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# Cross-Cultural Adaptation of Executive Function Performance Test (EFPT): ACOSMIN Systematic Review

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#### Abstract

**Background:** Psychometrics plays a crucial role in cross-cultural research, necessitating the adaptation of scales for measuring health status. As the Executive Function Performance Test measures functional cognition and can be helpful in medical, rehabilitation, and research settings, this review aims to methodologically review cross-culturally adapted versions of the Executive Function Performance Test using the COSMIN checklist.

**Methods:** The present systematic review was conducted based on the COSMIN methodology. After searching PubMed, Scopus, Google Scholar, and Web of Science with keywords ranging from July 2024, seven articles were selected for a thorough methodological review matching the review objectives.

**Results:** The outcomes revealed that cultural adaptation has similar phases with a few differences. The most frequently reported forms of reliability were interrater reliability and internal consistency, while some variations in validity assessment were found.

Conclusion: Proper cross-cultural adaptation requires steps of translation, cultural adaptation, and assessing validity and reliability. Since the tool does not provide adequate psychometric data, using it in the clinical field and research would be questionable. To adapt the Executive Function Performance Test to different cultures and languages, and also to measure its validity and reliability across various diseases that have not been previously assessed, further research is needed, following the steps outlined in this review.

Keywords: Cross-Cultural Adaptation, EFPT, Reliability and Validity, Occupational Therapy, Functional Cognition

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## Introduction

Functional cognition comprises 2 constructs: function and cognition, and is the application of cognitive functions inside the context of activities of daily living (ADL) and occupations. Functional cognition is an incorporated concept of functional and cognitive prerequisite skills for performing ADL (1). A broader definition of functional cognition has been presented; the noticeable function of the individual, which is led by cognitive procedures in daily

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living activities, is the result of dynamic interactions of individual physical ability, task demands, and the environment of the activity (2). Functional cognition demonstrates how cognition is used in variable difficulty levels of daily living activities and affects occupational performance and participation (3). Therefore, functional cognition enfolds concepts of executive function, metacognition, and other cognitive tasks in the context of ac-

#### *↑What is "already known" in this topic:*

The Executive Function Performance Test (EFPT) has been crossculturally adapted in various countries, including Spain, Brazil, Korea, France, Sweden, and Thailand; however, discrepancies have been identified in its methodology and psychometric properties.

#### →What this article adds:

This article reviews the methodology of articles investigating crosscultural adaptation of EFPT and highlights the proper methodological process for cross-culturally adapting a performance-based tool and measuring its reliability and validity. As EFPT is a valid tool for assessing functional cognition, reviewing its adaptation method and psychometrics across countries and disorders can guide occupational therapists in using robust assessment tools and inform the proper crosscultural adaptation and validation process of performance-based tools in Iran. tivity and environment (1). Unlike the neuropsychological assessments that isolate cognitive functions during evaluation (ie, memory, attention, inhibition, executive function, etc), the goal of assessing functional cognition is to evaluate the individual's whole capacity for performing tasks (eg, using strategies, habits, routines, and environmental resources) (4). Tools used for assessing functional cognition assess this concept within the context of ADL and instrumental activities of daily living (IADL)(5).

Different papers have stated that ADL is more related to motor function, and IADL is related to executive functions (6–9). The Executive Function Performance Test is one of the IADL-based tools that assesses functional cognition. To evaluate executive functions such as initiation, organization, sequencing, safety, and judgment, the Executive Function Performance Test (EFPT) requires individuals to complete 4 everyday tasks: meal preparation, telephone use, medication management, and bill payment. EFPT does not concentrate on disability. Instead, it focuses on individuals' ability to perform a task and the amount of help needed. In different countries such as Spain, Brazil, and Korea, a variety of conditions, including neurologic disorders, substance abuse, psychological disorders, breast cancer, and mild cognitive impairment, have been surveved (10–14).

The objective of this study was to review the articles that have investigated EFPT cross-culturally and to analyze their psychometric results. This will provide an overview of the cross-cultural psychometric procedures involved in adapting this tool for use across various disorders. Additionally, it can help other researchers who wish to adapt this tool to their own culture.

#### **Methods**

This review was accomplished based on the assertion from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 (15) and the COSMIN checklist for methodological research (16).

#### Eligibility Criteria

Articles that examined the cross-cultural adaptation and psychometric properties of the EFPT in different countries were included. Inclusion criteria were publication in English and availability of the full text.

## **Information Sources**

Web of Science, Google Scholar, PubMed, and Scopus databases were searched. The PRISMA flow diagram includes the records identified from each database, along with their corresponding numbers.

## Search Strategy

The search was performed with the following keywords: transcultural adaptation, validity, reliability, psychometric properties, executive function performance test, and EFPT. Syntaxes were modified in each database and searched in the title and abstract. The number of gathered articles at the first phase, screening phase, and full-text reading to include only relevant articles is represented in the following PRISMA chart (15).

#### Selection and Data Collection Process

Two reviewers screened the title, abstract, and full text. The data from full-text articles were extracted using 2 standardized extraction forms, including the name of the writer, year, country of origin, sample sizes, disorder of study population, inclusion and exclusion criteria, and study setting (Table 1); a table of adequacy of measurement properties using the COSMIN checklist with methodological domains: validity, reliability, and responsiveness (Table 2).

## **Synthesis Methods**

Data from the included articles have been extracted in Table 2 using the COSMIN checklist, which provides an overview of the psychometric properties of studies investigating cross-cultural adaptation of the EFPT.

## **Results**

This review identified 361 records. After removing duplicates (n = 15), a total of 344 records were screened, and 331 articles were eliminated because they did not match the inclusion criteria. Thirteen articles were assessed for eligibility; however, only 7 articles were eligible and discussed in this review (Figure 1).

This methodological systematic review aimed to provide an overview of psychometric validation and cross-cultural adaptation of the EFPT across various countries.

## Study Design

All articles were defined as cross-sectional studies considering cross-cultural adaptation and psychometric properties of EFPT.

## Sampling Technique and Sample Size

The sampling method of the articles was not mentioned. The sample size of articles varied from 17 in an investigation of face validity and an interrater reliability study (17) to 86 in the EFPT-Br study (12). Most articles mentioned an inadequate sample size as a limitation. In only 1 article, total scores have been compared with the healthy group (10). In other studies, scores have been compared in 2 groups: acute and chronic schizophrenia (18).

## **Cross-Cultural Adaptation**

To cross-culturally adapt the tool, some changes have been made in various cultures. In the Republic of Korea (11), some task modifications have been made, such as making rice porridge instead of oatmeal, ordering delivery food with a phone instead of groceries by phone, taking prescribed vitamins instead of medication, and paying bills by transferring funds from a bank account instead of writing checks. In the Brazilian adapted version (12), the task of making a phone call to the grocery store was replaced with a call to a pharmacy. Since patients' names are not typically displayed on medication bottles in Brazil, participants were required to match the drug bottle to the prescription, and illiterate participants were instructed to identify the correct bottle based on color. Additionally, because utility bills in Brazil are not paid at the bank, participants had to consult their bank statements to determine

Title	Author	year	country	Population	Sample size	measurement tools	study setting
Reliability and validity of the Spanish Version of the Executive Function Performance Test (EFPT) In Assessing Peo- ple in Treatment for Substance Addiction	Gloria Rojo-Mota	2021	Spain	substance abuse or dependence	52	Diagnostic and Statistical Manual of Mental Disor- ders [DSM–IV–TR]	Addiction Treatment Centre (CAD) San Blas Occupational Therapy Department
Reliability and validity of a culturally adapted execu- tive function performance test for Thai people with substance-induced disor- ders	Sutinun Juntorn	2021	Thailand	substance- induced dis- orders	30	Behavioral Assessment of the Dysexecutive Syn- drome	occupational therapy pro- grams at Somdet Chaopraya Institute of Psychiatry
Executive Function Performance Test: transcultural adaptation, evaluation of Psychometric Properties in Brazil	Juliana Conti	2018	Brazil	stroke	86	Barthel Index24; Functional Activities Questionnaire (FAQ)/Lawton and Brody Instrumental Activities of Daily Living (IADL)/the Stroke Impact Scale/e Mini-Mental State Examination/Brief Cognitive Screening Battery/ the Digit Span (backward and forwards)/ the Stroop Color-Word Test for illiterates/the Zoo Map from the Behavioral Assessment of the Dysexecutive Syndrome/Hospital Anxiety and Depression Scale and the Hamilton Depression Rating Scale	Hospital das Clínicas of the Universidade de São Paulo
Reliability and Validity of Culturally Adapted Execu- tive Function Performance Test for Koreans with Stroke	Hee Kim	2017	Korea	stroke	34	Korean Color-Word Stroop Test/Trail Making Test/Digit Span Test/ as- sessment of motor and process skills/ Korean mini-mental state examina- tion/ modified Barthel index	hospitals and welfare centers of the regions of Wonju and Jeonju
Inter-rater reliability and face validity of the Execu- tive Function Performance Test (EFPT)	Marie Cederfeldt	2015	Sweden	stroke	17		stroke unit at a regional hospital
Concurrent Validity of the Executive Function Per- formance Test in People with Mild Stroke	Marie Cederfeldt	2011	Sweden	stroke	23	The Barthel Index/The Assessment of Motor and Process Skills/	stroke unit at a regional hospital
Validity of the Executive Function Performance Test in Indi- viduals With Schizophrenia	Naomi Katz	2015	Israel	schizophrenia	61	Behavioral Assessment of the Dysexecutive Syn- drome Profile	hospitalized at Beer Yaakov Psychiatric Hospital in Israel

the correct payment amount. In Thailand (13), only the medication task was retained in its original form, while some cultural modifications were made to the other tasks.

#### Validity Assessment

Validity was evaluated in various ways, including face, structural, content, criterion, and construct validity. The validity assessment is highly tailored depending on the researchers' criteria, instrument feasibility, and statistical analysis. There are variances in both assessments and measurement techniques.

## **Reliability Assessment**

To assess reliability, internal consistency, along with intra- and interrater reliability, was examined. Nearly all articles examined internal consistency with the use of Cronbach's alpha with a threshold of ≥0.70, but in 1 article, it was assessed with McDonald's Omega (ω). Interrater and intrarater reliability were reported by the intraclass correlation coefficient (ICC), having a level of ICC >0.7, except for 1 article (12).

## Cross-Cultural Adaptation of the EFPT

Table 2. Psychometric Properties of Studies

Assessment	Reference	Measurement property: methodological quality per study							
		Internal consistency	Reliability	Measurement error	Content validity	Structural validity	Hypothesis testing	Criterion validity	Responsiveness
Reliability and validity of the Spanish Version of the Executive Function Performance Test (EFPT) In Assessing People in Treatment for Substance Addiction	Gloria Rojo-Mota	IC: = .91.McDonald's ω good+	NR	NR	NR	good+ mean of item residual absolute loadings = .19, goodness-of-fit index = .99	convergent validity: correlation with the neu- ropsychological tests with a considerable effect size (40 < r <60), good+ Known group validity: participants scored sig- nificantly higher than healthy participants. good+	NR	NR
Reliability and validity of a culturally adapted ex- ecutive function perfor- mance test for Thai peo- ple with substance- induced disorders	Sutinun Juntorn	IC: Cronbach's al- pha=0.72 good+	good+ intra-rater reliability: ICC= 0.98 inter-rater reliability: ICC= 0.88	NR	content validity: IOC=0.67-1.00	NR	NR	correlations be- tween the total EFPT-Th scores and the BADS total profile scores (r=-0.63, p<0.01) not good	NR
Executive Function Per- formance Test: transcultural adaptation, evaluation of Psychometric Properties in Brazil	Juliana Conti	IC: Cronbach's alpha = 0.819, good+	Intra-rater reliability: ICC=0.435 not good_inter-rater reliability: ICC=0.73g ood+	NR	NR	NR	Convergent validity: The EFPT-BR showed signif- icant correlations with other executive function tests, and the IADL measures (Barthel Index, FAQ, and IADL scale) good+	NR	NR
Reliability and Validity of Culturally Adapted Executive Function Performance Test for Koreans with Stroke	Hee Kim	IC: Cronbachalpha=0.77 good+	inter-rater reliability: ICC=0.87, good+	NR	NR	NR	NR T	EFPT-K demon- strated substantial associations with all neuropsycho- logical tests known to evaluate execu- tive processes, except for digits backward. good+	NR

Table 2. Psychometric Properties of Studies

Assessment	Reference	Measurement property: methodological quality per study							
		Internal consistency	Reliability	Measurement error	Content validity	Structural validity	Hypothesis testing	Criterion validity	Responsiveness
Inter-rater reliability and face validity of the Executive Function Performance Test (EFPT)	Marie Cederfeldt		inter-rater reliability: PA values between the raters' assess- ments varied from 53% to 100% (median 88% good+)						
Concurrent Validity of the Executive Function Performance Test in People with Mild Stroke		IC: Cronbach's alpha>0.7 good+	good	NR	NR	NR	NR	Concurrent validity: correlations between the AMPS process skills and the different tasks in the EFPT (rho = 0.54-0.60). AMPS process skills and the total sum of all the functions in the EFPT (rho = 0.61), good+	NR
Validity of the Execu- tive Function Performance Test in Individuals With Schizophrenia	Naomi Katz	IC: Cronbach's alpha= 0.88, good+	NR	NR	NR	NR	Known group validity: The acute group scored significantly higher than the chronic group on almost all tasks and components of the EFPT p = .045 to .000good+	v.o.1, good	NR

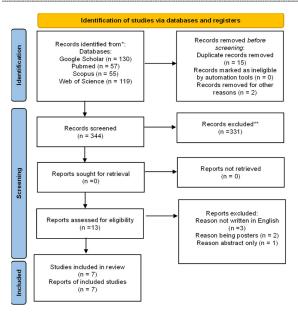


Figure 1. PRISMA flow diagram (15)

## **Discussion Cross-Cultural Adaptation**

The most commonly used guideline for transcultural adaptation of instruments is the one proposed by Guillemin et al in 1993, along with the methodologies outlined by Herdmanet al in 1998, and Beaton et al in 2000, as well as the methodological guidelines from the World Health Organization (19). These guidelines emphasize the importance of not merely translating instruments from one language to another, but also culturally adapting them to ensure conceptual validity across different cultures. Having almost similar steps of first translation, synthesis of the translations, back translation, expert panel review (semantic equivalence, idiomatic equivalence, experiential equivalence, and conceptual equivalence), testing of the prefinal version, and final survey with some changes according to the study circumstances (19, 20). Although the studies have a more or less similar structure, there is no definite rule that must be followed. Most studies followed the forward-backward translation method; however, cultural modification of tasks was only reported in EFPT-Korea, Brazil, and Thailand.

#### Validity Assessment

• Face Validity: It is considered to be the most straightforward and least robust.

The validity of the assessment was evaluated using standard back-translation procedures, critical review, and expert panel feedback, as well as assessments of feasibility, readability, consistency of style and formatting, and language clarity (19, 20). Only the Swedish version of the EFPT measured face validity with a dual-panel approach (17)

• Content Validity: Content validity was measured by a back-translation process, literature review, and expert

panel opinion, by experts with a content validity index. In different studies and situations, researchers use other methods, along with the feasibility of the study domain (19). Only in EFPT-Thailand was content validity measured using the Index of Item-Objective Congruence (IOC) by 3 professionals. The IOC task showed a high level of agreement for the components in each (IOC = 0.67-1.00).

• Construct Validity: Different ways of hypothesis testing (construct validity) are known as convergent validity, discriminative validity, and known group validity. A hypothesis is developed based on the relationship between scores on the main measures and another construct; data are then collected from a specified population, and conclusions are drawn regarding the hypothesis (20). Hypothesis testing may be assessed by factor analysis, as in the EFPT-Spain article; by comparison with similar instruments using Spearman's correlation coefficient, as in the EFPT-Korea study; or by comparison with similar instruments using Pearson's linear correlation, as in a study conducted in Brazil.

## **Criterion Validity**

Criterion validity was determined by comparison with the gold standard measure. Criterion validity, like all other types of validity, was assessed in various ways, including concurrent and predictive validity. Two articles used BADS as the gold standard to measure criterion validity (11,18). One study used AMPS (21) and the other study used neuropsychological tests showing a significant correlation, except for the digit backward test (11).

## **Reliability Assessment**

Internal consistency was measured in almost all of the articles, with Cronbach's alpha having a level of  $\geq$ 0.70, ranging from 0.72 to 0.88. In 1 study, IC was measured with McDonald's omega with  $\omega$ = 0.91 level (10). The high alpha (0.7-0.9) shows good reliability, indicating that the items of a test are interrelated. Thus, the EFPT has demonstrated good internal consistency across different countries. Interrater reliability was reported with ICC, ranging from 0.73 to 0.88, indicating excellent reliability. In 1 study, percentage agreement (PA) was used to measure agreement between the raters (17). Intrarater reliability has been calculated in 2 countries with ICC levels of 0.43 and 0.98. The reason for the poor intrarater reliability in the Brazilian study was the independence of participants in initiation, resulting in 0 scores.

The EFPT is a multi-item measure, and the critical distinction of the multi-item measure is whether it is a reflective scale or a formative index. Categorizing multi-item measures will help researchers fully understand the measurement tool and have some prior knowledge of the expected correlations between items. By the structural equation modeling terminology, items of a reflective measure are effect indicators because they show the effect of the construct. Additionally, a multi-item measure can include items that define or cause the construct, rather than being the effect of the construct, such as formative measures. The EFPT is a formative measure. In formative scales, because the items define the construct, the specific items

matter very much, such as initiation, execution, and termination in EFPT, as crucial items defining executive functions. As the construct does not comprise items of a formative index, they depict different aspects of an attribute, so the items are not necessarily correlated. Calculating Cronbach's alpha to show that items are interrelated is usually not meaningful in formative scales unless using Cronbach's alpha to show the correlation between the item and the central construct (20). All articles reported Cronbach's alpha except for the EFPT-Spain reporting McDonald's ω. The COSMIN taxonomy of measurement properties presented data on the psychometric properties of 7 articles. When considering the COSMIN table, data on some crucial properties were missing. The lack of psychometric data in some studies is a concern. Missing statistics on psychometric features does not always mean low psychometric quality; however, it suggests that the assessment tool is being utilized in a clinical field or for research that lacks adequate evidence. Moreover, in crosscultural studies, content validity is considered to be the most crucial psychometric property of an instrument. If there is no information on content validity, there will be considerable uncertainty about whether the content truly reflects the construct being assessed. The lack of psychometric data around content validity influences the generalizability and interpretation of the results. Data on content validity and discussion about expert panel opinions were mentioned in one study (13). To culturally adapt the EFPT to the target culture. The tool should undergo content and conceptual equivalence. To achieve this goal, some task modifications have been made. When selecting an assessment tool, clinicians should not only pay attention to the assessment's purposes and characteristics, but also to the quality of the tool's psychometric properties. Assessments with high-quality psychometric properties are essential in clinical settings. Tools with high-quality psychometric properties should be prioritized over tools that lack psychometric data or have low-quality scores.

## Limitations

Publications with full text in English were included. Furthermore, this review aimed to determine the psychometric properties of EFPT in various countries, including Spain, the Republic of Korea, Thailand, Brazil, Sweden, and Israel, across different disorders. The full text of the cross-cultural validation of EFPT in China, France, and the Czech Republic was not accessible.

## Implications for Occupational Therapy Practice

- The EFPT demonstrates adequate psychometric data in most studies.
- The EFPT is a valid and reliable tool for assessing functional cognition.
- Assessment of functional cognition can help occupational therapists determine the level of support required for a client in performing cognitive-demanding occupations, inform discharge decisions, and develop the most effective rehabilitation plan for clients.

## **Conclusion**

This methodological systematic review summarizes the results of 7 articles investigating the psychometric properties of the EFPT in cross-cultural backgrounds. The COSMIN checklist and taxonomy were used to assess the methodological quality of 7 articles. As some psychometric data were incomplete, the highest-quality tools, based on current data, were those that showed adequate face validity and content validity for developing culturally adapted measures at the first level. Then, psychometric properties, such as validity and reliability, and selecting the best gold standard tools to assess these properties were the second most essential steps in adapting the tool to meet the target population's or culture's psychometric needs. Further research into the psychometric properties of the EFPT is necessary so that clinicians and researchers can utilize this tool in various communities for a range of diseases.

## **Authors' Contributions**

The first and second authors searched the databases and provided data extraction tables. The first draft of the article was written by first and third authors. Final critical revision of the article was done by third and corresponding author. The research plan was suggested by corresponding author.

## **Ethical Considerations**

Ethical approval was not required for this study, as it is a systematic review based on published literature.

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## **Conflict of Interests**

The authors declare that they have no competing interests.

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