

Developing and implementing guidelines on culturally adapting the Addenbrooke's Cognitive Examination Version III (ACE-III): A qualitative illustration

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Abstract

Background: Cognitive tests currently used in healthcare and research settings do not account for bias in performance that arises due to cultural context. At present there are no universally accepted steps or minimum criteria for culturally adapting cognitive tests. We propose a methodology for developing specific guidelines to culturally adapt a specific cognitive test and used this to develop guidelines for the ACE-III. We then demonstrated their implementation by using them to produce an ACE-III Urdu for a British South Asian population.

Methods: This was a several stage qualitative study. We combined information from our systematic review on the translation and cultural adaptation of the ACE-III with feedback from previous ACE-III adaptors. This identified steps for cultural adaptation. We formatted these into question-by-question guidelines. These guidelines, along with feedback from focus groups with potential users were used to develop ACE-III Urdu questions. Clinical experts reviewed these questions to finalise an ACE-III Urdu.

Results: Our systematic review found 32 adaptations and we received feedback from seven adaptors to develop the guidelines. With these guidelines and two focus groups with 12 participants a sample ACE-III Urdu was developed. A consensus meeting of two psychiatrists with a South Asian background and familiarity with cognitive tests and cultural adaptation finalised the ACE-III Urdu.

Conclusions: We developed a set of guidelines for culturally adapting the ACE-III that can be used by future adaptors for their own language or cultural context. We demonstrated how guidelines on cultural adaptation can be developed for any cognitive test and how they can be used to adapt it.

Background

Cross cultural research is rising, particularly in developed countries such as the United Kingdom (UK) and the United States (US), to account for increasing minority ethnic populations. Within the UK alone 88 main languages other than English are spoken and over 14% of the population identify as belonging to a minority ethnic group [1]. This is predicted to rise to 20% by 2051, resulting in minority ethnic groups accounting for a fifth of the population [2].

Thus, health measures are being employed across a range of languages and cultures [3], with culture influencing the perception of test questions and individual's responses to these questions [4]. Due to a frequently large number of questions within cognitive tests relying on the respondent's' culture, seen most commonly when assessing domains such as language and memory, we see this tendency for susceptibility more prominently in this type of assessment [5].

However, cognitive tests, like all health measures, are not designed for the populations they are being implemented across, having been developed in English for European countries; they do not accommodate for non-English speakers or ethnic populations residing there [3]. This can account for a higher rate of false positive and false negative scores across cognitive tests within these groups as compared to their Caucasian or English speaking counterparts, cultural bias in the administration and responses of the cognitive tests, and the compromising of the generalisability of these results [4, 6, 7]. This creates a disparity in the cognitive tests available to us versus the diverse populations in need.

Attempts at identifying a robust solution have proposed designing new cognitive tests but due to such a process being time consuming and complex it is not considered the most feasible option [8]. A common suggestion has been to adjust cut-off scores for different minority ethnic and non-English speaking groups but this has been criticised for reducing sensitivity, specificity and likelihood ratios [9]. Therefore, culturally adapting an existing cognitive test has been regarded as a preferred alternative.

At present, there is no universally standard procedure for undertaking the cultural adaptation of any given cognitive test [10]. Current approaches undertake the translation of health measures into a target language but this does not account for the influence of culture on the perception of a health measure beyond the requirement of fluency in the target language. Within cognitive tests we see questions assessing for orientation biased towards the western calendar or memory tasks requiring familiarity with western names and western history [5]. When cultural adaptation is not undertaken such bias occurs along with a loss of conceptual equivalence, [11] which results in cognitive tests not culturally suitable for minority ethnic or non-English speaking populations.

Therefore, there must be a global consensus on undertaking thorough cultural adaptation of any health measure, including cognitive tests, before administering it to a target population that differs from the population it was originally designed for [4]. We propose the development of guidelines on culturally adapting any cognitive test according to a robust methodology to address this consensus, incorporating a review of previous literature [11] with the feedback of those that have already adapted the cognitive test. These guidelines would provide step by step instructions on how to culturally adapt every item of a cognitive test in accordance with evidence to allow for the retention of conceptual equivalence [11].

To illustrate how such guidelines can be formed we demonstrated the development and implementation of guidelines for culturally adapting the Addenbrooke's Cognitive Examination Version III (ACE-III) [12]. It is a gold standard tool for the diagnostic accuracy of cognitive impairment [13], consisting of 19 items that assess the cognitive domains attention, memory, fluency, language and visuospatial abilities. The ACE-III and its predecessors, the ACE [14] and ACE-Revised (ACE-R) [15] have been translated into a range of languages and incorporated into use across the globe. English versions of the ACE-III have also been adapted for the UK and the US. However, the ACE-III was originally designed for English speakers native to Australia, with a reliance on knowledge of the cultural background [12] and although cultural adaptation has been undertaken by adaptors to produce suitable adaptations [16, 17, 18] there are no existing standardised guidelines for the cultural adaptation of this cognitive test.

We endeavoured to develop such guidelines and implement them for a non-English speaking minority ethnic population within the UK, demonstrating the development and implementation process of such guidelines for any cognitive test. As South Asians are the UKs largest minority ethnic group, at over 6.3% of the overall population, we selected them as our target population to culturally adapt for. We also translated it into Urdu [19], as it is a popular South Asian

language and the 4th most common language spoken within the UK [1]. This version of the ACE-III Urdu has now been culturally validated [19] and is undergoing a psychometric validation.

Prior to this there was only one other Urdu version of the ACE-III available, which was culturally adapted for use within India [20]. Due to this it is not applicable to the cultural contexts of other South Asian countries where Urdu speakers reside [21], nor to the Urdu speaking diaspora within Canada, the Middle East, the US and the UK [22].

Methods

A several stage qualitative approach was undertaken to develop guidelines for translating and culturally adapting the ACE-III (See Fig. 1) and implement them to develop an ACE-III Urdu (See Fig. 2):

Step 1: A systematic review

Step 2: Receiving feedback from previous ACE-III adaptors

Step 3: Collating the data to form guidelines

Step 4: Implementing the guidelines with feedback from lay persons and experts' in the field

Step 5: Developing the ACE-III Urdu

Step 1: Systematic Review

We conducted a systematic review of all existing primary publications of translations and cultural adaptations of the ACE-III as well as its predecessors, with the full methodology described elsewhere [23].

We identified 113 publications through our search, of which 32 met our criteria for data extraction and analysis; 12 for the original ACE, 17 for the ACE Revised and 3 for the ACE-III. Overall, these publications spanned 18 languages; Arabic, Cantonese, Chinese, Czech, Danish, French, German, Greek, Hebrew, Italian, Japanese, Korean, Lithuanian, Malayalam, Persian, Portuguese, Slovak and Spanish [23].

For each of the publications we extracted data on the version of the ACE that was culturally adapted, the language it was translated into, the country it was culturally adapted for and the section of the text that described its cultural adaptation process. These reported processes were broken down into individual steps and grouped by ACE-III question, allowing us to identify which questions were culturally dependent, how they had been culturally adapted, and what the rationale was behind the changes.

We also assessed the quality of the reported cultural adaptation of each publication utilising the Manchester Cultural Adaptation Reporting Questionnaire (MCAR) [23], which showed which publications had reported their cultural adaptation process in sufficient detail to be replicated by future adaptors.

Step 2: Feedback from adaptors of the ACE-III

We aimed to receive feedback from official adaptors of the ACE-III who had translated and culturally adapted it for their respective language and culture and had made their adaptation available on the Neuroscience Research Australia (NeuRA) website that hosted the original ACE-III and its implementation materials at the time of this research [20].

We downloaded all available adaptations of the ACE-III from the website and translated them into English through the use of an online translation application and, when available, with the aid of postgraduate research students at the University of Manchester who were native speakers of the languages. The translated adaptations were read through to identify which questions in each adaptation of the ACE-III had been culturally adapted beyond a translation verbatim. For each cultural adaptation we developed a questionnaire that highlighted the questions that had been culturally adapted along with the original ACE-III counterparts, asking for the justification behind changing the original question and the development process of the culturally adapted version of the question with the rationale.

We distributed the questionnaires to the corresponding adaptors attached with a standardised email relaying the purpose of the questionnaires and a request for their completion. We also requested a check of our translation of their language version. After a two week period adaptors were sent a follow up email to act as a reminder. If adaptors did not initiate any form of contact after this no further contact was made.

Step 3: Data analysis and synthesis

To develop guidelines for translating and culturally adapting the ACE-III we collated the information from our systematic review [23] and the feedback from adaptors of the ACE-III to identify sets of mutually exclusive steps that can potentially be undertaken to culturally adapt each question of the ACE-III.

From our systematic review we had broken down the cultural adaptation processes extracted from each publication according to ACE-III question. The adaptation processes for each question across publications were merged, with duplicates removed to identify the mutually exclusive steps that could be undertaken to adapt each question.

The questionnaires sent to adaptors were already organised by question and we followed the same methodology of merging the adaptors' feedback on the cultural adaptation process of each question. We removed duplicating information such that for each question we had mutually exclusive steps that could be

undertaken to adapt that question along with the adaptors' accompanying rationale.

The cultural adaptation steps for each ACE-III question identified from the systematic review and from the adaptors' feedback were merged. Duplicates were removed to identify overall mutually exclusive cultural adaptation steps for each question. Accompanying rationale was presented with these steps and the respective publications and adapted versions of the ACE-III were cited, resulting in a question-by-question set of guidelines.

Step 4: Implementation of the guidelines

We conducted two focus groups within the British South Asian community of Greater Manchester. We aimed to recruit 12–14 laymen participants overall, fluent in speaking and writing Urdu, over the age of 60, able to give informed consent and who did not have a history of cognitive impairment.

Participants were voluntarily recruited via convenience sampling from the local Pakistani Community Day Centre and provided with an information sheet, available in English and Urdu. They were given 24 hours to decide if they wished to participate, after which they were contacted by a liaison at the Centre to confirm their participation and let them know the date and time of the focus group, which was also held at the centre. On the day of the focus group participants would be provided with consent forms and demographics sheets, available in English and Urdu.

Using the guidelines we produced several culturally adapted versions of all questions of the ACE-III, backed up by rationale, for the British Urdu speaking population from which the most suitable option would need to be selected. We presented these versions of the questions within our focus groups to receive their feedback on the questions' cultural appropriateness, which versions should be retained for a potential ACE-III Urdu and whether they proposed any changes or suggestions of their own. This feedback was audio recorded and transcribed.

We also conducted a consensus meeting with experts within the relevant fields, local to the Greater Manchester area. We aimed to recruit 2–4 experts on dementia, the cognitive testing process and the translation and cultural adaptation of these tests, who were familiar with the ACE-III, its rationale and how to administer it. These experts also had to be fluent in speaking and writing both English and Urdu and familiar with UK and South Asian cultures. The experts were recruited voluntarily via convenience sampling. The consensus meeting was held at the Centre for Primary Care and Health Services Research, at the University of Manchester, before which informed consent was obtained.

We presented the focus group feedback within the consensus meeting and experts determined which were the most appropriate and culturally suitable adaptations of each question of the ACE-III from the focus group suggestions. The consensus meeting was audio recorded, transcribed and the data was collated for each question of the ACE-III to determine how each would be culturally adapted.

Step 5: Developing the ACE-III Urdu

To develop the ACE-III Urdu the template was acquired through NeuRA, allowing the ACE-III Urdu to retain the exact same format as the ACE-III. Urdu is read from right to left so the template was reversed horizontally such that questions were presented on the right side of the template and the scoring instructions on the left side. Standard information requested prior to the administration of the ACE-III and instructions for the implementation of the questions were translated into Urdu and typed out. Each ACE-III question was typed out and designed according to the suggestions confirmed within the consensus meeting.

Results

Step 1: Systematic Review

The full results of the systematic review are described elsewhere [23].

Step 2: Feedback from adaptors of the ACE-III

Our search of the NeuRA website identified 17 fully adapted versions of the ACE-III for the languages Egyptian Arabic, Saudi Arabian Arabic, Chinese, Estonian, Hebrew, Hindi, Hungarian, Indian Kannada, Italian, Japanese, Marathi, Polish, Portuguese, Spanish, Tamil, Telugu and Indian Urdu. Three versions had been retained in English but culturally adapted for India, New Zealand and the US of America, resulting in a total of 20 ACE-III adaptations.

Of these adaptations the Estonian, Indian Kannada, Marathi, Japanese, Tamil and Telugu versions could not be translated into English due to a lack of resources in terms of translation applications and translators and were thus excluded from our analysis (30%). Questionnaires were developed for the remaining 14 adaptations (70%) and distributed to their respective adaptors, of which a total of seven questionnaires (35%) were returned to us fully completed.

The original Australian ACE-III was utilised by the Hindi, Hungarian and Spanish adaptors (15%) and the UK version of the ACE-III was utilised by the Egyptian Arabic, Hebrew and Welsh adaptors (15%) for their own adaptations. Polish adaptors utilised both (5%).

Table 1 summarises which questions of the ACE-III were culturally adapted by which adaptors, thereby showing the frequency of reported cultural adaptation undertaken for each question. We can see that all adaptors culturally adapted questions 6, 7, 18 and 19 for memory and questions 10, 11 and 14 for language, and the majority had adapted question 2 for attention. In contrast, none of the adaptors had culturally adapted any of the questions assessing visuospatial abilities. This highlights which cognitive domains, and their respective questions, rely on culture and which would suffice with a simple translation into the target language.

Step 3: Data analysis and synthesis

For each question of the ACE-III, the individual cultural adaptation steps identified from our systematic review and from adaptors' feedback, along with rationale undertaken, were tabulated to form the guidelines (See example in Figure 3 and see Appendix A1). For each question the following was presented:

- How the question has been previously culturally adapted with the steps undertaken.
- Examples compiled from publications and the questionnaires, citing the respective languages and adaptors of the ACE-III
- The rationale behind adapting the question and choosing the adapted replacement.

Step 4: Implementation of the guidelines

Our focus groups had 12 voluntary participants, five female (41%) and seven male (59%), from ages 61-75 years (M=66.67, SD=6.44), from the Greater Manchester area. (See Table 2 for a breakdown of participant demographics). Participants came from varied socio-economic backgrounds.

Through our proposed suggestions for each question of the ACE-III Urdu, developed through the use of the guidelines, we determined items 5b, 8, 9, 15a, 15b, 15c and 16 would suffice with a direct translation whereas the remaining questions required further cultural adaptation that were deliberated over during these focus groups (See Appendix A2 for the proposed suggestions, developed using the guidelines).

Our consensus meeting was attended by two experienced old age psychiatrists who were both bilingual British Pakistanis who had lived in both the UK and Pakistan and were familiar with the cultures of both countries. They were also both involved in clinical and research work relevant to South Asian populations and were knowledgeable about cognitive assessments, the ACE-III and the translation and cultural adaptation of health questionnaires.

Step 5: Developing the ACE-III Urdu

The suggestions finalised within this consensus meeting and incorporated to form the ACE-III Urdu [19] can be seen in Table 3.

Discussion

The combination of the systematic review and adaptors' feedback provided us with detailed information on the cultural adaptation of the ACE-III, which was utilised to develop question-by-question guidelines. We compiled extensive adaptation processes to develop the guidelines, which present culturally adapted versions of questions of the ACE-III. We could potentially have incorporated more cultures and languages through translators but due to limited resources we were unable to produce questionnaires for 6 of the existing adaptations and we had a poor return rate of questionnaires (35%), reducing the amount of additional information we could have received and compiled into the guidelines.

Therefore we must acknowledge that the usefulness of these guidelines, and any guidelines for any health measure developed via these methods, is dependent on how many language and cultural versions of that health measure have already been developed and how accessible these versions are. They are also limited by how many current adaptors of these versions can be requested to and are willing to provide rich data on the rationale behind culturally adapting questions that is often not conveyed through publications alone.

However, the methods for forming these guidelines are designed in such a way to allow for necessary updates as more information on cultural adaptation is acquired.

In addition, we were still able to account for 22 international languages and cultural contexts within our guidelines. Through the frequency of cultural adaptation across questions, evidenced in our systematic review [23] and from the feedback of the adaptors, we were also able to determine which questions would most likely require cultural adaptation and which could suffice with a simple translation and the guidelines highlight this. With the accompanying rationale these guidelines would allow future adaptors to conduct their own cultural adaptation of the ACE-III and we have demonstrated this through our cultural adaptation of the ACE-III for a British Urdu speaking population.

While utilising the guidelines to develop potential questions for an ACE-III Urdu [19] we acknowledged British South Asians' preference for using English words that are spelt with Urdu letters, such as, 'county', 'bell' and 'ball', as opposed to translating words into Urdu. This is attributed to the mixing of English and Urdu that occurs within British Urdu speaking communities. We also noted the influence of the structure in which sentences are presented in Urdu, and proposed the rephrasing of questions to avoid confusion. This can be seen with the elaboration of 'What is the season?' to 'Which of the four seasons is it?' due to the Urdu word for weather and season being the same.

We presented these suggestions within our focus groups with lay persons, allowing us to gather feedback from men and women who represented a vast array of educational backgrounds within the British Urdu speaking community. Throughout the discussion participants were able to follow the rationale provided by the guidelines when proposing suggestions for the ACE-III Urdu and there was a notable insistence on cultural adaptation for questions assessing memory and language, with little focus on fluency and visuospatial abilities.

Following this we conducted a consensus meeting with experts to review suggestions for the ACE-III Urdu proposed during the focus groups. There was a general consensus with the suggestions proposed, barring a few items. Within 'Question 2: Attention' experts preferred 'ball' be translated directly into Urdu and in the case of 'Question 7: Memory – Retrograde' experts decided to retain these questions as they were. The proposed suggestions were deemed too easy and the original questions were at a specific level of difficulty that was required to measure retrograde memory.

Conclusions

The guidelines are the first of their kind, and we have provided an in depth account of the novel approach we undertook to develop them. This was not restricted to published literature but incorporated the first hand experiences of cultural adaptation by existing adaptors of the ACE-III, which accounted for adaptations that may not have had corresponding publications. Furthermore, instead of adhering to general guidelines on cultural adaptation, developing guidelines designed for the cultural adaptation of a specific cognitive test allows for familiarity with the chosen assessment, in this case the ACE-III.

We have also demonstrated the usability of these guidelines by implementing them to devise an ACE-III Urdu [19] that is the first version of this language that can be implemented in the cultural context of the UK. The next step was to assess its suitability within the target populations in terms of cultural appropriateness and understanding, resulting in its cultural validation, which has been described with the full methodology, results and finalised ACE-III Urdu elsewhere [19]. Following this, further efforts should and are being taken to determine its performance in the detection of dementia within older Urdu speakers in the UK through a psychometric validation.

The implications of this methodology can be taken forward to develop guidelines in the same manner for other existing health measures, not limited to cognitive tests, enhancing the current standard of cross cultural research.

Declarations

Ethics Approval and Consent to Participate: Ethical approval was waived for this research by the University of Manchester Research Ethics Committee (UREC). This was because the portion of the research requiring participation of members of the public was an act of public involvement for research on developing an Urdu version of the ACE-III that was used in a cultural validation study [19]. However, informed consent was still obtained from all participants through a signed consent form.

Consent for Publication: Consent for publication was obtained verbally as the standard consent forms provided by UREC at the time of this research did not have a statement specifically regarding publication. It was also simpler to explain the publication process, the anonymising of their published data and obtaining consent for it through speaking in Urdu. However, we did obtain consent to use their quotes anonymously through a signed consent form.

Availability of data and materials: Not Applicable

Competing Interests: The authors declare that they have no competing interests

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Author Contributions: The research question was formulated and the study designed by WW and NM. The study was carried out by NM, with assistance from AM and MP, supervised by WW. The qualitative data analysis was conducted by NM, with assistance from MWW, supervised by WW. All authors contributed to the writing of the article.

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Abbreviations

United Kingdom – UK

United States – US

Addenbrooke's Cognitive Examination Version III – ACE-III

ACE Revised – ACE-R

Manchester Cultural Adaptation Reporting Questionnaire – MCAR

Neuroscience Research Australia – NeuRA

References

1. Office for National Statistics, National Records of Scotland, Northern Ireland Statistics and Research Agency. 2011 Census aggregate data. UK Data Service. June 2016
2. Rees P, Wohland P, Norman P, Boden P. A local analysis of ethnic group population trends and projections for the UK. *Journal of Population Research*. 2011 Sep 1;28(2-3):149-83.
3. Beaton DE, Bombardier C, Guillemin F, Ferraz MB. Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*. 2000 Dec 15;25(24):3186-91.

4. Ganguli M, Hendrie HC. Screening for cognitive impairment and depression in ethnically diverse older populations. *Alzheimer Disease & Associated Disorders*. 2005 Oct 1;19(4):275-8.
5. Parker C, Philp I. Screening for cognitive impairment among older people in black and minority ethnic groups. *Age and ageing*. 2004 Jun 24;33(5):447-52.
6. Khan F, Tadros G. Complexity in cognitive assessment of elderly British minority ethnic groups: Cultural perspective. *Dementia*. 2014 Jul;13(4):467-82.
7. Richards MA, Abas ME. Cross cultural approaches to depression and dementia. *Royal College of Psychiatrists*.
8. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. *Journal of clinical epidemiology*. 1993 Dec 1;46(12):1417-32.
9. Bohnstedt M, Fox PJ, Kohatsu ND. Correlates of Mini-Mental Status Examination scores among elderly demented patients: the influence of race-ethnicity. *Journal of Clinical Epidemiology*. 1994 Dec 1;47(12):1381-7.
10. Maneesriwongul W, Dixon JK. Instrument translation process: a methods review. *Journal of advanced nursing*. 2004 Oct;48(2):175-86.
11. Flaherty JA, Gaviria FM, Pathak D, Mitchell T, Wintrob R, Richman JA, Birz S. Developing instruments for cross-cultural psychiatric research. *Journal of Nervous and Mental Disease*. 1988 May.
12. Hsieh S, Schubert S, Hoon C, Mioshi E, Hodges JR. Validation of the Addenbrooke's Cognitive Examination III in frontotemporal dementia and Alzheimer's disease. *Dementia and geriatric cognitive disorders*. 2013;36(3-4):242-50.
13. Cheung G, Clugston A, Croucher M, Malone D, Mau E, Sims A, Gee S. Performance of three cognitive screening tools in a sample of older New Zealanders. *International psychogeriatrics*. 2015 Jun;27(6):981-9.
14. Mathuranath PS, Nestor PJ, Berrios GE, Rakowicz W, Hodges JR. A brief cognitive test battery to differentiate Alzheimer's disease and frontotemporal dementia. *Neurology*. 2000 Dec 12;55(11):1613-20.
15. Mioshi E, Dawson K, Mitchell J, Arnold R, Hodges JR. The Addenbrooke's Cognitive Examination Revised (ACE-R): a brief cognitive test battery for dementia screening. *International Journal of Geriatric Psychiatry: A journal of the psychiatry of late life and allied sciences*. 2006 Nov;21(11):1078-85.
16. Machado A, Baeta É, Pimentel P, Peixoto B. Psychometric and normative indicators of the version of the Addenbrooke's Cognitive Examination-III. Preliminary study on a sample of health subjects. *Acta Neuropsychologica*. 2015 Apr 1;13(2).
17. Guiu JM, de Bobadilla RF, Escudero G, Pérez JP, Cortés A, Rodríguez EM, Salgado MV, Ramos TM, Kulisevsky J, Guiu JM. Validación de la versión española del test Addenbrooke's Cognitive Examination III para el diagnóstico de demencia. *Neurología: Publicación oficial de la Sociedad Española de Neurología*. 2015;30(9):545-51.
18. Qassem T, Khater MS, Emara T, Tawfik HM, Rasheedy D, Mohammedin AS, Tolba MF, Aziz KA. Translation and cross cultural adaptation of the Addenbrooke's cognitive examination III into Egyptian Arabic. In *Royal College of Psychiatrists International Congress 2014*.
19. Mirza N, Panagioti M, Waheed W. Cultural validation of the Addenbrooke's Cognitive Examination Version III Urdu for the British Urdu-speaking population: a qualitative assessment using cognitive interviewing. *BMJ open*. 2018 Dec 1;8(12):e021057.
20. Neuroscience Research Australia. 2016. [online] Available at: <https://www.neura.edu.au/research-clinic/frontier/research/downloads/>. [Accessed 10 November 2016].
21. Central Intelligence Agency Library. *The World Factbook*. 2016. [online] Available at: https://www.cia.gov/library/publications/the-world-factbook/wfbExt/region_sas.html [Accessed 10 Nov. 2016].
22. South Asian Concern. *Who are South Asians*. 2016. [online] Available at: <http://southasianconcern.org/south-asians/who-are-south-asians/> [Accessed 10 Nov. 2016].
23. Mirza N, Panagioti M, Waheed MW, Waheed W. Reporting of the translation and cultural adaptation procedures of the Addenbrooke's Cognitive Examination version III (ACE-III) and its predecessors: a systematic review. *BMC medical research methodology*. 2017 Dec;17(1):141.

Tables

Table 1: Questions of the ACE-III that were culturally adapted by the adaptors

ACE-III Questions

Language of the adaptors	1	2	3	4	5a	5b	6	7	8	9	10	11	12	13	14	15a	15b	15c	16	17	18	19	
Egyptian Arabic		x			x		x	x			x	x	x	x	x					x	x	x	
Hebrew		x			x		x	x			x	x			x						x	x	
Hindi		x			x		x	x			x	x	x	x	x					x	x	x	
Hungarian							x	x			x	x			x						x	x	
Polish		x			x		x	x			x	x	x	x	x							x	x
Spanish		x					x	x			x	x		x	x							x	x
Welsh		x			x		x	x			x	x			x							x	x

x = cultural adaptation was undertaken

1: Attention- Orientation. 2: Attention- Registration. 3: Attention- Concentration. 4: Memory - Recall. 5a: Fluency- Letters. 5b: Fluency- Animals. 6: Memory- Anterograde. 7: Memory- Retrograde. 8: Language- Comprehension. 9: Language- Writing. 10: Language- Repetition. 11: Language- Repetition. 12: Language- Naming. 13: Language- Comprehension. 14: Language- Reading. 15a: Visuospatial Abilities- Infinity Diagram. 15b: Visuospatial Abilities- Wire Cube. 15c: Visuospatial Abilities- Clock. 16: Visuospatial Abilities. 17: Visuospatial Abilities. 18: Memory- Recall. 19: Memory- Recognition.

Table 2: Demographic details of focus group participants

PI	Gender	Age	Level of Education	Marital Status	Employment Status	First Language	Other Language
1F	Female	60+	X	X	Housewife	Punjabi	Urdu, English
2F	Female	74	10th Year	Widowed	Retired	Punjabi	Urdu
3F	Female	61	FA	Married	Housewife	Punjabi	Urdu
4F	Female	61	FA	Married	Housewife	Punjabi	Urdu
5F	Female	74	None	Widowed	Retired	Punjabi	Urdu
1M	Male	75	Graduate	Widowed	Retired	Punjabi	Urdu, English
2M	Male	62	BA	Married	Unemployed	Urdu	English
3M	Male	71	MA	Married	Unemployed	Punjabi	Urdu, English, Arabic
4M	Male	72	GCSEs	Married	Retired	Urdu	English
5M	Male	67	GCSEs	Married	Retired	Urdu	Punjabi, English
6M	Male	60+	X Graduate	X	X	Punjabi	Urdu, Italian, English
7M	Male	75	Graduate	Married	Retired	Punjabi	Urdu, English, Persian

Table 3: ACE-III Urdu items determined from focus groups and consensus meeting

ii. Rhino is replaced with a bear. x. Barrel is replaced with a suitcase. x. Crown is replaced with a cap. xi. Crocodile is replaced with a tortoise. ii. Accordion is replaced with a trumpet.	For viii, experts proposed the new suggestion of a bear to replace the rhino as it is a better known wild animal but still unique in the UK. Experts ruled that a lion could be confused with other big cats such as a tiger and a monkey is not as relative to the cultural context of the UK. For ix, experts selected a suitcase as it is a form of container with a specific purpose. For x, experts proposed the new suggestion of a cap as it is a better known form of headwear. For xi, experts proposed the new suggestion of a tortoise, because it is a better known wild animal that would be better recognised by the British Urdu speaking elderly. For xii, a trumpet was selected out of the proposed instruments by participants from the focus groups as it was considered the most uniquely shaped and easily recognisable by British Urdu speaking elderly.
13: Language	
The following questions were asked regarding the images: 'Which one is related to the head', 'Which one is found in the desert', 'Which one has a shell on it' and 'Which one is related to travel'.	All questions were developed by the authors NM and WW according to the images that were finalised, following the guidelines. Participants and experts agreed with the proposed questions.
14: Language	
The words used in the Indian Urdu ACE-III were retained.	Participants and experts agreed with the proposed suggestions developed with rationale from the guidelines
17: Visuospatial Abilities	
The letters ا ب ت ث ج were selected.	Participants and experts agreed with the proposed suggestions developed with rationale from the guidelines
18: Memory	
Refer to Question 6: Memory.	Refer to Question 6: Memory.
19: Memory	
Refer to Question 6: Memory. The names Jamal Butt and Haroon Khan replaced the original names for recognition.	Refer to Question 6: Memory. Participants agreed with the proposed suggestions developed with rationale from the guidelines. The alternative names chosen by the experts retained the length, familiarity and number of syllables.

Figures

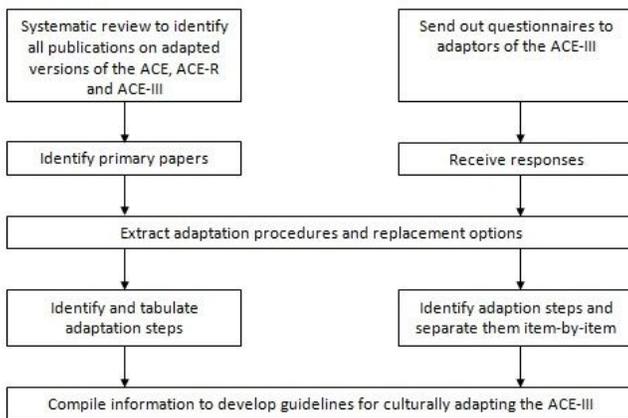


Figure 1

Overview of the process of developing guidelines for translating and culturally adapting the ACE-III

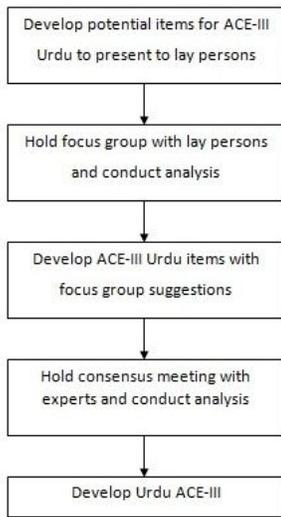


Figure 2

Overview of the process of utilising the guidelines to culturally adapt the ACE-III for British South Asians

ITEM 1. ATTENTION							
ATTENTION							Sum together only the items in bold in the Multiple choice
> Ask: What is the	Day	Date	Month	Year	Season	Attention (Score 0-5)	<input type="checkbox"/>
> Ask: Which	No./Floor	Street/Hospital	Town	County	Country	Attention (Score 0-5)	<input type="checkbox"/>
Often, the item is directly translated however some cultural adaptation may be necessary.							
Culturally Adapted Replacement	Language	Reasoning and Procedure					
'Country' became 'State'	Malayalam ¹	Not all countries have counties so an equivalent in the form of 'State' had to be used.					
Provided an example of a country beforehand.	Malayalam ¹	It was common to confuse state and country so an example was given to provide the concept of 'Country'.					
The year, month and date could tally with the Lunar, Hindu or Muslim calendar alternatively.	Malayalam ¹	These are locally popular calendars in some areas.					
Vague description of season or description of weather as a response to 'Season' was acceptable.	Malayalam ¹ , Czech ²	Some countries have seasons for very brief periods of time so only consider them in terms of weather.					

Figure 3

An example page of the guidelines

Supplementary Files

This is a list of supplementary files associated with this preprint. Click to download.

- [AppendixA2.doc](#)
- [AppendixA2.doc](#)
- [AppendixA1.doc](#)
- [AppendixA1.doc](#)
- [AppendixA3ProposedACEIIIUrduQuestions.doc](#)
- [AppendixA3ProposedACEIIIUrduQuestions.doc](#)