Validity of the Cognitive Abilities Screening Instrument in people with dementia

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Background & Purposes

The Cognitive Abilities Screening Instrument (CASI) is commonly used to measure global cognitive function in people with dementia. The development of the CASI were on the basis of the Mini-Mental State Examination (MMSE), the Modified Mini-Mental State test, and the Hasegawa Dementia Screening Scale. The CASI consists of nine domains as following: long-term memory, short-term memory, concentration, orientation, attention, abstraction and judgment, language abilities, visual construction, and category fluency. The CASI has three characteristics. First, it includes nine domains that comprehensively measure cognitive function and provide the cognitive profiles to ensure abilities and disabilities in multidimensional cognitive functions. Second, it has cross-cultural application in measuring the severity of dementia. Third, the MMSE score can be transformed from the CASI. Thus, the CASI is the CASI is a measure considered to apply for general use for people with dementia.

Ecological validity is the extent to which test results are associated to the performance in real-world. A good cognitive measure should be able to reflect performance in daily functions for the people with dementia. Convergent validity is the extent to which constructs that should be theoretically related are associated in reality. Discriminative validity refers to the ability of a measure to discriminate different levels of function (e.g., levels of disability) in people with dementia¹⁰. Examining various sorts of validity is to give vigorous support for the validation of a measure. To enhance the utility of test results of the TVPS-3, it is important to provide empirical evidence of ecological validity, convergent validity, and discriminative validity for clinicians and researchers.

However, ecological validity, convergent validity, and discriminative validity of the CASI are largely unknown, which limit its explanation and utility. Therefore, the purpose of this study was to examine ecological, convergent, and discriminative validity of the CASI in people with dementia.

Methods

Participants and procedure

We recruited people with dementia in Northern of Taiwan between June 2017 and January 2018. The inclusion criteria were as follows: (1) diagnosed with dementia according to Diagnostic and Statistical Manual of Mental Disorders, fifth edition, (2) age greater than 50 years old, (3) willingness to participate in the study (signed an informed consent by the patient or family caregiver). The criteria for people excluded from the study were: (1) diagnoses of mental retardation; and (2) history of severe brain injury. All eligible participants were assessed by the CASI, the Alzheimer's Disease Assessment Scale-Cognitive subscale (ADAS-Cog), the Mini Mental State Examination (MMSE), the Clinical Dementia Rating (CDR), the Barthel Index (BI), and the Lawton Instrumental Activities of Daily Living (Lawton IADL).

Data analysis

Ecological validity was examined the correlations (Pearson's r) among the CASI and the BI, Lawton IADL, and three functional domains of the CDR (i.e., community affairs, home and hobbies, and personal care). The criteria of ecological validity were as follows: $r < 0.30$, poor ecological validity; $0.30 \leq r < 0.60$, adequate ecological validity; and $r \geq 0.60$, good ecological validity.

We estimated correlations (r) among the CASI and the ADAS-Cog, MMSE and three cognitive domains of the CDR (i.e., orientation, memory, judgement and problem solving) for examining convergent validity. The criteria of convergent validity were as follows: $r < 0.40$, low correlation; $0.40 \leq r < 0.70$, moderate correlation; and $r \geq 0.70$, high correlation. To examine discriminative validity, independent t -test ($\alpha=0.05$) was used to determine whether the CASI could distinguish participants with disability (BI=0-18) and without disability (BI=19-20).

Results

A total of 58 participants (29 men and 29 women) were included. Table 1 shows the demographics and clinical characteristics of participants. For ecological validity, the CASI total score had moderate to high correlations with the BI, Lawton IADL, and three functional domains of the CDR ($r = 0.46$ - 0.80). Except for the attention and language domains, the other domains of the CASI were moderately correlated with the BI ($r = 0.30$ - 0.53). The nine domains exhibited moderate to high correlations with Lawton IADL and three functional domains of the CDR ($r = 0.42$ - 0.75). For convergent validity, the CASI total score revealed high correlation with the ADAS-Cog, MMSE, and three cognitive domains of the CDR ($r > 0.70$) (Table 3). Three domains of the CASI (i.e., long-term memory, abstraction and judgement, and language) showed high correlations with the ADAS-Cog, MMSE, and three cognitive domains of the CDR ($r = 0.71$ - 0.89). The short-term memory and mental manipulation domains revealed moderate correlations with the ADAS-Cog, MMSE, and three cognitive domains of the CDR ($r = 0.45$ - 0.69). The other four CASI domains demonstrated moderate to high correlations with the ADAS-Cog, MMSE, and three cognitive domains of the CDR ($r = 0.58$ - 0.75). For discriminative validity, the t -test results showed that statistically significant differences ($p < 0.05$) were noticed in the CASI total score and domains, except for the short-term memory domain.

Table 1 Demographics and clinical characteristics of participants (n=58).

Characteristic	
Age (years), mean (SD)	80.54 (7.90)
Gender, n (%)	
Male	29 (50)
Female	29 (50)
Marital status, n (%)	
Unmarried	1 (1.7)
Married	23 (39.7)
Divorced	3 (5.2)
Widowed	31 (53.4)
Education, n (%)*	
Below elementary school	23 (41)
Junior to senior high school	17 (30.4)
College and above	16 (28.6)
Place of residence, n (%)	
Home	37 (63.8)
Residential Care Homes	21 (36.2)
CDR, mean (SD)	1.15 (0.76)

*There are missing data in education (2).

Conclusions

The CASI has acceptable ecological validity, good convergent validity, and sufficient discriminative validity. The CASI can partially reflect the activities of daily living and is useful to assess global cognitive function in people with dementia. For the short-term memory with non-significant difference, clinicians and researchers should be used cautiously for distinguishing people with dementia who have different level of disability.

References

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