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Psychometric Properties of the Functional Assessment Instrument for Cancer Therapies - Cognitive Function (FACT-COG) in the Mexican General Population

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Abstract

Introduction: Cognitive deterioration can be a factor that can affect the quality of life of the general population throughout life.

Objective: To determine the psychometric properties of the Functional Assessment Instrument for Cancer Therapies - Cognitive Function (FACT-COG) in the Mexican general population.

Method: 212 people with an average age of 33 years participated. A non-experimental cross-sectional design was used. Instruments: FACT-COG (3rd version-MX).

Statistical analysis: An exploratory and confirmatory factor analysis was performed.

Results: Five factors with a total of 31 items were identified. The overall internal consistency of the scale was α = 0.964 and for each subscale, the alpha indices ranged from 0.803 to 0.937, accounting for 71% of the total variance. The confirmatory factor analysis presents satisfactory model structure adjustment indicators (CFI, RMR, and RMSEA) that denote a balanced and parsimonious model.

Discussion and conclusion: The FACT-COG in the Mexican general population presented adequate exploratory and confirmatory psychometric characteristics, which suggests that it is an adequate instrument to assess perceived cognitive function in the general population.

Keywords: Quality of life; Cognitive function; Mexico; Psychometric properties

Introduction

Cognitive impairment (CD) is defined as that alteration in cognitive functions that prevent a person from carrying out their daily activities with the usual efficiency [1]. CD is usually measured employing standardized neuropsychological tests; however, the use of self-report questionnaires is increasingly common, which allows knowing the subject's perception of their cognitive functions from the observation of their daily activities. These questionnaires are usually one of the most common reasons for conducting neuropsychological tests and knowing cognitive functioning in an objective way [2]. So, in recent years, the evaluation of cognitive function on quality of life has become relevant, as well as the impact on daily life. In this context, the Functionality Assessment Instrument in Cancer Treatment - Cognitive Function (FACT-COG) [3] is a self-report questionnaire initially used in cancer patients to assess deterioration in cognitive abilities and their impact on the quality of life based on the patient's perception [4].

It is an instrument widely used worldwide since it has been validated in different populations, it consists of 37 items, in a self-applicable format, it has constructs functionality and quality of life concerning cognitive function and it is used to assess the self-reported perception of different neuropsychological symptoms and their effect on the quality of life, since it is common for this population to notice negative changes in their cognitive

functioning, such as memory problems, concentration failure, and attentional difficulties. In the cancer population, there are validations of the FACT-COG in the Asian [5], which identified reliability of 0.92, with 4 original factors and variance of 74.2%. In the validation in the French population [4] in a heterogeneous sample of cancer patients, reliability of 0.93 and its 4 original factors were obtained. Finally, the validation of the FACT-COG in Korea [6] showed an internal consistency of 0.94, statistically significant correlations with symptoms of depression and other measures of quality of life, preserving the 4 original factors. A factorial structure of four factors with 36 items was identified in the Mexican population with cancer [7] The internal consistencies of each subscale had a value of between 0.98 to 0.95, of the global scale 0.98, which explained 77.6% of the variance, with appropriate indicators of the adjustment of the structure of the model.

In a healthy population, psychometric properties have been reported in a sample of the French population to obtain normative data [8]. To measure the effect of age on cognitive functions, three age groups were considered: 30-49, 50-69, and 70-89. The results of the validation in the general population of the FACT-Cog showed good internal consistency, with Cronbach's alpha of .91 for the Perceived Cognitive Impairment (DCP) subscale, of .74 for Comments of Others (CO), of .90 for Perceived Cognitive Abilities (CCP) and .88 for Effects on Quality of Life (CVD). To assess internal validity, correlations were made between the four subscales, which correlated significantly with each other. Spearman correlation from .31 to .63, ps <.0001, except CO and CVD. An effect of age was found on the DCP and CCP subscales, where older people presented more subjective complaints (p<.001). On the other hand in students and the elderly population [9] identified a structure of four factors (deficiencies, abilities, ability to notice and quality of life), with some support to separate the factors of disability / wide capacity in domains specific cognitive. The older adult sample was better described using both disabilities/abilities and specific cognitive domains, while the student sample suggested two factors of disability/ability, but the separation of the elements of concentration/acuity and memory / verbal disability.

Both studies conclude that FACT-Cog can be used in populations other than cancer patients, the values obtained from the healthy population can be used to compare the perceived cognitive function in cancer patients, as they provide a reliable reference to evaluate the impact of disease and / or treatments on perceived cognitive function. However, a validated instrument that evaluated the perception of cognitive deterioration in the quality of life has not been identified in the Mexican population, so the objective of this study was to validate the FACT-COG in a group of the Mexican general population.

Method

An online survey was conducted, in which 212 men and women of Mexican nationality participated through a non-probability convenience sample. A non-experimental, cross-sectional design was used10.

Participants inclusion criteria:

a. Minimum age of 18 years,

b. Know how to read and write.

c. With internet access and some electronic device such as a smartphone or laptop.

d. Acceptance and signing of informed consent Exclusion criteria:

e. cognitive impairment that prevents you from completing the survey. Elimination criteria:

f. That during or after completing the survey they decide not to continue participating.

g. Non-acceptance of informed consent

Process

Obtaining the psychometric properties of the Functional Assessment Instrument for cancer therapies - Cognitive Function. The entire sample voluntarily participated by understanding and signing the informed consent. The procedures of this research complied with the provisions of the Declaration of Helsinki regarding research in human participants.

Instrument

The Functionality Assessment Instrument in Cancer Treatment - Cognitive Function (FACT-COG) (19) is an instrument that evaluates, through self-report, the patient's perception of their cognitive abilities and the effects of cognitive changes on their functionality and quality of life. The original instrument has shown an internal consistency of $\alpha = 0.96$.

Statistical analysis: Descriptive statistical analyzes of the total sample were performed.

Exploratory analysis: The central tendency statistics of each item were obtained to know their distribution in the response options; extreme groups (quartile 25 and 75) were determined, a Student's t-test was performed for independent samples to identify the discrimination property of each reagent, those with a p> 0.05 were eliminated from the analysis. Subsequently, cross-table analyzes were performed to determine the correlation between items and the exploratory factor analysis considering an a priori value of > .50 per item. With the reagents that passed these analyzes, Cronbach's alpha was estimated.

Confirmatory analysis: With the exploratory results, the fit of the 4-factor model was evaluated utilizing confirmatory factor analysis (AFC) using the maximum likelihood method that included the steps of identification and specification of the model, estimation of standardized parameters, (R2 correlations,

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covariances, modification indices and critical proportions of the differences), and finally, evaluation of the fit by observing acceptable limits of the estimators, as well as non-collinearity in the measured variables. The following indices were estimated X2, goodness-of-fit index (GFI) and its complements (AGFI, TLI), as well as the comparative goodness-of-fit index (CFI) 27, which is the best indicator for samples equal to or greater than 200 and finally the mean square root of the approximation error (RMSEA).

Results

As shown in Table 1, the total sample was made up of 212 participants, 83% women, and 17% men, with an average age of 33.9 years. Just over half are single residents of Mexico City, mainly with a bachelor's degree table 1.

Table 1. Description of the sample (n = 212).

Age = 33.99 (18-69)						
		f	%		f	%
Gender				Scholarship		
	Woman	176	83	Elementary school	5	2.4
	Man	36	17	High school	23	10.8
Marital status				Bachelor's degree	121	57.1
	Single(a)	124	58.5	Postgraduate	63	29.7
	Married(a)	51	24.1	Occupation		
	Free union	20	9.4	Professional	75	35.4
	Separated	13	6.1	Student	55	25.9
	Divorced					
	Widowed	4	1.9	Employee	41	19.3
Residence				Self-employment	16	7.5
	Mexico City	118	55.7	Work at home	10	4.7
	Other states of Mexico	48	22.6	Unemployed	10	4.7
	Mexico state	46	21.7	Retired	4	1.9
				Other	1	0.5

Internal consistency

The internal consistency analysis identified a general index α = 0.966, a reagent was removed that did not obtain the minimum of .50. Five factors were identified: Perceived cognitive memory impairments α = 0.934, Perceived cognitive deficits in the generation of ideas: α = 0.937, Comments from Others: α = 0.803, Perceived Cognitive Abilities: α = 0.909 and Effects on Quality of Life: α = 0.925.

Exploratory factor structure

The exploratory factor analysis obtained in the Bartlett sphericity test a value p = 0.001 indicating non-identity of the correlation matrix, while the Kaiser-Meyer-Olkin index (KMO) was 942; Varimax rotation was used to extract the model, in which five factors were identified, which together explain 71.3% of the variance. See table 2 for the exploratory factor structure table 2.

Table 2: Exploratory factor analysis of the FACT Cog-PG (n = 212).

Global Cronbach's alpha α = 0.966 Variance = 71.37%	Factor load					Item Mean	SD of the item
	1	2	3	4	5		
CogF19. I have walked into a room and forgotten what I meant to get or do there	0.772					2.93	0.98
CogV13. I have had trouble recalling the name of an object while talking to someone	0.755					3.02	1.02
CogM10. I have had trouble remembering where I put things, like my keys or my wallet	0.754					3.01	1.03
CogM12. I have had trouble remembering new information, like phone numbers or simple instructions	0.687					3.1	1.03

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CogF24. I have forgotten names of people soon after being introduced	0.665					3.29	0.97
CogV16. I have used the wrong word when I referred to an object	0.66					3.25	0.98
CogV15. I have had trouble finding the right word(s) to express myself	0.577					2.89	1.06
CogV17b. I have had trouble saying what I mean in conversations with others	0.565					3.04	1.02
CogC33c. I have had to use written lists more often than usual so I would not forget things	0.557					3.1	1.07
CogC33a. I have had to work harder than usual to express myself clearly	0.504					3.11	1.06
CogC31. I have had to work harder than usual to keep track of what I was doing		0.711				2.9	1.16
CogC7. I have had trouble concentrating		0.697				2.38	1.26
CogC32. My thinking has been slower than usual		0.695				3.04	1.09
CogA3. My thinking has been slow		0.689				3.03	1.06
CogA1. I have had trouble forming thoughts		0.648				2.99	1.05
CogF23. I have had to work really hard to pay attention or I would make a mistake		0.613				2.82	1.15
CogF25. My reactions in everyday situations have been slow		0.568				3.23	0.92
CogPM1. I have been able to remember things, like where I left my keys or wallet			0.774			2.43	1.04
CogPM2. I have been able to remember to do things, like take medicine or buy something I needed			0.765			2.58	1.02
CogPV1. I have been able to bring to mind words that I wanted to use while talking to someone			0.76			2.48	0.96
CogPF1. I am able to pay attention and keep track of what I am doing without extra effort			0.736			2.33	1.02
CogPCH2. My memory is as good as it has always been			0.687			2.29	1.09
CogPCH1. My mind is as sharp as it has always been			0.678			2.3	1.05
CogPC1. I have been able to concentrate			0.568			2.1	0.99
CogQ38. These problems have interfered with my ability to do things I enjoy				0.838		2.35	1.29
CogQ41. These problems have interfered with the quality of my life				0.83		2.45	1.18
CogQ35. I have been upset about these problems				0.807		2.16	1.17
CogQ37. These problems have interfered with my ability to work				0.792		2.54	1.27
CogO3. Other people have told me I seemed to have trouble thinking clearly					0.819	3.64	0.79

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CogO2. Other people have told me I seemed to have trouble speaking clearly					0.759	3.67	0.71
CogO4. Other people have told me I seemed confused					0.686	3.59	0.73
CogM9. I have had trouble finding my way to a familiar place					0.507	3.4	1
Alpha value of the factor	0.934	0.939	0.916	0.926	0.82		
Factor variance	18.50%						
Average	30.75	20.39	16.53	9.49	14.29		
Standard deviation	8.105	6.582	5.855	4.438	2.59		
Factor variance	8.105	43.32	34.28	19.69	6.71		
Intraclass correlation	0.587	0.68	0.61	0.756	0.506		
Lower value	0.536	0.632	0.557	0.711	0.437		
High value	0.64	0.727	0.664	0.798	0.574		
F value	15.232	15.88	11.95	13.41	5.09		
P value	≤0.001	≤0.001	≤0.001	≤0.001	≤0.001		

*The items have their original numbering and are ordered according to their factor load.

Confirmatory factor structure

The fit of the model of factors obtained with the exploratory analysis was evaluated using confirmatory factor analysis (AFC) using the maximum likelihood method, with the following steps:

a. Identification of the model: For the analyzed model, of a total of 22 variables, there were 21 endogenous variables. There were 5 unobserved variables (total parameters to be estimated by the model).

b. Parameter estimation: The STATA 14.2 program was asked to apply the maximum likelihood method, with standardized estimators, R2 estimator (multiple squared correlations), covariances of the estimators, indexes to be modified and critical proportions for the differences.

c. For the evaluation of the fit (the sample exceeds n = 212), as a first step, all the results were examined to ensure that the estimated coefficients did not exceed the acceptable limits (that there were no negative or insignificant error variances, higher standardized coefficients to 1, or excessively high standard errors related to some estimated coefficient).

d. The regarding the absolute measures of the global adjustment, the chi-square value was 1142 (p = ≤0.000, 424gl). Comparative measures of global fit, such as the comparative index (CFI), is near ideal (CFI = 0871), as is the Tucker-Lewis index, which takes into account the complexity of the model (TLI = 0.858) indicating an acceptable fit to the data.

The parsimony indices (PCFI) are very close to the optimal value, so the model is adequate as the goodness of fit statistics acceptably show, plus the root of the mean squared approximation residual (RMSEA = .089, IC 90 [.083-.096] and the root mean standardized quadratic residual (SRMR = .061).

Discussion

The psychometric analyzes carried out for the validation of the Functional Assessment Instrument for Cancer Therapies - Cognitive Function (FACT-COG) in the Mexican general population present a factorial structure similar to the original and to the validations in other countries, the version of this study identified 5 original factors that are Comments from Others (CO), Perceived Cognitive Skills (HCP) and Impact on Quality of Life (ICV) while Perceived Cognitive Impairment (DCP) was made up of two components ¨ Perceived cognitive deficits attentional memory ¨ and ¨Perceived cognitive deficits in the generation of ideas with a variance¨ that together explained an adequate percentage of the variance.

The model contains 5 factors with a strong association between them, as shown by the exploratory analysis, which makes it possible to recommend this instrument to assess perceived cognitive function in the general population. The most powerful indicators of the model structure adjustment (CFI, SRMR, and RMSEA) suggest that it is a balanced and parsimonious model. The FACT-COG is a widely worldwide used instrument worldwide since it has been validated in different populations. When comparing the present study with those of other countries, it can be seen that they are very similar both in their reliability, factor loads, explained variance, and validity. This study supports the use of FACT-Cog with five identified factors, the factor

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perceived cognitive deficiencies in two components may be more appropriate for the general population expressing a quality of life without high rates of dysfunction or characteristic symptoms of a population with some disease chronic-degenerative like cancer. The suggested that the disability/deficit items partly represent the mood states of the respondents, while the skill/ability items capture general self-efficacy. Different emotional and cognitive processes may be involved in the negative evaluation and positive experiences [10]. Finally, this version validated in the Mexican population can help people to evaluate their cognitive functions from the observation of their daily activities. This will allow more scope for research and utility of FACT-Cog use in both research and clinical settings.

Conclusion

The Instrument for the Evaluation of Functionality in Cancer Treatment - Cognitive Function (FACT-COG) is an instrument that demonstrated adequate psychometric properties in the Mexican population, thus providing evidence of the instrument's validity. In addition to that, the FACT-COG can be used in the Mexican population in both clinical and diagnostic studies. It would also allow patients to be referred to the corresponding clinical intervention on time to improve the quality of care received by the multidisciplinary team, for a specialist to be able to carry out an objective evaluation and determine if appropriate rehabilitation is required.

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