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Adaptation and validation into Portuguese language of the six-item cognitive impairment test (6CIT)

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ABSTRACT

Background: The six-item cognitive impairment test (6CIT) is a brief cognitive screening tool that can be administered to older people in 2–3 min.

Objective: To adapt the 6CIT for the European Portuguese and determine its psychometric properties based on a sample recruited from several contexts (nursing homes; universities for older people; day centres; primary health care units).

Method: The original 6CIT was translated into Portuguese and the draft Portuguese version (6CIT-P) was back-translated and piloted. The accuracy of the 6CIT-P was assessed by comparison with the Portuguese Mini-Mental State Examination (MMSE). A convenience sample of 550 older people from various geographical locations in the north and centre of the country was used.

Results: The test–retest reliability coefficient was high ($r = 0.95$). The 6CIT-P also showed good internal consistency ($\alpha = 0.88$) and corrected item-total correlations ranged between 0.32 and 0.90. Total 6CIT-P and MMSE scores were strongly correlated. The proposed 6CIT-P threshold for cognitive impairment is $\geq$10 in the Portuguese population, which gives sensitivity of 82.78% and specificity of 84.84%. The accuracy of 6CIT-P, as measured by area under the ROC curve, was 0.91.

Conclusion: The 6CIT-P has high reliability and validity and is accurate when used to screen for cognitive impairment.

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KEYWORDS
Cognitive impairment; dementia; screening; six-item cognitive impairment test

Introduction

Ageing populations have contributed to an increase in the prevalence of dementia. In 2010, there were an estimated 35.6 million people with dementia worldwide. It is estimated that by 2030 this figure will have risen to 65.7 million and that it will continue to double every 20 years, increasing to 131.5 million by 2050 (Prince et al., 2013, 2015). Dementia is now considered to have reached pandemic proportions in developed countries. The economic impact of dementia is significant, with costs estimated at US$ 818 million in 2015, and by 2018 this figure is expected to reach trillions of US dollars, with serious implications for government authorities and global societies (Prince et al., 2015). In Western Europe, the estimated prevalence of dementia is around 7% (Prince et al., 2013) and the estimated prevalence of mild cognitive impairment (MCI), when no more than two cognitive domains are impaired, is 2.5%–15.6% (Alexander et al., 2015; Apostolo et al., 2016).

Most cases of dementia/MCI remain undetected and untreated. Cognitive screening is essential for the early detection of cognitive impairment and timely diagnosis is important as it allows patients to be referred promptly to specialist services. This should ensure that they receive appropriate treatment and thus delay or reduce symptoms, which should in turn improve quality of life for individuals living with dementia and for their family and carers (Parker & Philp, 2004; Prince et al., 2015). There are many cognitive screening instruments available for use in the clinical context, which are intended to assess cognitive function in individuals with apparent memory loss (Larner, 2013). Several sets of clinical guidelines recommend the use of cognitive screening to detect dementia and MCI, for example, the National Institute for Health and Care Excellence (NICE, 2006) recommends the widespread use of the Mini-Mental State Examination (MMSE; Folstein, Folstein, & McHugh, 1975) but suggests other brief cognitive screening tests, such as the six-item cognitive impairment test (6CIT; Brooke & Bullock, 1999).

The 6CIT is a brief, simple cognitive screening instrument that has been shown to have good psychometric properties (sensitivity and specificity) when used to identify cognitive impairment (Abdel-Aziz & Larner, 2015; Davous, Lamour, Debrand, & Rondot, 1987; Hessler et al., 2016; Tuijl, Scholte, De Craen, & Van Der Mast, 2012) and is considered particularly suitable for screening for milder forms of cognitive impairment (Brooke & Bullock, 1999). Because it is more sensitive to mild dementia than the MMSE (Abdel-Aziz & Larner, 2015; Brooke & Bullock, 1999) it has been recommended as a reliable alternative to the MMSE in diverse settings.

The reliability and validity of the 6CIT has been tested in several settings, for example primary care (Hessler et al., 2014), secondary care (Abdel-Aziz & Larner, 2015; Hessler et al., 2016; Tuijl et al., 2012) and tertiary care (Wade & Vergis, 1999). Doubts had already been raised about its reliability and validity in primary care contexts (Hessler et al., 2014) and on the basis of its psychometric properties, in particular its lack of sensitivity. Hessler et al. (2014) advised that the 6CIT should

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not be used routinely to screen for dementia in primary care settings. However, in specific settings, such as neurology departments, memory clinics and nursing homes, the 6CIT has better psychometric properties (Abdel-Aziz & Larner, 2015; Brooke & Bullock, 1999; Davous et al., 1987) and is considered a valid measure of cognitive deterioration.

In our first step towards developing and validating a Portuguese version of the 6CIT (6CIT-P), we demonstrated that a Portuguese version of the 6CIT had good internal consistency and reproducibility (Paiva & Apóstolo, 2015), but the low educational level of the sample constituted a significant limitation. This study represents a continuation of our earlier research and was intended to address the weaknesses of the earlier study by testing the 6CIT-P in an educationally diverse sample. Our aims were: (1) to develop a European Portuguese version of the 6CIT (6CIT-P) and assess its suitability for use in diverse non-hospital settings; (2) to evaluate the reliability and validity of the 6CIT-P, examining whether it is as effective as the MMSE in detecting cognitive impairment in elderly people living in nursing homes and in the community (recruiting from universities for older people, day centres and primary health care units).

Methods

We conducted two-phase instrument validation study. Phase I consisted of translation and cultural adaptation of the original 6CIT and phase II involved assessing the reliability of the new 6CIT-P in the Portuguese cultural context.

Participants

To obtain a representative sample, data were collected in several rural and urban areas in the northern and mid-regions of the Portugal. The sample was recruited from (1) nursing homes; (2) universities for older people; (3) day centres; (4) primary health care units using convenience-based, non-probabilistic sampling techniques.

The following inclusion criteria were used: (1) 60 years of age and older; (2) capable of oral communication; (3) not depressed (Geriatric Depression Scale-15 score < 6); (4) consent. Participants were either living in a nursing home or in their own home. Participants living at home were interviewed at day centres or university for older people; those who did not attend such facilities (referred by primary health care units) were interviewed at their home. All facilities were selected, for convenience. Once an institution had consented to participate in the study, we recruited participants who met the inclusion criteria. In nursing homes, day care centres and primary health care units, the health professionals working in the facility (medical doctors and nurses) collaborated in the selection or referral of elderly people. In universities for older people, recruitment was done by the researchers. All interviews were carried out by trained postgraduate students. Individuals who did not meet the inclusion criteria were excluded from the study.

Materials and procedure

The 6CIT comprises six simple questions covering knowledge of the current date (year, month and day), memorisation of five items (name and address), mental reversal of numbers (20 to 1) and the months (December to January), and thus assesses functioning in the following cognitive domains: orientation, learning, memory and calculation (Brooke & Bullock, 1999). The absence of visuospatial and interpretative items (e.g. writing a sentence) makes it easier to evaluate visually impaired patients (Larner, 2015). The estimated total response time is only 2–3 min and the questions are simple and without cultural content. Unlike most cognitive screening instruments, the 6CIT uses a reversed scoring system; scores range from 0 to 28 and higher scores indicate greater cognitive impairment (Brooke & Bullock, 1999).

Phase I – translation and cultural adaptation

There were five stages in this phase (Beaton, Bombardier, Guillemin, & Ferraz, 2000). In Stage 1 (Translation), the English 6CIT was translated into Portuguese independently by two native Portuguese speakers. Stage 2 (Synthesis) involved comparing the two independent translations with each other and with the original version and agreeing a single draft Portuguese version. In Stage 3 (Back-translation), two native English speakers (a nurse and professional translator) translated the Portuguese draft back into English independently. The back-translators had no knowledge of the original instrument. In Stage 4 (Expert Committee), the translations were discussed by experts in mental health and psychiatry, with particular reference to cultural equivalence. The experts reached a consensus on a version that they considered idiomatic and semantically, experientially and conceptually equivalent to the original. Stage 5 (Pilot study) involved testing the draft Portuguese version in a Portuguese sample ($n = 54$, the first 54 participants recruited to the study).

Phase II – reliability of the 6CIT in a new cultural context

We collected socio-demographic information about the sample (age, gender, marital status and educational level) and administer the MMSE and 6CIT-P on the same day.

The MMSE is a 11-item tool designed to evaluate several cognitive domains: temporal and spatial orientation, short-term memory, attention, mental calculation, recall, perception, language and visuospatial perception. It takes about 8 min (range: 4–21 min) to administer. Although time consuming, it is considered a 'gold standard' cognitive test, and hence an acceptable method of screening for and monitoring cognitive impairment (Folstein et al., 1975). Score on the MMSE is influenced by educational level and so operational cut-off values for the Portuguese version vary according to years of literacy: 22 for 0–2 years; 24 for 3–6 years and 27 for 7 or more years of literacy (Morgado, Rocha, Maruta, Guerreiro, & Martins, 2009).

The education level categories used in this study were the same as for the Portuguese version of the MMSE (0-2 years; 3-6 years; >7 years).

Statistical analysis

Phase II – reliability of the 6CIT in a new cultural context

Descriptive analysis of the socio-demographic data was used to provide a picture of the basic characteristics of the sample. The first 54 participants recruited to the study completed the 6CIT-P twice, with an interval of two weeks between assessments, to provide a measure of test–retest reliability (Pearson's r). All the assessments carried out as part of the test–retest procedure were administered by a single researcher (postgraduate student).

The internal consistency of the 6CIT-P was assessed with Cronbach's alpha coefficient.

Convergent validity was assessed by calculating the correlation (Pearson's *r*) between the 6CIT-P and the Portuguese MMSE (Morgado et al., 2009). The Portuguese MMSE was treated as a 'gold standard' tool measuring an equivalent construct. Educational cut-offs for the Portuguese MMSE were as described earlier.

Receiver operating characteristic (ROC) curves were generated using the MedCalc® statistical software and used to determine the best cut-off points. Optimal cut-off points on the ROC curves were calculated using the Youden index (Fluss, Faraggi, & Reiser, 2005). The Youden index provides a way of determining the optimal threshold for a test, based on sensitivity and specificity. Graphically, the Youden index is defined as the distance between the ROC curve and the chance line, and the optimal threshold is the score at which this distance is maximal. Other standard summary measures of test accuracy were calculated, including sensitivity, specificity, positive and negative predictive values and positive and negative likelihood ratios.

An independent-samples Kruskal–Wallis test was used to analyse the distributions of 6CIT and MMSE scores in the literacy groups and the different settings, performing pairwise comparisons. Finally, multiple regression analyses were used to examine the influence of demographic, social and educational characteristics on 6CIT and MMSE scores to test which is more dependent of the its predictors.

Ethical considerations

This study was approved by the Health Sciences Research Unit Ethics Committee (Opinion P12-11/2010). Participants with mild to moderate dementia who were capable of writing provided informed consent. In the case of participants with advanced dementia and participants not capable of writing, informed consent was provided by a legal representative or family member.

Results

Phase I – translation and cultural adaptation

Steps 1, 2 and 3 of the translation process proceeded in a fluid manner. The brevity of the instrument facilitated these steps. At Stage 4, the expert panel suggested changes to the title and to items 3, 4 and 6. The changes were semantic, e.g. replacing 'patient' with 'person', or involved simplifying the wording or adjusting it to render it more culturally appropriate. The pilot study involved the 54 participants, showed that the 6CIT had high strong internal consistency (α = 0.82) and the corrected item-total correlations ranged between 0.30 and 0.75, representing a moderate to strong correlation between the items and total score, as is described elsewhere (Paiva & Apóstolo, 2015).

Phase II – reliability of measuring the 6CIT for the new cultural context

The final sample comprised 550 participants with an average age of 76.7 years (SD = 9.7; range: 60-103). A large majority of the sample was female (*n* = 387, 70.4%) (Table 1). Almost half the participants were widowed (*n* = 247, 44.9%), 216 (39.3%) were married or in a de facto marital relationship, 56 (10.2%) were single and the remaining 31 (5.6%) were divorced.

Table 1. The demographic, social and educational characteristics of the sample (*N* = 550).

Women, *n* (%)	387 (70.4)
Age in years, mean (SD)	76.7 (9.7)
Widowed, *n* (%)	247 (44.9)
Married, *n* (%)	216 (39.3%)
Single, *n* (%)	56 (10.2%)
Divorced	31 (5.6%)
Institutionalised, *n* (%)	152 (27.6)
Living in the community, *n* (%)	398 (72.4)
Day centres	180 (32.7)
Universities for older people	92 (16.7)
Own house	126 (22.9)
Educational level in years, *n* (%)	
0–2	169 (30.7)
3–6	238 (43.3)
7–18	143 (26.0)

Just over a quarter of the participants (*n* = 152, 27.6%) were institutionalised in six nursing homes and 398 (72.4%) living at home. Of those living in the community, 92 (16.7%) were users of two universities for older people, 180 (32.7%) were recruited from nine day centres and the remaining 126 (22.9%) elderly were referred by primary care units and interviewed in their own home (Table 1).

Educational level varied between 0 and 18 years (*M* = 4.8, SD = 4.6). The distribution of the sample (*N* = 550) by educational level was as follows, 0-2 years: 30.7%; 3-6 years: 43.3%; ≥7 years: 26.0% (Table 1).

Reliability

The test–retest reliability coefficient was high (*r* = 0.95, *p* = 0.00; *n* = 54) indicating good temporal stability. The 6CIT-P also had high strong internal consistency (α = 0.88) and the corrected item-total correlations ranged between 0.32 and 0.90, representing a moderate to strong correlation between the items and total score.

Validity

Scores on the 6CIT-P were compared with MMSE scores to provide a measure of convergent validity. 6CIT-P and MMSE scores were strongly negatively correlated (*r* = −0.90), indicating acceptable convergent validity. The correlation is negative because the polarity of the tests is different.

Sensitivity and specificity of the 6CIT-P

We compared the performance of the 6CIT-P and MMSE in screening for cognitive impairment. This information is presented graphically in the form of ROC curves (Figure 1).

The screening accuracy of the 6CIT-P relative to the MMSE, expressed as area under the ROC curve (AUC), was 0.90 when educational level was not taken into account; we refer to this condition as Global 6CIT-P. When educational level was taken into account, screening accuracy was 0.94, 0.95 and 0.84 for the 0-2 years of literacy, 3-6 years of literacy and ≥7 years of literacy groups, respectively.

To choose the cut-off point of the 6CIT, it was decided to select the point where the average of these two measures is maximal using the Youden index. The sensitivity, specificity, predictive value and likelihood ratio for the 6CIT-P with different cut-off scores are reported in Table 2.

By analysing Table 2, the proposed Global 6CIT-P cut-off score for the Portuguese population is 10, with sensitivity values of 82.78% and specificity of 84.84%, based on

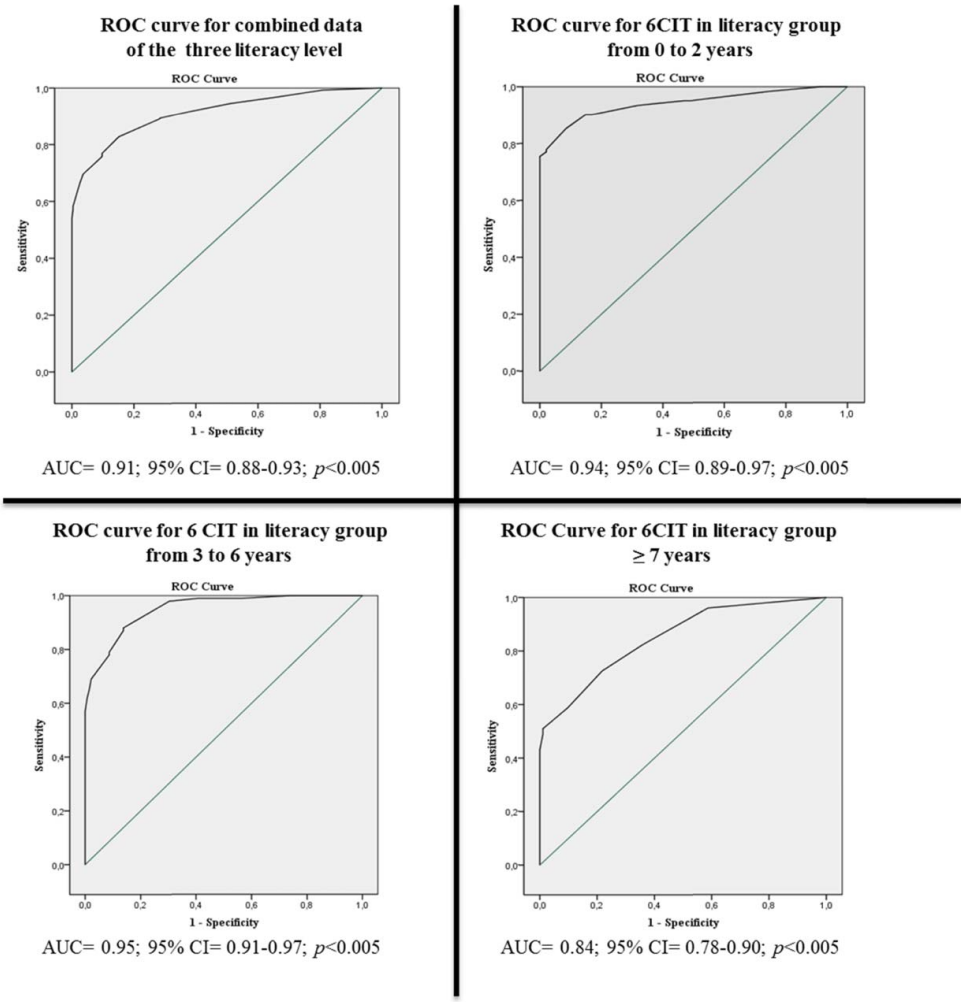

Figure 1. ROC curves for 6CIT.

comparisons with the MMSE and without taking into account educational level.

We also calculated separate cut-offs for the three educational levels. For individuals with 0-2 years of literacy, the optimal cut-off point was estimated to be 12, giving sensitivity and specificity of 93.44% and 68.09% respectively. For individuals with 3-6 years of literacy, the optimal cut-off was 10 (giving sensitivity and specificity of 88.0% and 86.2% respectively) and for those with 7 or more years of literacy the cut-off was 4, giving sensitivity and specificity of 72.55% and 78.26% respectively.

The independent-samples Kruskal–Wallis test showed statistically significant differences in all the groups ($p = 0.00$). So, we can assume different distributions both in literacy groups and living settings in the community. Multiple regression analyses assessing the relationships between 6CIT-P and MMSE scores on educational variable demonstrated that 6CIT-P score is more dependent on educational level than MMSE score ($_{\text{Beta weights}} = -0.35$ vs. 0.33), see Table 3.

Discussion

Given that cognitive screening is not carried out assiduously in Portugal in either primary or secondary care settings, there is a need for screening instruments that are quick to use, yet accurate. Portugal has an elderly population with a high prevalence of dementia, like all developed countries. The

Table 3. Influence of 6CIT and MMSE with demographic data: results of the regression model.

Predictors	R^2	Beta	*t*-test (95% confidence interval)
6CIT-P	0.46		
– Living in the community		0.44	$t = 11.59$; $p < 0.005$; 95% CI = 4.2-6.02)
– Educational level		−0.35	$t = -9.31$; $p < 0.005$; 95% CI = −0.95 to −0.62)
MMSE	0.43		
– Living in the community		−0.44	$t = -11.41$; $p < 0.005$; 95% CI = −4.44 to −3.1)
– Educational level		0.33	$t = 8.4$; $p < 0.005$; 95% CI = 0.4-0.65)

Note: All other variables do not fit in the model.

Table 2. Youden index and optimal cut-off points for the 6CIT-P by educational group.

6CIT-P method	Youden index (*J*)	Optimal cut-off point	Sensitivity	Specificity	PPV	NPV	LR+	LR-
Global	0.67 (0.60–0.72)	10 (8–11)	82.78	84.84	84.3 (79.4–88.5)	83.3 (78.5–87.5)	5.46 (4.1–7.3)	0.20 (0.2–0.3)
Literacy group from 0 to 2 years	0.76 (0.66–0.82)	12 (4–15)	93.44	68.09	88.4 (81.5–93.3)	80 (64.4–90.9)	2,93 (1.9–4.5)	0.09 (0.05–0.2)
Literacy group from 3 to 6 years	0.74 (0.65–0.82)	10 (9–12.03)	88	86.23	82.2 (73.7–89.0)	90.8 (84.5–95.2)	6.39 (4.2–9.8)	0.14 (0.08–0.2)
Literacy group ≥ 7 years	0.50 (0.34–0.60)	4 (0–8)	72.55	78.26	64.9 (51.1–77.1)	83.7 (74.2–90.8)	3.34 (2.2–5.1)	0.35 (0.2–0.6)

Note: PPV, positive predictive value; NPV, negative predictive value; LR+, positive likelihood ratio; LR−, negative likelihood ratio; MMSE, Mini-Mental State Examination; 6CIT-P, six-item cognitive impairment test – Portuguese version. Numbers in parenthesis are 95% confidence intervals.

resources of the health services are not enough for the demands; that is why many cases of mild dementia are diagnosed late.

We consider that the sociodemographic profile of our sample was as one would expect: it was elderly (*M* age = 76.7, SD = 9.7), mostly female (70.4%) and tended to have a low educational level, with only 26.0% of participants having seven or more years of education, despite the efforts of the research team to recruit older people with a higher education level, for example through universities for older people.

Our research, which began more than two years ago, focused initially on translating the 6CIT and adapting it to the Portuguese cultural context (Phase 1). The process was made easier by the simplicity and brevity of the 6CIT. Some adjustments to the initial translation were necessary, but consensus on the changes was easily reached amongst the group of translators and experts who collaborated to produce the 6CIT-P. The first – and so far only– Portuguese translation and cultural adaptation of the 6CIT was made for this study, and this allowed us to investigate the usefulness of the 6CIT-P as a method of screening for cognitive impairment in nursing homes and in other community settings in Portugal.

We conclude that the 6 CIT-P is suitable for use as screening instrument in diverse settings. The 6CIT-P demonstrated good temporal stability, based on the analysis of two-week test–retest reliability. Its other psychometric properties were also satisfactory and suggest that it is suitable for use as a cognitive screening tool. Cronbach's α coefficient and the correlations between total 6CIT-P and MMSE scores were highly acceptable.

The Global 6CIT-P showed good sensitivity and specificity (82.78% and 84.84%, respectively). These values are similar to those reported in other studies of the psychometric properties of the 6CIT (Abdel-Aziz & Larner, 2015; Brooke & Bullock, 1999; Davous et al., 1987; Hessler et al., 2016; Tuijl et al., 2012).

In individuals with a low educational level, the 6CIT was less specific (68.09%) but more sensitive (93.44%). Sensitivity tended to decrease as education level increased, whereas specificity showed the opposite trend.

In the Global condition (all educational levels), with a cut-off point of $\geq$10, the 6CIT-P shows promise as a screening instrument, with sensitivity and specificity $\geq$80% and an excellent AUC value (AUC = 0.91; 95% CI = 0.88-0.93; p = 0.00). In this study, we recommend cut-off scores for the 6CIT-P in four conditions, three specific educational levels and the cases where educational level is not known or not taken into consideration (Global 6CIT). The variability in the cut-off points (12, 10 and 4) is attributable to the range of years of education in our sample (0–18), as the multiple regression analyses demonstrated. Our study, perhaps for the wide range of years of educational level, showed that the cut-off point for the 6CIT-P is sensitive to educational level, but another study reported that 6CIT score was not sensitive to educational level (Tuijl et al., 2012).

Limitations

The sampling process we used (convenience, non-probabilistic) has limitations, particularly when the goal is to generalise the results to a wider population. To improve the generalisability of the results, we recruited participants from many geographically dispersed settings across the northern and central regions of the country.

The MMSE is not a true gold standard when used for diagnostic purposes. In this sense, the method of cognitive assessment used for comparison and treated as a 'gold standard' is further methodological limitation. Addressing this limitation, the criterion validity of this cognitive assessment tool, may be a proposal to future work, which could include application a method of making complete diagnosis of cognitive impairment/dementia (e.g. supported by the Diagnostic and Statistical Manual of Mental Disorders (DSM) criteria).

We achieved our aims, namely developing a European Portuguese version of the 6CIT and determining its psychometric properties. The use of a variety of settings (nursing homes and community settings, namely universities for older people, day centres and primary health care units) strengthens the results, nevertheless there is a need for further research in other settings to confirm the generality or otherwise of our results.

Conclusion

We have described the translation and cultural adaptation of the 6CIT to produce a European Portuguese version, and assessments of its reliability and validity. The assessment of cut-off points specific to particular educational levels for the Portuguese population is particularly valuable, given the great educational heterogeneity still existing in Portugal. The results of the evaluation of psychometric properties of this screening instrument lead us to conclude that it has promise for use in Portugal, and the great advantage of being quick to administer.

Disclosure statement

No potential conflict of interest was reported by the authors.

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References

Abdel-Aziz, K., & Larner, A. J. (2015). Six-item cognitive impairment test (6CIT): Pragmatic diagnostic accuracy study for dementia and MCI. *International Psychogeriatrics, 27*(6), 991–997. doi:http://doi.org/10.1017/S1041610214002932

Alexander, M., Perera, G., Ford, L., Arrighi, H. M., Foskett, N., Debove, C., … Gordon, M. F. (2015). Age-stratified prevalence of mild cognitive impairment and dementia in European populations: A systematic review. *Journal of Alzheimer's Disease, 48*(2), 355–359. doi:http://doi.org/10.3233/JAD-150168

Apostolo, J., Holland, C., O'Connell, M. D. L., Feeney, J., Tabares-Seisdedos, R., Tadros, G., … Cano, A. (2016). Mild cognitive decline. a position statement of the cognitive decline group of the European innovation partnership for active and healthy ageing (EIPAHA). *Maturitas, 83*, 83–93. doi:http://doi.org/10.1016/j.maturitas.2015.10.008

Beaton, D., Bombardier, C., Guillemin, F., & Ferraz, M. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine, 25*(24), 3186–3191. doi:http://doi.org/10.1097/00007632-200012150-00014

Brooke, P., & Bullock, R. (1999). Validation of a 6 item cognitive impairment test with a view to primary care usage. *International Journal of Geriatric Psychiatry, 14*(11), 936–940. doi:http://doi.org/10.1002/(SICI)1099-1166(199911)14:11<936::AID-GPS39>3.0.CO;2-1

Davous, P., Lamour, Y., Debrand, E., & Rondot, P. (1987). A comparative evaluation of the short orientation memory concentration test of cognitive impairment. *Journal of Neurology, Neurosurgery, and Psychiatry, 50*(10), 1312–1317. doi:http://doi.org/10.1136/jnnp.50.10.1312

Fluss, R., Faraggi, D., & Reiser, B. (2005). Estimation of the Youden Index and its associated cutoff point. *Biometrical Journal, 47*(4), 458–472. doi: http://doi.org/10.1002/bimj.200410135

Folstein, M. F., Folstein, S. E., & McHugh, P. R. (1975). "Mini-mental state." A practical method for grading the cognitive state of patients for the clinician. *Journal of Psychiatric Research, 12*(3), 189–198. doi:http://doi.org/10.1016/0022-3956(75)90026-6

Hessler, J., Bronner, M., Etgen, T., Ander, K.-H., Forstl, H., Poppert, H., … Bickel, H. (2014). Suitability of the 6CIT as a screening test for dementia in primary care patients. *Aging & Mental Health, 18*(4), 515–520. doi: http://doi.org/10.1080/13607863.2013.856864

Hessler, J. B., Schäufele, M., Hendlmeier, I., Junge, M. N., Leonhardt, S., Weber, J., & Bickel, H. (2016). The 6-item cognitive impairment test as a bedside screening for dementia in general hospital patients: Results of the general hospital study (GHoSt). *International Journal of Geriatric Psychiatry*, *32*(7), 726–733. doi: 10.1002/gps.4514

Larner, A. J. (2013). Comparing diagnostic accuracy of cognitive screening instruments: A weighted comparison approach. *Dementia and Geriatric Cognitive Disorders Extra, 3*(1), 60–65. doi:http://doi.org/10.1159/000348623

Larner, A. J. (2015). Six-item cognitive impairment test: Suitable for the visually impaired? *Progress in Neurology and Psychiatry, 19*(6), 20–22. doi:http://doi.org/10.1002/pnp.405

Morgado, J., Rocha, C. S., Maruta, C., Guerreiro, M., & Martins, I. P. (2009). Novos valores normativos do mini-mental state examination [New normative values of Mini-Mental State Examination]. *Sinapse, 9*(2), 10–16.

National Institute for Clinical Excellence/Social Care Institute for Excellence. (2006). Dementia: Supporting people with dementia and their carers in health and social care. London, UK: Department of Health. Retrieved from https://www.nice.org.uk/guidance/cg42

Paiva, D., & Apóstolo, J. (2015). Estudo de adaptação transcultural e validação do six item cognitive impairment test. In J. Apóstolo & M. Almeida (Eds.), *Elderly health care nursing. Monographic series – health sciences education and research* (pp. 3–18). Coimbra: Unidade de Investigação em Ciências da Saúde: Enfermagem (UICISA: E)/Escola Superior de Enfermagem de Coimbra (ESEnfC).

Parker, C., & Philp, I. (2004). Screening for cognitive impairment among older people in black and minority ethnic groups. *Age and Ageing, 33*(5), 447–452. doi:http://doi.org/10.1093/ageing/afh135

Prince, M., Bryce, R., Albanese, E., Wimo, A., Ribeiro, W., & Ferri, C. P. (2013). The global prevalence of dementia: A systematic review and meta-analysis. *Alzheimer's & Dementia, 9*(1), 63–75. doi:http://doi.org/10.1016/j.jalz.2012.11.007

Prince, M., Wimo, A., Guerchet, M., Gemma-Claire, A., Wu, Y.-T., & Prina, M. (2015). *World Alzheimer report 2015: The global impact of dementia – an analysis of prevalence, incidence, cost and trends*. London: Alzheimer's Disease International.

Tuijl, J. P., Scholte, E. M., De Craen, A. J. M., & Van Der Mast, R. C. (2012). Screening for cognitive impairment in older general hospital patients: Comparison of the six-item cognitive impairment test with the mini-mental state examination. *International Journal of Geriatric Psychiatry, 27*(7), 755–762. doi:http://doi.org/10.1002/gps.2776

Wade, D., & Vergis, E. (1999). The short orientation-memory-concentration test: A study of its reliability and validity. *Clinical Rehabilitation, 13*, 164–170.