Cross-cultural adaptation of the Knowledge of Research Evidence Competencies questionnaire in French

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ABSTRACT

Background: The Knowledge of Research Evidence Competencies questionnaire (K-REC) stands out as one of the only quick, easy to administer, valid and reliable tests to measure respondents' actual evidence-based practice (EBP) knowledge. Such reliable and valid tools to assess actual EBP knowledge do not exist in French. **Objective**: The purpose of this study is to translate, cross-culturally adapt and validate the K-REC questionnaire to assess EBP knowledge in French languages. **Methods**: A committee of experts followed the five-step adaptation and validation process recommended in the guidelines to translate the K-REC from English to French. A preliminary psychometric test was conducted among 21 French physiotherapists (PT). **Results**: The respondents rated the instrument as being very clear (99% of the ratings). Members of the expert panel were in perfect agreement (Cohen's kappa inter-rater coefficient equal to 1) in judging the instrument to be content valid (S-CVI/Ave = 1.00). **Conclusion**: The K-REC has been successfully adapted and validated in French. Pilot testing provided a preliminary description of internal reliability estimates and respondents' scores. More complete descriptions of EBP among French health professions will be possible with this new instrument and contribute to the refinement of EBP training programs.

KEYWORDS: Educational measurement, Evidence-based practice, Physical therapy, Professional education, Professional practice

Introduction

Evidence-based practice (EBP) is commonly defined by the mutual integration of the latest research evidence, patient preferences and clinical expertise. Initially applied to medicine [1], it is now appraised in health and social care professions. Despite such valuation, practitioners still report barriers to implementing EBP in their clinical routine. Consequently, EBP education and training programs have been extensively developed over the last decade [2, 3, 4]. To appreciate the educative value, it became important to develop tools to assess how EBP is perceived and how it is used in a clinical setting by practitioners [5]. However, cross-cultural and interprofessional studies remain scarce. For example, the first inventories of EBP perception among physiotherapists (PT) have only started to be provided since the early 2020's in France [6], Italy [7], Saudi Arabia [8], Philippines [9], United Arab Emirates [10], Canada [11] and Australia [12]. To make up for such a gap, reliable and valid tools must be developed and adapted to different cultural and professional contexts.

Building on tools developed to test evidence-based skills and knowledge in medicine [13] and other health professions [14] including PT [15], Lewis et al. elaborated the Knowledge of Research Evidence Competencies questionnaire (K-REC, [16]). The K-REC mimics a clinical scenario to measure actual EBP knowledge of respondents. It has been proven to be valid and has been used in several entry-level and longitudinal studies involving PT [12, 16, 17].

While the first description of self-reported EBP perceptions among French PT has recently been provided [6], actual EBP knowledge among French practitioners has never been evaluated. This is because there are no reliable and valid tools to assess actual EBP knowledge in French. To

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complement inventories on self-reported EBP perception among French PT [6], we decided to adapt the K-REC. Hence, the purpose of this study is to provide a valid and reliable adaptation of the K-REC in French. A secondary objective is to report on preliminary psychometric testing of the instrument among French PT.

Method

Design

The protocol for the translation of the K-REC from English (source language, SL) to French (target language, TL) had been designed before conducting the study. It complies with the process recommended by the conventional guidelines used in health care contexts to adapt and validate instruments [18, 19]. It consists in a five-step process including [1] a double initial translation by two independent translators, [2] a synthesis of the double translation, [3] a double back-translation to the original language, [4] the appraisal of a committee of experts to produce a pre-final version and [5] the pilot testing and validation of the pre-final version.

K-REC questionnaire

The K-REC (Supplementary materials) mimics a clinical scenario to measure actual EBP knowledge of respondents. It is a 9-item, 10-minute questionnaire with a maximum score of 12 asking for short answers (multiple choice, true or false, or short open-ended). It has been designed to be easy to score using marking guidelines. It has good test-retest (Cohen's kappa and ICC range from 0.62 to perfect agreement) and inter-rater (Cohen's kappa and ICC range from 0.83 to perfect agreement) reliability for individual item and total scores. It has also been shown to differentiate EBP training exposure (e.g. construct validity, p<1.10-4, effect size=1.13 [16]).

Permission to adapt the K-REC was granted by the authors of the original instrument before the establishment of the translation.

Step 1 – Initial translation

On this first step, two persons independently performed a forward translation. In addition of providing an individual translation (T1 and T2), each translator wrote a report (Supplementary materials) that included a summary of the rationale of their choices and additional comments on potentially challenging sentences or uncertainties. The T1 translator (VF) is the principal investigator, a biomedical researcher specialized in neurosciences, non-naive to the K-REC. The T2 translator (NL) is an epidemiologist with experiences in EBP and musculoskeletal disorders and was naive to the K-REC. Both translators were accustomed to speaking and writing in the SL and the TL, worked in SL and TL-speaking countries (VF in United States, Canada and France, NL in Denmark, Canada and France) and have already been involved in projects focused on EBP. As recommended [18, 19], [1] translators' mother language was the TL, [2] one was naive to the instrument and the other not, and [3] they had different backgrounds and profiles.

Step 2 – Synthesis of the translations

A consensual synthesis of T1 and T2 (named T12) was made. The consensus was held between the two translators that carefully documented ambiguities and discrepancies and how they were resolved (Supplementary materials).

Step 3 – Blinded backward translation

Two other independent persons individually performed a backward translation (BT1 and BT2) to the SL of the consensual forward translation T12. The purpose of this step is to highlight potential inaccuracies in the T12. Both backward translators were used to speaking, working, and translating in the SL. The provider of BT1 (BF) is a PT familiar with translating content and symposia from SL to TL and from TL to SL. The provider of BT2 (SE) is a SL and TL dual national chiropractor. In addition to their translation skills, we formed this pair to obtain translations from people whose profile comply with the target audience but have different backgrounds and occupations. BT1 and BT2 are provided in the supplementary materials.

Step 4 – Establishment of the pre-final version by an expert committee

A multidisciplinary committee of 6 experts was reunited to evaluate, revise, and consolidate the translation process to establish a pre-final version (PF) of the instrument in the TL. To make up their decisions, the experts were provided the original questionnaire and each translation step (T1, T2, T12, BT1, BT2 and their associated reports). The main objective of the committee was to achieve equivalence between the source and target version in four areas: semantic, idiomatic, experiential and conceptual [18]. Issues, decisions, and their rationale were documented in the supplementary materials along with the PF.

The committee was composed of a multidisciplinary team including methodologists, practitioners and translators involved in steps 1-3. The composition of the committee is detailed in the supplementary materials. If ambiguities and discrepancies would have not been resolved, we considered repeating steps 1 to 4. A consensual PF was appraised from the first round of the four-step process.

Step 5 – Pilot testing of the pre-final version

In accordance with the purpose of the instrument, the PF was first tested on a sample size of 25 French PT. The sample size was set to follow guidelines for sampling adequacy [18, 19]. For convenience, we enrolled participants from the target audience (PT) belonging to the authors' and their affiliations' networks. To avoid potential biases, we blinded the participants to the purpose of the study and to the fact we were the investigators. We asked each participant to respond to the questionnaire and to rate as clear or unclear the instructions and items of the questionnaire. Participants were asked to provide a short description on the issues and their potential suggestions for unclear ratings. In addition, they were also asked to briefly describe their perception of the objective of the questionnaire.

The questionnaire was delivered on a web-based platform (SurveyMonkey™). The questionnaire started with a short notice indicating the instructions, confidentiality disclosure, General Data Protection Regulation (EU Regulation 2016/679) and right of withdrawal. Only participants agreeing to the conditions continued to the beginning of the questionnaire. Instructions were purposely kept vague. Participants were informed that they will be asked to individually evaluate the clarity of items composing a questionnaire that is intended to be understandable for health professionals, in particular PT. Answers to the questions and clarity ratings were collected following the numerical order of questions. A unique, anonymized identifier was attributed to each participant. The survey link was made private. Completion of the questionnaire was restrained to a two-week period in November 2022.

Answers, clarity ratings, and potential missing data were evaluated in the sample. Following recommendations, elements with at least 20% of unclear ratings would have been considered for revision [19, 20].

Content validity was independently assessed by two members of the expert committee. They were provided with a report of each item including the distribution of collected answers and missing data, the descriptive statistics of clarity ratings, the correct response(s) and the descriptive statistics of the number of points scored in the sample. On this basis, they were asked to independently rate each item for content validity using the following scale: 1=not relevant, 2=unable to assess relevance, 3=relevant but needs minor alteration, 4=very relevant and succinct [19, 21]. Ratings of 3 or more are considered content valid, whereas ratings of 2 or less would imply that the item should be revised.

Inter-rater agreement was measured using Cohen's kappa coefficient [22]. The content validity of the instrument was reported using the average content validity for scales (S-CVI/Ave) metric. The S-CVI/Ave consists of the proportion of items rated as content valid (i.e. items with a rating of either 3 or 4) across all items and raters. Values of S-CVI/Ave above 0.90 are recommended [21].

The protocol of the adaptation process, the PF and the pilot testing were sent to the authors of the original instrument for approval of the French adaptation of their tool (K-REC-Fr). Marking guidelines are reported in Appendix 2.

Preliminary psychometric testing

Answers from respondents that judged the PF totally clear (0 elements marked as unclear) were examined, as a convenience sample, to establish a preliminary psychometric testing of the K-REC-Fr.

Reliability theory now suggests the use of several reliability coefficients in addition to the widely used Cronbach's alpha to account for its limitations [6, 23]. Internal reliability estimates of the K-REC-Fr were computed using the psych package in R. These include, Cronbach's alpha [24], worst split-half reliability (β) [25], McDonald's hierarchical and total omegas (respectively ωh and ωt) [26], Guttman's $\lambda 4$ and $\lambda 6$ [27].

Descriptive statistics (first and third quartile, and median) were provided for the scores of the full questionnaire and each item. In the original instrument, passing is defined as a score $\geq$ 50% of the maximum possible score. Passing was computed for each item separately and for the whole questionnaire. The percent of respondents passing is provided in the descriptive summary.

Results

Validation of the pre-final version into the K-REC-Fr

Responses to the PF were collected from 25 blinded participants. Twenty-one participants (84%) answered every item. The four remaining participants judged the clinical scenario to be clear but neither of them went further on in the questionnaire. Subsequent analyses were performed on the sample of 21 respondents. Respondents were between 26 and 40 years old (MD=33.5) and graduated between before 2000 and 2018 (MD=2011). Descriptions of respondents is presented in Table 1. Respondents evaluated the clarity of each item. Among the 252 evaluations (21 respondents x 12 items), we collected 249 "clear" and 3 "unclear" (1.2%).

Eighteen respondents (85.7%) judged all items to be clear. Three respondents each found one item to be unclear among the 12 items of the PF (8.3% of items). These unclear ratings were for three different items. Therefore, three items were rated unclear by 4.76% (n=1) respondents and 9 items were considered completely clear by the respondents.

Two members of the expert committee individually evaluated responses for each item for content validity. Ratings of members of the expert committee were in perfect agreement (Cohen's kappa inter-rater coefficient equal to 1) in judging the PF to be content valid (S-CVI/Ave = 1.00). This consensual evaluation yielded two minor adjustments of the PF based on responses and comments from the pilot sample. First, the clinical scenario will remain visible throughout completion of the questionnaire. Second, the instruction for question 1 will specifically ask to write a question in French as some responses from the pilot were not written as questions or were not written in French. The consequently modified PF constitutes the final step of the adaptation of the original instrument (K-REC-Fr, Appendix 1).

Preliminary psychometric testing of the K-REC-Fr

Internal reliability estimates varied between 0.22 (β) and 0.88 ($\lambda 4$, Table 2).

Respondents scored between 2.5 and 10 out of 12. Fifty-seven percent of respondents scored above 50%, which is equivalent to passing the test. While no single respondent scored the maximum possible score, the maximum possible score was achieved for each item when all respondents were considered. The lowest respondent scores were obtained for the Research Evidence Statistics items (19.05 and 33.33% passing). The highest scores were obtained for the item on levels of evidence (90.48% passing). A descriptive summary of the responses collected is presented in Table 3.

Table 1 Characteristics of respondents

	MD (Q1-Q3) / n (%)
Age[a]	33.5(30.00-35.25)
Year of physiotherapist diploma graduation[b]	2011(2009-2013)
Gender	
Male	20 (95.24)
Female	1 (4.76)
Highest university diploma	
French state physiotherapist diploma	9 (42.86)
Osteopath diploma	2 (9.52)
Postgraduate Diploma (PGDip)	2 (9.52)
Bachelor's degree (BSc)	4 (19.05)
Master's degree (MSc)	4 (19.05)
Training in EBP (nb hours)	
0	1 (4.76)
1-3	3 (14.29)
3-10	8 (38.10)
10-20	2 (9.52)
+20	7 (33.33)

MD: median; Q1-Q3: first and third quartile

[a]: 1 respondent did not inform their age

[b]: graduation date before 2000 was considered a different category (n=1 respondent, 4.76%)

Table 2 Internal reliability estimates

Cronbach's alpha	β (min)	ωh	λ_6 (smc)	λ_4 (max)	ωt
0.53	0.22	0.61	0.81	0.88	0.80

Discussion

A multidisciplinary expert committee was reconvened to translate and adapt the K-REC instrument for French PT. The process followed conventional guidelines used in health care contexts [18, 19]. The translated and adapted instrument produced by the expert committee was validated on a representative sample of 21 blinded PT. Respondents overwhelmingly rated the instrument as clear (98.8% of ratings). On the basis of the responses collected, the members of the expert committee were in perfect agreement (Cohen's kappa inter-rater coefficient equal to 1) in judging the instrument to be content valid (S-CVI/Ave = 1.00). The appraised and validated instrument resulting from the successful translation and adaptation of the K-REC for French PT can be referred to as the K-REC-Fr.

Table 3 Descriptive summary of responses collected

Item no. and content	MD (Q1-Q3)	Min obtained – Max obtained (Max possible)	Percentage of respondents passing (Score ≥50%)
1 Research question (PICO)	1.00 (0.50-1.00)	0.00-2.00 (2.00)	66.67
2 Sources of information	1.00 (0.50-1.50)	0.00-2.00 (2.00)	66.67
3 Study design	1.00 (1.00-1.00)	0.00-1.00 (1.00)	76.19
4 Search strategy (MeSH)	0.00 (0.00-0.50)	0.00-0.50 (0.50)	38.1
5 Search strategy (Boolean)	0.00 (0.00-0.50)	0.00-0.50 (0.50)	42.86
6 Critical appraisal	1.00 (1.00-1.00)	0.00-1.00 (1.00)	80.95
7 Critical appraisal	1.00 (0.50-1.50)	0.00-2.00 (2.00)	71.43
8a Research evidence statistics	0.00 (0.00-0.00)	0.00-1.00 (1.00)	19.05
8b Research evidence statistics	0.00 (0.00-1.00)	0.00-1.00 (1.00)	33.33
9 Levels of evidence	1.00 (0.50-1.00)	0.00-1.00 (1.00)	90.48
Total	**6.00 (5.00-8.00)**	**2.50-10.00 (12.00)**	**57.14**

This made the K-REC-Fr the first validated instrument to assess EBP skills of PT in France.

We enhanced the initial internal reliability description of the original instrument [16], by computing additional internal reliability estimates of the K-REC-Fr. These values were computed for descriptive purposes and should not be used for arbitrary cut-point classifications; rather, they should be compared with studies that share a similar framework. Lower values were found for Cronbach's alpha (0.53) and β (0.22). These coefficients assess a single construct that is common to all items. Conversely, higher values were found for multifactorial coefficients (ωs and λs). These coefficients assess a single construct that is common to all items. Such characteristics suggest multidimensionality in the internal reliability of the test. This is consistent with the subdivision of the questionnaire into content to be tested (namely: research question, search strategy, research design, critical appraisal, research evidence statistics, and levels of evidence).

The lowest respondent scores were found for research evidence statistics and search strategy items. These preliminary results need to be confirmed in a larger sample of the target population.

The K-REC has been developed to evaluate the first three fundamental steps of the EBP process model (ask, acquire, and appraise) among entry-level health professionals. It has been deliberately designed to be quick to complete (10 minutes) and easy to score, while covering the content of longer instruments such as the Fresno on which it is based [13, 16]. The Fresno is one of the most appraised historical tests to assess actual knowledge in evidence-based medicine [5]. The main drawback of the Fresno is its general difficulty of use. Because it consists of short essays, it is long to complete, difficult to score in a reproducible manner, and inaccessible to novice learners [15, 16]. In contrast to the K-REC, the Fresno has been extensively adapted [28, 29, 30, 31, 32]. In a recent adaptation of the Fresno for PT, 68% of participants dropped out of the study [30]. The most cited reasons were lack of knowledge and lack of interest. Participants who managed to return the questionnaire had difficulty completing the test, especially the items assessing statistical knowledge. Similarly, respondents from our sample had more difficulties with research evidence statistics items. Nevertheless, and in contrast to the Fresno adaptation, they responded to these items and completed the entire questionnaire. The Fresno questionnaire poses challenges for both respondents and raters, making it particularly challenging to implement in routine practice [28]. A recent development is a French tool designed to assess EBP skills in general practitioners [33]. While this tool has potential utility, it shares challenges with the Fresno in that it proves challenging to complete, score, and apply across health professions. This underscores the importance of adopting user-friendly tests, such as the K-REC, to effectively evaluate practical EBP knowledge.

The 9 questions of the K-REC assess EBP knowledge regarding research question, search strategy, research design, critical appraisal, research evidence statistics and levels of evidence. In the original test of the instrument, the lowest results were observed for research evidence statistics followed by search strategy content with respectively 40% and 52% of PT scoring more than half of the points for these items [16]. These contents were also associated to the lowest percentage of respondents passing (score ≥50%) in our preliminary testing with passing rates ranging from 19 to 43%. Respondents expressed particular difficulty in understanding and interpreting statistical reports as measured by items 8a and 8b. This not only supports the success of our adaptation, but also suggests that PT from different countries share similarities in terms of EBP knowledge.

The passing rate in our sample (57%) aligns closely with that observed among Australian PT students who completed two 13-week EBP courses during their 2nd or 3rd year of a 4-year PT education (55%) [34]. The majority of respondents in our sample experienced 3 to 10 hours (38%) or more than 20 hours (33%) of EBP courses. This exposure could be assimilated to the EBP courses reported by Lewis et al [34]. Therefore, despite graduating 11 years ago at the time of response collection (median), PT from our sample achieved similar results than students with comparable EBP exposure. This apparent status quo in EBP learning was found in another study comparing student assessments at graduation and one year into practice [12]. Interestingly, EBP knowledge did not seem to benefit from one year of working experience. In fact, scores either remained unchanged or even decreased after one year of working as a PT compared to the scores obtained just after graduation [12]. This finding recommends that EBP training should be integrated into continuing education programs throughout PT careers to build and consolidate learning. Achieving this learning would require teaching and monitoring through appropriate courses and assessment tools.

Other instruments have been used to assess EBP. The Evidence-Based Practice Profile (EBP2) questionnaire [35] stands out as one of the most valid, reliable, and complete of these instruments [36]. The EBP2 has

been used to describe the EBP profiles of health professionals in a variety of contexts [9, 37, 38, 39]. However, it only measures self-reported perceptions of EBP determinants (knowledge, skills, attitudes, and beliefs). Because the K-REC is quick to complete, accessible to novice respondents, and complementary to the EBP2, it has begun to be linked to the EBP2 to effectively capture EBP perceptions and actual knowledge [12, 17, 34]. A recent study provided the first description of the EBP profiles of PTs working in France [6]. However, this description only assessed self-reported perceptions and not actual knowledge of EBP due to the lack of an adapted tool. The adaptation of appropriate and validated tools, such as the K-REC, would make it possible to complement such an inventory by reporting actual EBP knowledge. Therefore, the successful translation and adaptation of the K-REC presented in this article will make it possible to continue and complete the existing inventory of EBP among PT practicing in France.

Strengths, limitations and considerations for further research

The main strength of this study is the application of the recommended guidelines for the translation and adaptation of self-report instruments in health-care contexts [18, 19]. The study protocol adhered to the pre-study recommendations, underwent conduction, and was reviewed by the authors of the original instrument. Each step of the protocol was carried out as planned and were reported transparently. The pilot study allowed for a description of the internal consistency estimates of the instrument and summary statistics of respondent scores. Our study has some limitations. Because our study was not designed to provide precise descriptions, the results of the psychometric tests should be used only to formulate hypotheses. Our sample was a convenience sample of the target population and the results may not be generalizable. Studies with larger sample sizes are needed to more accurately describe the EBP profiles of PT.

Conclusion

This study provided an appraised and validated French instrument to assess actual EBP knowledge. This instrument is the result of the successful translation and adaptation of the K-REC for French PT, making it the first validated instrument to assess EBP skills of PT in France. The development and adaptation of valid and reliable instruments is fundamental for the assessment of EBP learning. Such assessment will contribute to the appropriate development of educational programs according to evidence-based teaching principles. The K-REC-Fr will allow the continuation and completion of the existing inventory of EBP among PT practicing in France, which could contribute to the improvement of continuing education programs.

Statement and declaration

Authors' contribution

The authors confirm contribution to the paper as follows:

- Nadège Lemeunier: Conceptualization; Project Management; Adaptation Process; Writing - Original Draft; Writing - Review & Editing
- Sophie Entwistle: Adaptation Process
- Benjamin Fraisse: Adaptation Process
- Delphine Sorondo: Adaptation Process
- Grégory Vigne: Adaptation Process; Writing - Review & Editing
- Arnaud Bruchard: Project Management
- Timothy S Olds: Writing - Review & Editing
- Lucy K Lewis: Author of the original instrument; Adaptation Process
- Vincent Fontanier: Conceptualization; Project Management; Adaptation Process; Data Curation and Analysis; Methodology; Writing - Original Draft; Writing - Review & Editing

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Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Competing Interests

The authors have no declarations of interest to report.

Disclosure statement

All authors declare they have neither financial nor non-financial interests.

Ethics

No health information was collected during the study. Invited participants had to read and agree to a short notice to take part in the survey. The notice included instructions, disclosure of confidentiality, the General Data Protection Regulation (EU Regulation 2016/679), and the right to withdraw. Participants who refused would have been excluded (no cases in the sample).

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