of the expert committee reached a consensus on the most appropriate terminology to help Chinese participants understand the items. Table S1 presents the results of the back-translation, issues, and agreements for each ENAT item. These results demonstrate that different cultural backgrounds, national conditions, and social systems were taken into account in the adaptation to enable patients' understanding of the items (Figure 1). The Expert Committee believes that the aim of developing an accurate Chinese version of the ENAT has been achieved.

Internal consistency

The study results showed that the Cronbach's α coefficient of the CENAT was 0.74. Kaiser–Meyer–Olkin measure was 0.9, suggesting that this dataset was adequate for factor analysis. Common factors with the characteristic value ≥1 were extracted by using principal component analysis and maximum variance rotation method. The results showed that the characteristic values of factor 1, factor 2, factor 3, factor 4, and factor 5 were ≥1, and the contribution rate was 67.9%, including all 39 items (Table 2). The confirmatory factor analysis showed good-fit indices for a five-factor model of the CENAT (df=692, p-value<0.01, root mean square error of approximation=0.08). The correlation coefficient between the five factors ranged between 0.65 and 0.91 (Figure 2).

Criterion-related validity

Table 3 presents the Spearman's correlations between the CENAT and other measures. The results showed that the CENAT had weak but significant correlations with the measures of self-efficacy (PEPPI r=0.40, p<0.001; SER r=0.40,

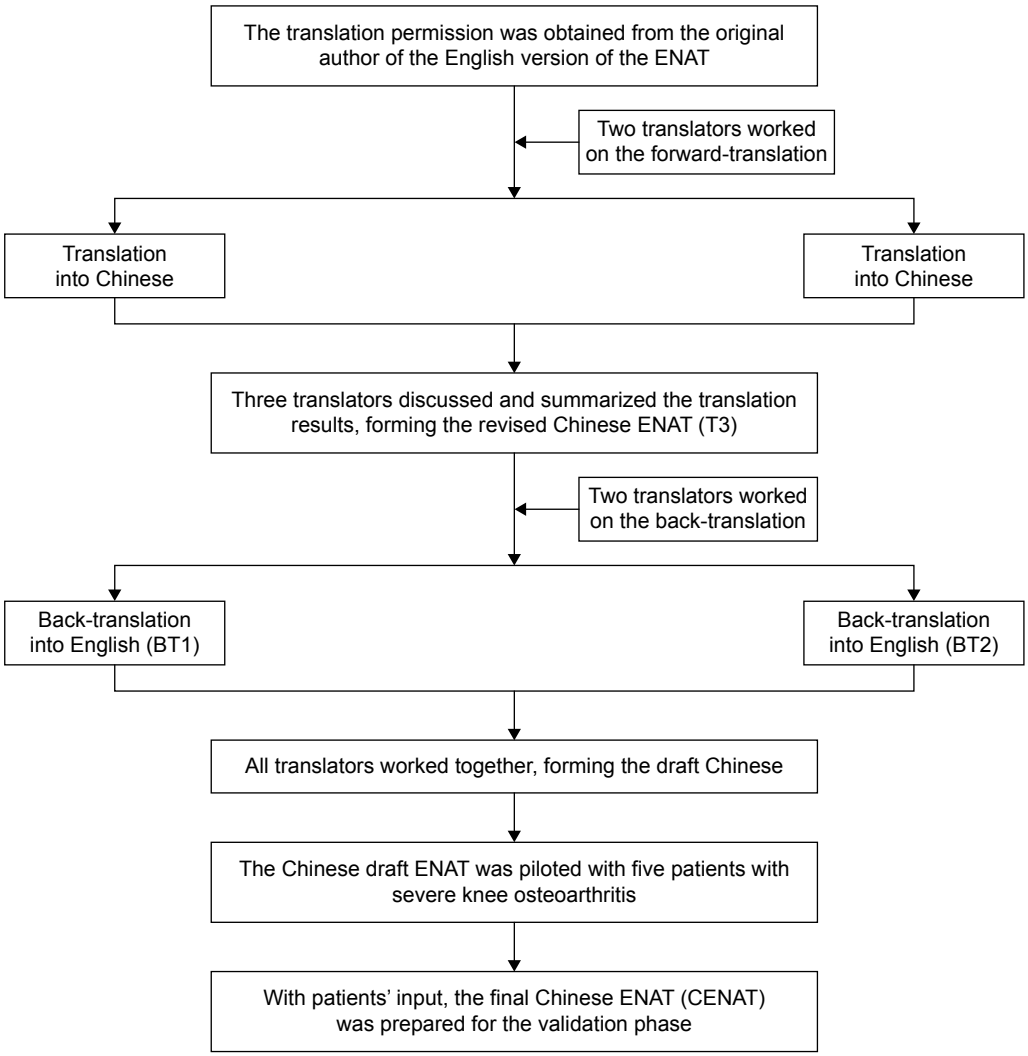

Figure 1 The process of cross-cultural adaptation of the ENAT into Chinese.
Abbreviations: BT1, back-translation 1; BT2, back-translation 2; ENAT, educational needs assessment tool.

Table 2 Factor analysis of the CENAT rotating element matrix[a]

Item	Factor				
	1	2	3	4	5
Pain1	0.343	0.242	0.101	0.225	0.742
Pain2	0.369	0.094	0.195	0.634	0.267
Pain3	0.144	0.286	0.138	0.789	–0.010
Pain4	0.155	0.236	0.281	0.766	0.029
Pain5	0.030	0.213	0.110	0.751	0.205
Pain6	0.155	0.010	0.222	0.668	0.348
Movement7	0.374	0.412	0.390	0.234	0.275
Movement8	0.166	0.275	0.424	0.189	0.477
Movement9	0.182	0.516	0.227	0.225	0.441
Movement10	0.469	0.254	0.226	0.389	0.346
Movement11	0.305	0.724	0.180	0.282	0.089
Feeling12	0.184	0.322	0.587	0.399	0.223
Feeling13	0.398	0.168	0.614	0.435	–0.019
Feeling14	0.416	0.016	0.191	0.363	0.434
Feeling15	0.336	0.071	0.601	0.413	0.135
Disease16	0.187	0.505	0.199	0.188	0.582
Disease17	0.463	0.446	0.377	0.249	0.255
Disease18	0.284	0.562	0.391	0.233	0.078
Disease19	0.526	0.581	0.131	0.225	0.150
Disease20	0.373	0.328	0.331	0.258	0.315
Disease21	0.377	0.454	0.241	0.341	0.174
Disease22	0.533	0.505	0.091	0.084	0.257
Treatment23	0.452	0.264	0.346	0.126	0.628
Treatment24	0.681	0.296	0.359	0.169	0.219
Treatment25	0.650	0.399	0.144	0.091	0.259
Treatment26	0.662	0.259	0.377	0.219	0.113
Treatment27	0.668	0.245	0.332	0.134	0.257
Treatment28	0.609	0.478	0.148	0.131	0.333
Treatment29	0.624	0.127	0.311	0.447	0.092
Selfhelp30	0.211	0.311	0.675	0.247	0.331
Selfhelp31	0.340	0.318	0.513	0.316	0.209
Selfhelp32	0.213	0.603	0.377	0.097	0.266
Selfhelp33	0.337	0.668	0.216	0.246	0.206
Selfhelp34	0.279	0.741	0.212	0.118	0.215
Selfhelp35	0.651	0.512	0.193	0.139	0.007
Support36	0.272	0.333	0.673	0.155	0.269
Support37	0.664	0.240	0.289	0.229	0.224
Support38	0.307	0.517	0.554	0.112	0.080
Support39	0.685	0.343	0.136	0.118	0.269

Notes: Extraction method: principal component. Rotation method: orthogonal rotation method with Kaiser standardization. [a]Rotation converges after the eighth iteration.

Abbreviation: CENAT, Chinese version of the educational needs assessment tool.

$p<0.001$; and SEE $r=0.39$; $p<0.001$). There were no correlations between the CENAT and age ($r=-0.03$, $p=0.69$) nor disease duration ($r=-0.11$, $p=0.11$).

Discussion

In the present study, a standard adaptation method[24] was used to adapt the ENAT into Chinese, and this process was useful in ensuring the conceptual equivalence between the original (English) ENAT and the Chinese version. Simplistic translation of a questionnaire into another language without cross-cultural adaptation and validation is inadequate.[22,35] Due to different cultural background, national conditions, and other factors, some items of the Chinese ENAT could not be directly translated into Chinese; therefore, the adaptation process took account of culture to ensure that the concepts contained in the items were meaningful to Chinese patients.

As our purpose was to adapt the ENAT into Chinese and test its validity, the results have confirmed that the CENAT is a valid tool for assessing the educational needs of patients with severe KOA in China. Factor analysis and results of the internal consistency have demonstrated that the ENAT has retained its construct validity after being adapted into Chinese. In chronic disease, self-efficacy has been shown to mediate the effect of patient education.[16] The presence of correlation between the CENAT and measures of self-efficacy implies a degree of convergent validity, although these were only weak correlations. Care needs to be taken in interpreting these results as the CENAT assesses patient educational need, and this was a noninterventional cross-sectional study, and the level of patients' need does not necessarily correspond to self-efficacy. Conversely, the lack of significant correlation with age and disease duration implies a divergent validity, both of which provide further evidence of the validity of the CENAT in KOA.

The ENAT was designed to assess educational needs of patients with arthritis, and in this study,[14] we have now demonstrated its validity in Chinese population of patients with KOA. The CENAT can, therefore, be used to direct needs-based education and to develop the health educational programs in patients with KOA in China.

The limitations of this study are that 1) as the sample was selected from hospitalized patients, the risk of selection bias cannot be excluded; 2) we could not undertake more powerful analyses such as item-response theory or exploration of differential item functioning. While those analyses can be carried out in the future, we believe that the current analysis provides preliminary evidence of the validity of the CENAT; 3) being a noninterventional cross-sectional study, the evidence of criterion-related validity was limited and sensitivity to change was not assessed; 4) the CENAT was used in hard copy (paper) form and as the technology of questionnaire moved into electronic forms, its response in online and app forms will need to be assessed; 5) this study validates the CENAT in KOA; therefore, further evidence will be required before the tool is used in other types of osteoarthritis. Despite the abovementioned limitations,

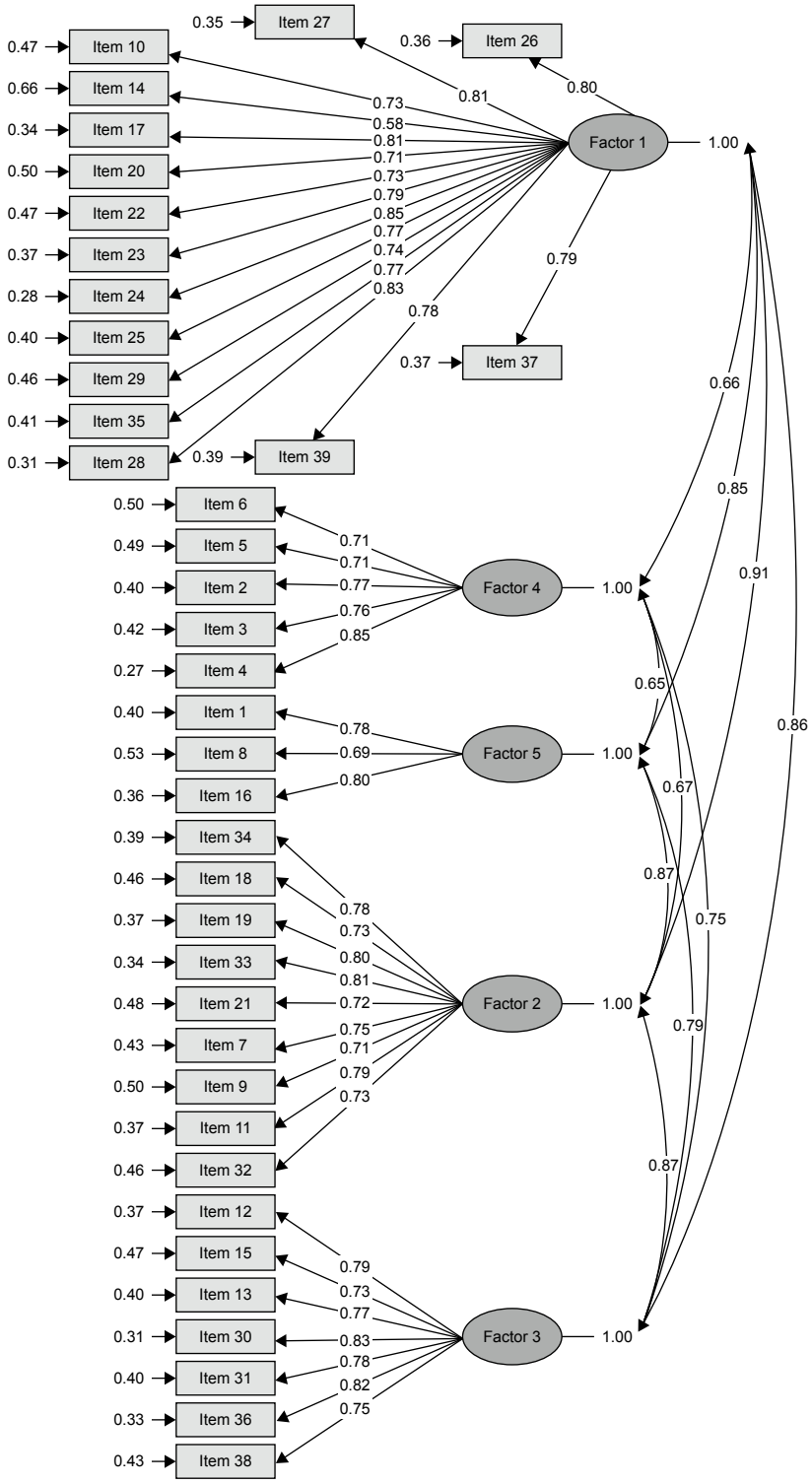

Figure 2 Standardized factor loading and residuals for the items of the Chinese version of educational needs assessment tool.

we believe that our conclusions are well supportive of the validity of the CENAT in this patient population.

Conclusion

This is the first study to adapt and validate the ENAT into Chinese for use in severe KOA. We systematically investigated the validity of the Chinese version ENAT, showing that the Chinese version ENAT has a good construct validity, internal consistency, and satisfactory criterion-related validity. Therefore, this tool can help nurses to assess the educational needs of patients with severe KOA and provide effective needs-based patient education. Although

Table 3 Spearman's correlations between the CENAT and other measures

CENAT	ENAT	PEPPI	SER	SEE	Disease duration	Age
CENAT						
Spearman's correlations	1	0.40**	0.40**	0.39**	–0.11	–0.03
P		0.000	0.000	0.000	0.114	0.690
N	196	196	196	196	196	196
Bootstrap[a]						
Deviation	0	–0.003	–0.002	–0.000	0.005	0.000
Standard error	0	0.069	0.067	0.069	0.067	0.074
95% CI						
Floor	1	0.251	0.264	0.249	–0.239	–0.178
Ceiling	1	0.426	0.514	0.521	0.025	0.111

Notes: [a]Unless otherwise noted, bootstrap results are based on 1,000 bootstrap samples. **$p<0.01$.
Abbreviations: CENAT, Chinese version of ENAT; ENAT, educational needs assessment tool; PEPPI, perceived efficacy in patient–physician interactions; SEE, self-efficacy for exercise scale; SER, self-efficacy for rehabilitation.

the scale has demonstrated validity in this study, further research will be required to provide the evidence for other psychometric properties including sensitivity to change.

Disclosure

The authors report no conflicts of interest in this work.

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Supplementary material

Table S1 Back-translation, issues, and agreements for each educational needs assessment tool item

Original	Back-translation 1 (BT1)	Back-translation 2 (BT2)	Issues	Agreement
Arthritis educational needs assessment tool	Assessment tool for educational needs in patients with arthritis	The tool for assessing needs for education in patients with arthritis related	Chinese language has multiple meanings for the word "arthritis"	关节炎教育需求评估工具 "Arthritis" is the most adequate translation
How long have you had your arthritis for?	How long have you been diagnosed with arthritis?	How long have you suffered from arthritis?	Uncertainty whether word "diagnosed" or "suffer" should be used in the Chinese version	"您因为关节炎病了多久?" The Chinese translation is correct in terms of style
Please state your age in years:	Please state your age	Please state your age in years:	Discussion on whether phrase "in years" is needed.	"请陈述您的年龄" The phrase "in years" has been omitted
How old were you when you left school?	How old were you when you graduated from school?	How old were you when you graduated from school	Education in the Chinese system does not require age information	"您的学历是" The most appropriate Chinese phrase was chosen
At this time, do you want education about anything to help you deal with your arthritis?	Do you want to get information which will help you manage arthritis?	Do you want to help yourself to cope with arthritis by any obtaining education?	Uncertainty how to translate into Chinese "manage" or "cope with"	"您希望获得应对自身关节炎的信息吗" Chinese translation is correct in terms of style
If yes, what?	If yes, what information would you like to get?	If yes, what would you like to know?	Uncertainty how to translate into Chinese "get" or "know"	"如果是，您想知道什么" Chinese version is correct in terms of style
In general, how much information do you want about your arthritis?	In general, how much would you like to know about your arthritis?	In general, how much information would you like to get about your arthritis?	Discussion on whether word "information" should be added	"通常，您想了解多少关于关节炎的知识?" The word "information" was added
How much do you need to know now about each of the following things? Please tick in the column that shows best how you feel:	How much do you need to know now about each of the following issues? Please tick in the column that shows best how you feel:	How much would you already know about the following issues? Please mark the appropriate column with an "√"	Discussion concerning the phrase "Please mark the appropriate column with n '√'"	"下列问题您想了解多少？请在适当的列表下打勾" Chinese version is correct in terms of style
Using heat or cold on painful joints	Treatment of painful joint by cold or heat	Reduce the pain of joints by cold or heat	Uncertainty how to translate into Chinese "treatment" or "reduce"	"用冷热疗法处理关节疼痛" The most correct Chinese phrase has been chosen
This section relates to managing pain	Section on managing pain	Section on dealing with pain	Discussion on whether to choose a more formal way of introducing section of questions	"疼痛管理相关部分" A more formal way of introducing a new section was chosen
How important is it for you to know more about the following	How important is it for you to know more about the following issues for you?	How important is it for you would know more about the following issues?	Discussion on a formal way of asking a question	"知道以下更多的信息对您来说有多重要" A formal way of asking a question has been chosen
Using exercise	Physical exercise	Functional exercise	Uncertainty whether "physical" and "functional" can be used synonymic	"运动疗法" The most correct Chinese phrase was chosen
The section relates to movement	Section on issues related to movement	Section on issues related to mobility	Discussion on word choice between "movement" and "mobility"	"活动相关部分" The most adequate Chinese version was chosen

(*Continued*)

Table S1 (*Continued*)

Original	Back-translation 1 (BT1)	Back-translation 2 (BT2)	Issues	Agreement
Ways of doing things which wear my joints less	Methods of reducing wear of joints	Ways of relieving joints	"Wear my joints less" was repeated in the Chinese phrase	"缓解关节磨损的方法"
Ways to deal with moods or depression	Ways to alleviate moods or depressive states	Ways to cope with moods or depressive states	Discussion on word choice between "alleviate" and "cope with". Ambiguous meaning of the term "moods"	"应对负性情绪或抑郁状态的方法" The chosen term "negative emotion" means frequent changes in mood
Why I am feeling down or depressed	Why do I feel moody or depressed	Why do I feel disappointed or depressed?	Ambiguous meaning of the phrase "feeling down"	"为什么我会感到情绪低落或沮丧?" The chosen term "moody" relates to feel down
What type of arthritis do I have	What type of arthritis do I have	What type of arthritis do I have	Lack of knowledge of arthritis in Chinese patients	"我患有哪种关节炎?" Chinese version is correct in terms of style
How might arthritis t affect my children or relatives	What is the effect of the disease on my children and family?	Can the disease affect the lives of my children and family?	Multiple meaning of word "affect"	"关节炎对我的孩子和家人会产生什么影响" The chosen phrase "the effect of" relates to "affect"
Ways my arthritis can be treated	Therapies for arthritis	The treatment of arthritis	Uncertain whether to use the word "therapies" or "treatment" in the Chinese version	"关节炎治疗方法" The most adequate Chinese translation was chosen
Ways my arthritis is affecting me	Ways arthritis is affecting me	The way of my arthritis is affecting me	Multiple meaning of word "affect"	"关节炎对我造成影响的方式?" The chosen phrase "the effect of" relates to "affect"
What might happen in the future	What will happen to me in the future	How will my condition change in the future	The question is open ended	"在未来，我的状态将如何改变" The translation focuses on patient's condition in the future
This section is about treatments you may be receiving from health professionals.	Section on treatments that you can receive from medical professionals.	Section contains treatments that the patient can receive from nurses and other health professionals	Lack of a Chinese equivalent of a term "health professionals"	"你能得到健康护理工作者治疗的部分" The chosen phrase describes the meaning of "health professionals"
How operation might help me	Can surgery help me	Can surgery help me	Uncertainty how to translate "operation" into Chinese	"手术能帮助我吗" The most adequate Chinese term was chosen
What are the side effects of my medicines	What are the side effects of my drugs	Are there any side effects to the drugs		"药物的副作用是什么" Chinese version is correct in terms of style
How aid might help me (splints, adaptations, collars)	What aid may help me (orthopedics orthotics, splints, fixators)	What aids can help me (orthopedics orthotics, splints, fixators)	Difficulty with translating term "adaptations" and "collars"	"器具怎么可以帮助我"（骨科矫形器、夹板、固定器） Descriptive phrases "adaptations" and "collars" have been chosen
Alternative treatments or herbal remedies	Conservative treatment or Chinese traditional treatment	Conservative treatment or Chinese traditional treatment	Multiple meanings of the phrase "alternative treatments" and "herbal remedies"	"保守治疗或中医疗法" The most adequate Chinese term has been chosen

(*Continued*)

Table S1 (*Continued*)

Original	Back-translation 1 (BT1)	Back-translation 2 (BT2)	Issues	Agreement
Foods or vitamins that might help	Diet or vitamins that may help	Foods or vitamins which might help	More formal version of question in Chinese should be given	"食物或维生素能带来的帮助" Chinese version is correct in terms of style
Exercises I should be doing	Recommended exercises	Recommended exercises	Uncertainty whether the word "recommended" should be used	"推荐的运动" The most adequate Chinese translation was chosen
How much exercise should I be doing	Amount of exercise	Amount of exercise	Uncertainty whether the word "amount" should be used	"运动量" The most adequate Chinese term was chosen
Times when I should call the doctor or nurse	Times when I should contact a doctor	Situations when I should consult a doctor	Uncertainty whether the word "situations" is adequate, and lack of a Chinese equivalent of the sentence "Registered nursing don't provide consultative services regarding issues relevant to the practice of nursing for outpatients"	"在什么情况下，我应该看医生?" Chinese translation is correct in terms of style
Organizations I can get in touch with about arthritis	Departments which can help patients with arthritis	Departments that can help patients with arthritis	Lack of a Chinese equivalent of a term "Arthritis Organizations". Uncertainty whether "departments" is the correct translation of the term "organizations"	"哪些部门可以帮助关节炎患者" Chinese phrase describing contacting an organist was chosen
Who I can ask for financial help	Who can I ask for financial help	Who can I ask for financial help	Lack of cultural equivalence (it is possible to ask for financial help in case of suffering from arthritis)	"我可以向哪里寻求经济帮助?" Chinese version is correct in terms of style
Where I can find groups who will help me to cope with arthritis	Where can I find support groups for arthritis	Where can I find support groups for people with arthritis	Lack of cultural equivalence (it is possible to ask for help outside the health care system)	"我在哪里可以得到病友的帮助?"
How I can get the most out of seeing the doctor or nurse	How to make more effective contacts with the doctor or nurse	How can I improve communication with the doctor or nurse to maximize effectiveness	Idiomatic meaning of the "get the most out of" can be translated in various ways in Chinese	"如何提高与医生或护士的交流效果" Chinese version is correct in terms of grammar

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