

RESEARCH ARTICLE

Translation and cultural adaptation of tools to assess diverse Asian American and Asian Canadian subgroups: The Asian Cohort for Alzheimer's Disease (ACAD) Study

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Abstract

INTRODUCTION: The availability of sociocultural and language-appropriate study materials and instruments is critical for the assessment of cognitive function in people from diverse backgrounds. This report describes the translations and cultural adaptations of study materials for the Asian Cohort for Alzheimer's Disease (ACAD) study.

METHODS: We performed translations and cultural adaptations in accordance with the World Health Organization (WHO) translation guidelines to ensure reliable, complete, and culturally appropriate translations from English to the specified Asian languages.

RESULTS: We developed Asian language versions of the ACAD documents (consent, data collection packet, and community and social media outreach materials) reflecting the sociocultural backgrounds of the ACAD target population (i.e., older Asian adults)

DISCUSSION: The multistep translation process accounting for distinctive Asian sociocultural and language backgrounds provides an important guideline for Alzheimer's disease and related dementias (ADRD) researchers to promote health literacy and research with underrepresented Asian American and Canadian adults.

KEYWORDS

Asian, Alzheimer's disease, cognitive assessment, community-based participatory research, cultural adaptation, dementia, translation

Highlights

- Asian American and Asian Canadian older adults are the fastest-growing populations.
- A lack of linguistically and culturally appropriate cognitive assessment tools creates barriers for quality healthcare and clinical research.
- We report the translations and cultural adaptations of the Asian Cohort for Alzheimer's Disease (ACAD) study materials into Chinese, Korean, and Vietnamese.
- This translation methodology should be extended to Asian Indians, Filipinos, and other Asian American or Asian Canadian populations.

1 | BACKGROUND

Older racial and ethnic minority populations in the United States are growing faster than their non-Hispanic White (NHW) counterparts and will comprise 42% of the older adult population by 2050, with the number of Asian Americans aged 65 and older increasing by 352% by 2060.¹ Asian American and Asian Canadian (ASAC) populations are the fastest growing and most heterogeneous minorities in the United States and Canada.^{2–5} The rise in older Asian populations calls for their greater representation in geriatric and dementia research to support the diverse populations in the United States and Canada.

Asian American older adults often face language and cultural barriers to access healthcare when compared with other ethnic/racial groups, such as NHW, African Americans, and Hispanics.^{6–10} While Hispanics also have language and cultural barriers, Asian Americans

encounter unique challenges due to their diverse linguistic and cultural backgrounds, as they come from a wide range of countries and regions. Only 15% of Asian Americans aged 65 years and older speak English at home, and over half (60%) have limited English proficiency.¹¹ Similar statistics were reported in the 2021 Canadian Census, with nearly 54% of people of Chinese ancestry speaking mostly Mandarin or Cantonese at home.¹² In addition, the lack of linguistically and culturally appropriate cognitive assessment instruments creates additional obstacles to the quality of healthcare and health research for Alzheimer's disease (AD) and related dementias (ADRD).^{13–15} A study using data from California Medicare fee-for-service data underlined that Asian Americans with AD/ADRD were also less likely to receive a timely diagnosis and underwent fewer diagnostic evaluations compared to NHW.¹⁶ Thus, developing a healthcare infrastructure that enables access to language-appropriate medical services, particularly

for evaluating cognitive functions in the diverse Asian subgroups (e.g., Korean, Vietnamese, or major Chinese languages—Mandarin or Cantonese), presents a major challenge to clinical care and clinical research in AD/ADRD.

Most cognitive assessment instruments were developed with a focus on populations of European ancestry with English as the primary language and culture.^{13,17} Numerous studies have highlighted the difference in the manifestation of aphasia by language.^{18–26} However, verbatim translation of cognitive and other testing instruments without considering culture and language nuances could result in inaccurate or misleading test results.^{27,28} Achieving the linguistic and conceptual equivalence in cross-language and cross-cultural research is challenging. A range of translation methods for research instruments has been documented, including translation, back and forward, cognitive interviewing, and a possible combination of translation methods.^{29–34} Though literal back translations are often performed to indicate the accuracy of the translation in the target language,^{30,31,33} it does not address issues of respondent comprehension and conceptual equivalence.^{29,32} Documents providing directions and recommendations on the translation and cultural adaptation of surveys were developed by governmental or professional organizations, including the “WHO forward translation,”^{34,35} the “Census Bureau’s Guidelines for Translation of Data Collection Instruments,” from the US Census;³⁶ and “The Internal Test Commission (ITC) Guidelines for Translating and Adapting Testing” from the cultural special interest group of the International Neuropsychological Society.^{37,38} These provided detailed guidelines, including consideration for different cultural contexts.

Taking the best practices and guidelines mentioned above into account, we shared the process by which the Asian Cohort for Alzheimer’s Disease (ACAD) study team translated study materials for our participants in the United States and Canada. Our overarching goal was to achieve inclusivity and a better understanding of the etiology of AD/ADRD by using sociocultural and language-sensitive instruments in these populations, while keeping them comparable to the meaning of the original English version.

Our original English version data collection forms were translated into Chinese and Korean to collect data from non-English speakers who can speak these two languages. One ACAD site in southern California (University of California, San Diego) enrolled a smaller number of Vietnamese participants in a pilot study whose translation steps are described in a previous publication.³⁹

2 | METHODS

We used either the translation and verification method or the cultural adaptation following the WHO forward translation guidelines. In this study, “translation and verification” refers to the process of translating our study materials from English into the intended Asian ethnic languages and then checking that the translated version accurately reflects the original English version. “Cultural adaptations” in translation refers to the process of modifying or adjusting translated texts to

RESEARCH IN CONTEXT

1. **Systematic review:** The review of literature related to Alzheimer’s disease (AD) and related dementias (AD/ADRD) revealed constant and adverse healthcare disparities as well as research disparities across racial and ethnic groups, even though ethnic minority older adults are growing faster than their non-Hispanic White counterparts. The literature has a strong bias toward European ancestry and English language speakers, while populations of Asian ancestry, especially immigrant subpopulations, remain underserved and understudied.
2. **Interpretation:** The significant barrier to conducting or participating in clinical research is the availability of linguistically and culturally appropriate study materials and instruments. Most cognitive scales were developed with a focus on European ancestry populations and culture, and with English as the primary language. This report describes the Asian Cohort for Alzheimer’s Disease (ACAD) work in translation and cultural adaptations of study materials into four Asian languages, including Cantonese, Mandarin, Korean, and Vietnamese.
3. **Future directions:** The multistep translation process and Asian language versions of the ACAD documents provide an important guideline for AD/ADRD research. However, as cognitive assessment scales are used with different populations and in different circumstances, their psychometric properties need to be established. Moreover, these scales should provide normative data and optimal cutoff values for screening or diagnostic procedures.

fit the cultural context of intended Asian ethnic groups, ensuring the translated content is relevant and avoiding potential misunderstanding or offense by using culturally appropriate language and references.

2.1 | ACAD

ACAD is the first large, multisite AD/ADRD cohort of participants with Chinese, Korean, and Vietnamese ancestry to collect genetic and lifestyle data and use of Asian language cognitive assessment across the United States and Canada. The rationales and study design (including the selection of instruments for data collection) have been previously reported.⁴⁰ This paper focuses on the methodology and findings related to the translation of study materials, including cognitive assessments and the lessons learned, describing the collaborative, iterative approaches for translation, and cultural adaptation that reflect various Asian ancestries in the ACAD study. We contacted the authors who translated the selected instrument into Asian languages through the journal or AD/ADRD investigators’ networks to obtain feedback and

TABLE 1 Instrument types and translation methods.

Instrument types	Translation method
Community outreach activities-related documents	Translation and verification
IRB-related documents	Translation and verification
Data collection packet (DCP)	
Measures and surveys: Demographics survey, Mediterranean Diet Assessment Scale (MEDAS); Clinical Dementia Rating Scale (CDR), Rush Early Life Enrichment, Geriatric Depression Scale (GDS); Functional Assessment Questionnaire (FAQ)	WHO forward translation and reconciliation ^a
Part C: Common Objects Memory Test (COMT); Cognitive Abilities Screening Instrument (CASI) or Modified Mini-Mental State Test (3MS); Category Fluency (CF); Clock Drawing Test (CDT)	WHO forward translation and reconciliation ^a
Training-related documents	Translation and verification

^aWorld Health Organization. (2016). *WHO guidelines on translation and adaptation of instruments-process of translation and adaptation of instruments* (p. 4). World Health Organization. Abbreviations: IRB, institutional review board; WHO, World Health Organization.

permission. The authors were supportive and permitted the use of the translated versions and the manuals. They also provided the translation process and rationale for cultural adaptation, as well as constructive suggestions for using it in the ASAC population.

The English versions of the measures selected in the data collection packet (DCP) were developed by or adopted from other ADRD research programs. This paper focuses on the process by which these materials have been translated into Chinese (simplified and traditional) for Mandarin- and Cantonese-speakers, as well as into the Korean language. Although Mandarin is the most spoken Chinese language worldwide, we included both Mandarin and Cantonese because both are commonly spoken Chinese languages in the United States⁴¹ and Canada.⁴²

2.2 | Translation framework

The ACAD study has several types of written materials. Table 1 depicts various types of ACAD study documents. The translation and verification method was selected for the community outreach-related documents (e.g., study flyers, introduction PowerPoint slides), institutional review board (IRB)-related documents (e.g., Informed Consent Form), and training-related documents because the primary focus is precise terminology and accuracy. Cultural adaptation, the World Health Organization (WHO) Forward Translation and Reconciliation method was selected for the DCP, which requires cultural adaptation to ensure concepts are understood and interpreted appropriately to convey the intended meaning accurately.

An important consideration in the translation of cognitive assessment batteries and health surveys is the equivalence of the translated version to the meaning intended by the instruments' authors (semantic equivalence) in terms of proving a specific ability and achieving a specific degree of difficulty for the task. Achieving semantic equivalence in different cultures can be challenging because ASAC older adult groups who grew up before the 1960s might not be familiar with concepts such as the Western calendar, Western names, or Western social structures, such as using the library, visiting museums, or attending concerts. Notably, the WHO forward translation, a conceptual translation with a committee review process, requires significantly more time, effort, and a larger budget. Therefore, the conceptual translation was used only for those in the DCP. Additionally, we were able to adopt existing translated materials validated through other studies, including the Collaborative Approach for Asian Americans, Native Hawaiians, and Pacific Islanders Research and Education (CARE) registry.⁴³

2.3 | Translation workflow

The translation process and the steps involved are shown in Figure 1. First, research team members comprised of multilingual clinical and field study researchers from all intended ethnic groups worked closely to identify and select instruments appropriate for intended study populations. Second, we contacted the authors who translated the selected instrument into Asian languages through the journal or ADRD investigators' networks to obtain feedback and permission. The authors were supportive and permitted the use of the translated versions and the manuals and provided the translation process and rationale for cultural adaptation as well as constructive suggestions for using it with the ASAC population. Third, we conducted further search for selected cognitive assessment scales in targeted languages, looking for cutoff scores in general practice and community settings. Fourth, all the selected materials were categorized based on the purpose or characteristics of the document (e.g., manual, flyers, cognitive assessment).

The workflow of the multistage translation process was developed to ensure that translated content was accurate, consistent, and delivered on time across the four language teams. First, study materials were categorized into two groups: materials already translated (published) or requiring minor revisions, and materials requiring new translations or major revisions. Second, based on the status of the translation and characteristics of the materials, translation methods of verification or cultural translation were decided by the ACAD investigators and community advisory board (CAB) members, as shown in Table 1.

Below is the process of translation and cultural adaptation for study materials that were identified as needing major revisions:

1. Step 1: Preparation: Translators were provided with basic information about study populations, including socio-demographic, mode of administration, and how and where the instruments would be administered. Also, the translators were provided specific instruc-

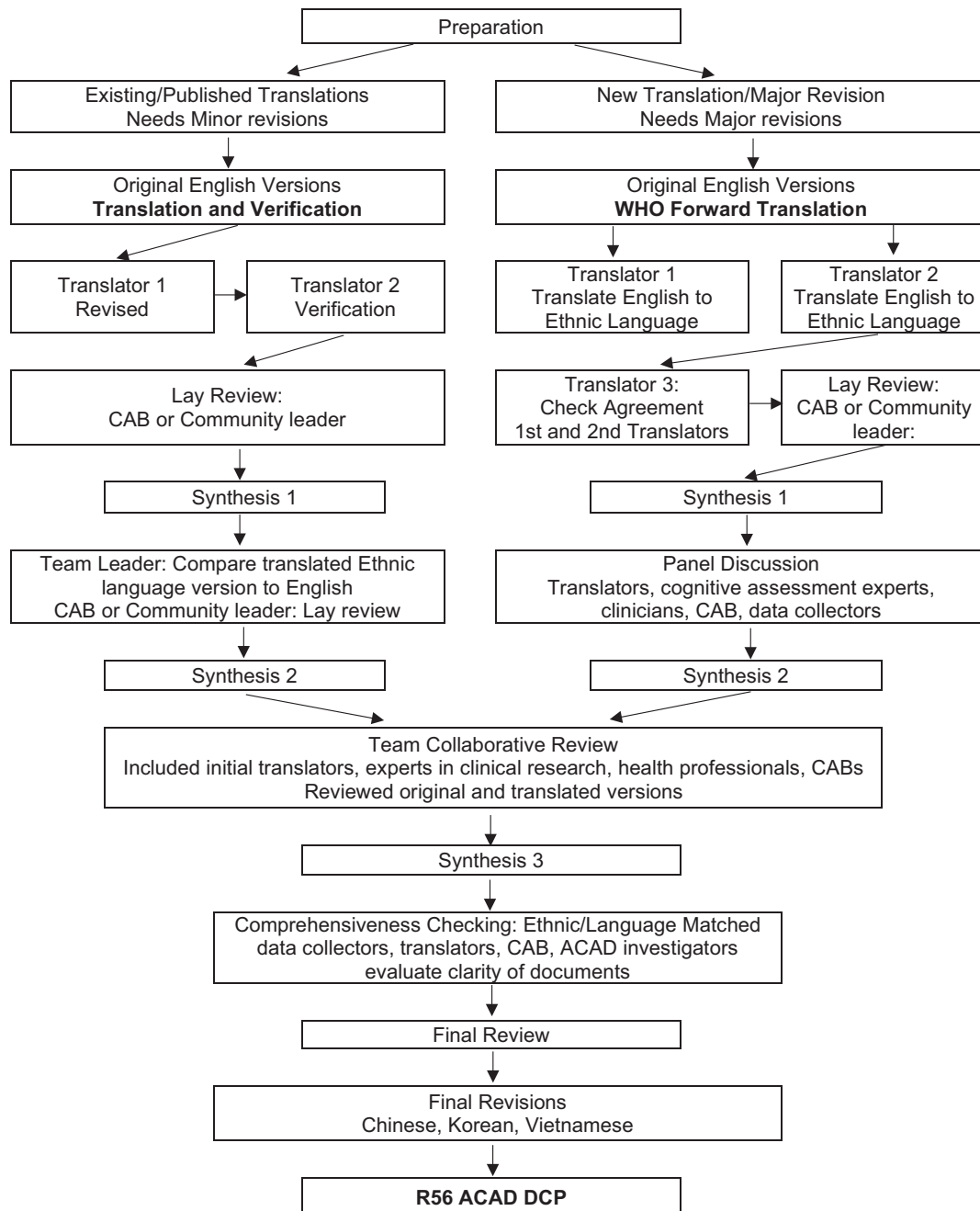


FIGURE 1 Collaborative and interactive translation, cultural adaptation, and verification process for each ethnic language translation team.

- tions about the reading and educational level of study populations so that their translation would reflect language usage by study participants.
- Step 2: Translators 1 and 2, who were bilingual and bicultural, independently forward translated the original English documents into the target languages. When translating, translators were asked to identify terms difficult to translate, such as "culture-specific terms," "concepts with no direct equivalent," "concepts with multiple terms in translation," or "concepts needing an explanation or sentence" requiring adaptation or explanation to convey the intended meaning.

- Step 3: The third translator, having ethnic expertise and being knowledgeable about health terminology and content areas of concepts in the instrument, reviewed the ethnic language translated versions checking agreement and discrepancies with the English version.
- Step 4: One bilingual native-tongue lay person (CAB or community outreach members) reviewed the translated version to identify culturally appropriate translations and to reflect literacy and the common use of language in the study population.
- Step 5: Panel discussion: A multilingual expert group consisting of translators, investigators, clinicians, and CAB or community out-

reach members reviewed the translated version to check for any inconsistencies between the source language and the translated version and to maintain the integrity of the original instrument, in terms of semantics, conceptual equivalence, and to reach consensus. The panelists reviewed and discussed until an agreement was reached.

6. Step 6: Comprehensiveness checking: Individual research team members with bilingual and bicultural backgrounds and CABs reviewed the final version to check whether the instructions and response options were understood.

A general protocol was developed for the translation and cultural adaptation process, describing the procedure for each step of the translation, including the selection of translators. Each ethnic language translation team consisted of experts who included initial translators, experts in health science research, health professionals, CAB members, translation reviewers (verification), community participants, and panelists. Each language translation team was responsible for assembling a team of highly qualified translators. For a more organized dialogue among the different language teams and within the subgroup translation team, regular meetings within each team and across teams were held to share the lessons learned and similarities and differences in the cultural adaptation process.

2.4 | Selection of translators

Selecting translators with prior experience translating and working with multilingual documents is key to achieving high-quality translation and cultural adaptation. We assembled a skilled and experienced multidisciplinary translation team of bilingual and bicultural investigators and community leaders with a history of translations or working with bilingual documents in research or community outreach activities. Specifically, translation team members included bilingual and bicultural clinicians (e.g., neurologists and neuropsychologists), researchers, or community representatives (e.g., CAB members) who are familiar with translating study materials from English into the intended languages. Translators were not necessarily formally trained and certified but had the necessary skills, knowledge, and professional experience in translating health research materials. As a prerequisite for the Institutional Review Board of the University of Pennsylvania to conduct translation work, each study team member involved in conducting translations signed a statement attesting to their competency. The selected translators were involved in activities of translation, verification, and cultural adaptation. Each language translation team was composed of five to eight members.

The required qualifications of translators were:

1. Bilingual: Translators should be fluent in both English and the studied ethnic languages.
2. Bicultural: Translators should be familiar with the culture of both English and the studied ethnic languages.

3. Knowledgeable: Translators should have some knowledge of the content of the instrument being translated, health concepts, and medical terminologies used.
4. Independent: Translators should have a solid understanding of the sociocultural context of the studied population.
5. Native language expertise: Translators should preferably translate into their mother language.
6. Healthcare/AD/ABRD expertise: Preferably, translators have experience in translating in the subject areas related to healthcare or AD/ABRD.

The translators selected were not only bilingual but also understood the participants' culture and the purpose of the ACAD project so that the translators could choose the words best suited to convey the meaning of the participants' native language in the research language. Translators included both speakers of the native language of the participants and native English speakers, as well as those educated in the native language of the participants or those educated in English. We considered a native language the one that the translator used during their childhood or until elementary education. When needed, translation team leaders worked closely with CABs to validate materials by using culturally and linguistically appropriate (unbiased) translations. Each ethnic language had a translation team leader who worked closely with other translation team members, including CAB or community outreach members. The translation team leaders were not only fluent in both English and the target language but also had knowledge of the purpose of the ACAD study and of the instruments to be translated, since this knowledge was important in making informed decisions during the panel discussion.⁴⁴ The CAB consists of 10 local/regional/national leaders with diverse professional backgrounds from across the United States and Canada, representing the intended cultural groups. The CAB members were nominated by ACAD investigators and the recruitment sites. A few CAB members were and still are actively involved in the translation process.

2.4.1 | Guidelines/requirements for translation and adaptation

The translation is:

1. Conceptually and semantically equivalent.
2. Appropriate; there is acceptable wording for the studied ethnic languages.
3. A complete text, not omitted, added to, or clarified in the translated text.
4. Free of spelling or grammatical errors and discourse conventions in the studied ethnic languages.
5. Culturally appropriate: Translators can add cultural knowledge and contextual information, and language-sensitive examples for certain questions, including metrics, and situation-relevant examples of play, games, oral traditions, and so forth, where

forms of expression may be different from those of the target population.

6. Documented in detail.

3 | RESULTS

3.1 | Translation and verification

ACAD translation procedures began by providing English-based materials to the translation leaders of each written language group. The instruments were given to initial translators who translated them into the targeted language, and then, following translation, committee members reviewed and verified them. The committee members were experts with considerable collective experience in working with ADRD populations and experiential knowledge of the health and cultural health practices of the targeted population. The goal was to ensure that the content of the translation was both accurate and culturally appropriate for the diverse target populations from a linguistic (e.g., grammar and sentence structure) and cultural (e.g., colloquial language, literacy level) perspective. Also, a critical aspect of this role was to check not only if the translated version captured the meaning of the original instruments, but also for grammatical accuracy and verbally natural structure, appropriate for a diverse level of literacy in the target population.

3.2 | WHO forward translation and reconciliation

Only the documents (data collection instruments) for cognitive assessment batteries, early life enrichment, diet, and functional assessment used the WHO Forward Translation method to ensure detailed explanations of the terms used in each question, as well as underlying concepts that the questions were intended to measure. Translators were asked to add cultural and local contexts and ethnic language-sensitive examples. Two bilingual translators independently translated the English version into the target language first, after which the translated drafts were checked for agreement. The panelist discussion (two to three members) was then convened and instructed not to provide another translation but to answer a questionnaire on whether each question had been properly translated to measure the concepts, and if not, why not. Additionally, their task was to check whether the translated version captured the meaning of the original instruments and whether it was grammatically and colloquially correct. They also reviewed whether the translation was at a level of literacy or oral language appropriate for the target population and focused on the cultural relevance of adjectives or culturally stigmatizing statements.

After consensus from panelists, each translation team independently reviewed the whole translation process to provide materials that: (1) were reliable with semantic and conceptual equivalence, had accurate medical terminology and textual competency across the targeted language; (2) read with fluency and a natural flow in the

targeted language; (3) was appropriate to the literacy level of targeted older adults; (4) was appropriate in style, tone, and degree of formality; and (5) were consistent with standardized administration and scoring.

3.3 | Cultural and language adaptation with conceptual equivalence

A critical aspect of translation involves ensuring sociocultural appropriateness and selecting languages and scripts that effectively convey the original context and meaning in the target language. Translators play a vital role in translating the materials and infusing them with cultural relevance and local context. This includes integrating locally relevant empirical indicators, such as specific types of play, games, and cognitive exercises most relevant to the target populations. The following are examples of adaptations made to ensure cultural and linguistic validity for ACAD participants while maintaining functional and conceptual equivalence.

3.3.1 | Diet—Mediterranean Diet Adherence Screener (MEDAS)⁴⁵

The MEDAS questionnaire, originally developed in Spanish,⁴⁶ has been translated and validated in multiple countries in several different languages, including English,⁴⁷ German,⁴⁸ Japanese,⁴⁹ Korean,⁵⁰ and Chinese.⁵¹ Despite the fact that cultural differences in dietary habits exist among these countries and populations, the MEDAS has been shown to capture the overall dietary quality and to be associated with health outcomes, possibly due to its inquiry about broad food groups rather than individual food items. However, we found phrasing the questions in more specific terms to be more useful. In the current study, certain modifications were made to adapt to the cultural and linguistic background of the study population while keeping the inquiry consistent with the intended meaning. Specifically, the frequency measure was modified to reflect those familiar with Asian culture. We have learned the word, “daily” cannot translate clearly to once per day linguistically so it was translated into several words including once per day, one time per day, or every day, to reflect each ethnic group language practice. Regarding the measure of serving size, since Western serving sizes may be very different (generally larger) than typical Asian servings,⁵² we specified intake amounts, instead of translating the word “serving.” Similarly, we specified types of nuts to those most frequently eaten by Asian subgroups of older adults (e.g., cashews; chestnuts; hazelnuts [filberts]; hickory nuts; macadamia nuts; pecans; pine nuts).

3.3.2 | Early life enrichment

From the initial translation process, concerns arose about the empirical indicators of physical and cognitive stimulating activities that did

TABLE 2 Examples of modification to the lifestyle questionnaire as a socio-cultural adaptation for ACAD.

English	Korean	Vietnamese	Chinese
Early life experience	Experience in your childhood	Early life experiences	Early living experiences
How often did you play games like checkers, Chinese chess or Go, or other board games, cards, or word games?	How often did you play Hwatu, Omok, Baduk, Janggi, word-chain game? ^a	How often did you play games like Chinese chess (cờ tướng), cờ ca-rô, cờ cá ngựa, card games, or other strategy games? ^d	How often did you play Mahjong, board games (such as Chinese checkers, Chinese chess, wéi qí), puzzles, card games, word games, or other strategy games? ^c
Play team sports, such as dodgeball, basketball, baseball, football, softball, soccer, or hockey	Did you play sports or games with others (rubber rope play, Ozami/Ojami play, skipping rope, football/jokgu, pigu/dodgeball, basketball, baseball, soccer, etc.)? ^b	Did you play sports or games with others (soccer, badminton, skipping rope, tug of war)?	Team sports (such as dodgeball, basketball, rugby, softball, soccer, or hockey).
Did your family subscribe to a daily newspaper	No change	Changed from a daily newspaper to the newspaper	Changed from a daily newspaper to the newspaper

^aHwatu (화투: A traditional Korean card game that uses 48 cards adorned with nature and traditional symbols to create various combinations for scoring points). Omok (오목; A strategic board game where players alternate placing Go stones on a grid, aiming to align five stones in a row, column, or diagonal to achieve victory). Baduk(Go) (바둑: A strategic board game where two players place black and white stones on a grid to expand their territories and surround the opponent's Go stones). Janggi (장기: A strategic traditional Korean board game in which two players use pieces such as "chariot," "cannon," "horse," "elephant," "guard," "general," and "king" to capture the opponent's "general" or fulfill certain conditions to win). Word-chain game (끝말잇기: A game where each person speaks a new word that begins with the last syllable of the word mentioned by the previous person).

^bRubber rope play (고무줄놀이: A game where two players hold a rubber band at both ends, and another jumps over it, moving forward, sideways, and backward in time with a song). Ozami/Ojami play (오자미/오재미 놀이: A game where a cloth filled with beans or sand is sewn shut, and players keep it airborne by tossing it back and forth with their hands, preventing it from falling to the ground). Skipping rope (줄넘기 놀이: An aerobic exercise where individuals or groups jump over a long rope being swung in a circle). Football/jokgu (족구: A competitive sport between two teams where players use only their feet and heads to exchange a ball over a high net). Pigu/dodgeball (피구: A ball game where two teams are divided within a designated area, trying to hit the opposing side with a single ball).

^cMahjong (麻將: A strategy game with a set of 155 tiles based on Chinese characters and symbols played by four players.). Chinese checkers (跳棋: A strategy board game that can be played by two, three, four, or six people, playing individually or with partners. The first player to race all of one's pieces across the hexagram-shaped board to the opposite of one's starting corner using single-step moves or moves that jump over other pieces wins the game.). Chinese chess (中國象棋/Xiangqi: A strategy board game for two players that represents a battle between two armies, with the primary objective being to checkmate the enemy's general).

Wéi Qí (圍棋/Go: A strategy board game for two players in which the aim is to surround more territory than the opponent.).

^dChinese chess (cờ tướng: same description as Xiangi Chinese).Cờ ca-rô (same description as Omok in Korean). Cờ cá ngựa (best translated as Horse Race board game; a strategy board game for two to four players in which players use dice to move their "horses" around the board, blocking or displacing other players. The first player to move all their horses completely around the board and back to their "stables" (starting point) wins.

not reflect our Asian elders' culture and social backgrounds from when they were 6–18 years old. As in the original study, the early lifestyle activities items were developed in their socioeconomic settings. In previous studies, participants chose activities rated as cognitively demanding or correlated with cognitive functioning.^{53,54} However, the listed empirical indicators included activities such as possessing a library card and a world atlas, or attending a concert, many of which were not common to most native countries of our Asian cohorts from the 1920s to 1950s due to experiences of war or impacts of the Cultural Revolution and Colonization. In addition, lifetime physical and cognitive stimulation/engagement of cognitive function did not reflect and capture activities for historically and socio-culturally de-Westernized populations in the context of the participants' early life; per capita income was less than \$500 in the 1950s and 1960s.⁵⁵ As an example, public or private libraries were almost nonexistent, so the content of the questionnaires did not reflect the sociocultural structure of the participants' early lives in Asian countries. Examples of socio-cultural adaptation and modifications to the Early Life Experience Scale are shown in Table 2.

3.3.3 | Cognitive assessment batteries

1. *The Common Objects Memory Test (COMT)*⁵⁶ serves as a validated list learning task that does not use verbal stimuli, even if naming is required of participants. First, each translation team reviewed the COMT's standard color photographs of 10 common objects that were familiar to the intended communities. All four language groups agreed that none of the photographs should be replaced. Then, words translated for objects were checked as appropriate for target languages in the United States and Canada.
2. *Category Fluency* serves as an assessment tool of language, memory (duplicates are not counted more than once) and mental flexibility.^{57,58} Participants are instructed to name as many vegetables as they can in a minute. They next name four-legged animals. These instructions were translated into the Asian languages and then verified by the different translators. There was no major disagreement among translators. We used the same instructional sets and provided the same duration of the trials across the study groups.

3. *The Cognitive Abilities Screening Instrument (CASI) and modified Mini-Mental Status Examination (3MS)* were selected as screening tests of global cognitive functioning. The CASI was adapted from items on three cognition and dementia screening tests: the Hasegawa Dementia Screening Scale,⁵⁹ the Mini-Mental Status Examination (MMSE),⁶⁰ and the 3MS.⁶¹ Both the CASI and 3MS were developed by the same authors.^{61,62} The Korean American group selected the 3MS because, unlike the CASI, the Korean version 3MS with report of cutoff points and normative data based on gender, age, and education has been utilized frequently in the Korean community.^{63,64} In addition to translation, minor revisions were made to reflect the population of interest residing in United States and Canadian settings.
4. CASI: The decision by the Chinese and Vietnamese group to utilize the CASI was primarily driven by its availability in the Chinese (CASI-2) language. CASI-2, the Chinese version, has well-established cutoff points for different ages, genders, and educational backgrounds.⁶⁵
5. K-3MS: The 3MS was originally developed in English to improve on the MMSE by making it more sensitive to cognitive impairment.⁶¹ It was translated into two Korean versions, and both Korean versions of 3MS and K-3MS were modified to better adjust to the cultural background.^{63,66} The Korean 3MS was chosen because, unlike the CASI, there is normative data correcting for gender, age, and education, empirically derived cut-points, and it has been widely used.
6. The difference between the K-3MS and the original English-3MS was in question 1 to check long-term memory. Instead of asking for a birthdate, this question was replaced with asking the name of the current president and the previous president, down to the three previous presidents. The rationale for replacing this question was that it was challenging to verify birth date and place in the report of individuals with dementia in community settings. In the ACAD study, Korean American participants may name either US presidents or Korean presidents, whichever is preferred. Regarding question 6 of memory registration, the three words—shirt, nickel, and honest—in the English version were changed to airplane, pine tree, and sincere in the K-3MS. In Korean, the first two words coincide with Korean MMSE and end with vowel sounds (airplane [*bee-hang-gi*] and pine tree [*so-na-mu*]). The last word, sincerely (*Seong-sil* in Korean), was substituted for honest (*Jeong-jik*) based on findings of the pilot study that *Jeong-jik* was more difficult to hear or perceive than *Seong-sil*, possibly because the latter ended with a voice sound and could be heard more comfortably. Also, the 3MS Korean manual was developed and translated into English for English-speaking research team members.
7. *Clock Drawing Test (CDT)*:^{67,68} The CDT instructions in English that state, "I would like you to draw a clock, put in all the numbers, and set the hands for 'ten after eleven,'" are the common Western way of stating the time. However, in the intended Asian languages, the instructions to state the time would typically be given as the hour first, followed by the minutes, "eleven-ten" instead of "ten after eleven." This practice is directly related to how time is typically

expressed in many Asian languages, where the hour is mentioned before the minutes (hour then minutes).

3.4 | Final review: Comprehensiveness checking

We used individuals who were bilingual translators and reviewers, investigators, and other research team members to review the usability of the translated instruments from the perspective of ASACs with limited English proficiency asked to respond to the final translated materials in a survey context. This comprehensiveness checking process did not use qualitative or quantitative research approaches to assess the cultural appropriateness of concepts or domains of the scales. The participants were asked about the clarity of the document, their understanding of the content, and instructions in the translated documents. After conducting a comprehensive check, problems with comprehension or difficulty formulating responses were reviewed and resolved.⁶⁹

4 | DISCUSSION

This paper describes the intricate steps and processes involved in addressing language and cultural issues when translating and the cultural adaptation of study materials for ACAD, including cognitive assessments, shared lessons learned, and a list of best practices for translation and cultural adaptations for the ASAC population.

4.1 | Best practices

Best practices for translation and cultural adaptation started with contacting the authors who translated the instruments that we wanted to translate and obtaining their permission to use the instruments. Some authors not only gave us permission to use their translated instruments but also shared their own protocols for translations and field notes of their lessons learned, which were very valuable as they helped us to foresee the issues and sometimes to avoid unnecessary trial and error. The next step involved finding and recruiting translators who were native speakers of the studied Asian languages, fluent in English, and having had experience in translating or managing translations was important. We would like to highlight that our translation team members with backgrounds in neurology, neuropsychology, health, or Asian languages and culture, and translation experts were integral parts of the research team,⁷⁰ not just working on the translation activity.

We were aware of culturally sensitive topics and explained the rationale for modifying questionnaires and instructions to cognitive assessment instruments based on cultural differences, and presented steps of the cultural adaptation process. These multiple translation and cultural adaptation steps allowed us to understand the importance of culturally adapted translations by selecting culturally relevant terms that reflect history and context. In addition, we have learned that, when selecting professional translation services, it is important that they

have the expertise to take the socio-cultural and historical background of the study populations into account.

Language and culture are intertwined; thus, it is crucial to address issues of language and culture together when translating. Cultural differences can have profound implications for cognitive functions, as previously demonstrated in visual perception,⁷¹ eye movement,⁷² perceptual affordances,⁷³ attention control,⁷⁴ spatial reasoning,⁷⁵ sense of self,⁷⁶ and motivation.⁷⁷ Language influences thought^{78,79} and thereby acts as a determinant of the culture of any particular community, perhaps because it is viewed as the way of expressing feelings, thoughts, and ideas that must be communicated.

Most cognitive assessment instruments were originally developed for use in populations of European ancestry with English as the primary language and culture.^{17,27,54} Therefore, we conducted literal translations of the test questions and then made adaptations that appropriately reflected the sociocultural background of our Asian languages. In the context of cultural adaptation, it is important to address how the structure of a language influences the way in which speakers of the language view the world. For example, most Asian languages are analytic and thus do not possess inflection morphology for nouns (e.g., foot—feet, book—books with plurality). For example, the host at a restaurant asks the guest, “For seating, how many are there in your party?” An English speaker can reply simply, “Two,” but in Asian languages, the response would be “two people.” Our findings have reinforced the need to culturally adapt the existing cognitive assessments to be an optimized approach for different languages and cultural contexts.

4.2 | Lessons learned

We illustrate the complex process of translation based on our experiences for a multiethnic cohort study into multiple Asian language groups, to ensure that cultural adaptations were made with considerations for culture, economic status, and social structure among these diverse ethnic groups of ASACs. The ACAD translators encountered challenges addressing variations within first-, second-, or third-generation immigrants. We held regular meetings to review and cross-check the balance between clinic/psychometrics and cultural components, and tried to capture the complexity of translation for different generations of immigrants. We have learned the importance of regular and periodic meetings to provide a forum to address challenges that were similar or different among different translation teams and developed strategies within the group and among groups to ensure accuracy and cultural relevance, as well as applicability to the ACAD cohort project. However, it is clear that differences between and within cohorts exist and will remain due to the different cultures and languages of each ethnic group.

Though visual cognitive assessment, which is language-neutral, was easy to translate and useful for studying multilingual populations in a single cohort study, studies have reported on the marked differences in the perceptions of pictures by individuals of different cultures.^{80,81} “Common objects” in Western cultures might not be common objects

in ASAC, therefore, we first assessed whether the listed representative drawings were common objects in ASACs. More studies are necessary to test the validity and normative data of visual cognitive assessments for ASACs. Incorporating community leaders with cultural knowledge into the translation process can significantly improve cultural and linguistic sensitivity by providing access to nuanced understandings of local customs, idioms, and social norms, leading to more accurate and culturally appropriate translations that resonate with the target audience.

We have learned that the desirable or acceptable degree of translation freedom is difficult to determine. A translation that was too faithful to the original version appeared inappropriate, and at the same time, if it was too flexible, it brought concerns about equivalence or harmonization, especially in a cohort study with multiple ethnic groups and languages. Hence, in addition to the generic translation and adaptation guidelines, the translators, reviewers, and panelists were given designated category- and item-specific guidelines. The category- and item-specific guidelines were produced based on a thorough review of the English source, and then on the comments arising from the translatability assessment. In addition, close collaboration within each and between language translation teams and with all relevant research members was critically important.

5 | LIMITATIONS OF ADAPATION/TRANSLATION

There are potential limitations to adaptation and translation, such as idioms or social norms that may not have an equivalent in the studied languages, requiring substitutions that may not convey the same nuance (e.g., clock drawing). This study did not include a cognitive interview evaluation, so we may not fully assess whether participants truly understood and interpreted the translated materials. In addition, it should be pointed out that translation and cultural adaptation approaches require more time and expert involvement than translation and verification methods, especially if the project requires translation into multiple languages, which may call for creative solutions or early planning with an additional budget and securing translation experts for the cultural adaptations.

6 | FUTURE DIRECTIONS

This study is open for future studies to evaluate its psychometrics among ASAC groups and normative values for the listed cognitive assessment scales and cut-off values for cognitive impairment. To ensure fidelity across different languages, the translated instruments in Chinese and Korean, continue to be validated against the original English version in the ACAD study, and the translations for the Vietnamese cohort as additional participants are recruited post pilot phase, has begun to follow the translation process described for the Chinese and Korean subgroups.

Although this is the first ADRD cohort study of ASAC subgroups, this type of study needs to be extended to Asian Indians, Filipinos,

and other Asian American/Canadian populations in the future. It is time to create resources for ASAC populations, including a collection of validated cognitive assessment tools in Asian languages and findings comparing them to other ASAC subgroups or other ethnic groups. While hundreds of Chinese dialects are spoken worldwide, they have largely adopted two Chinese written languages: Simplified and Traditional Chinese scripts. Thus, when recruiting ASAC populations, it is crucial to consider their diverse language backgrounds and living experiences. Studies are needed to examine the similarities and differences in translation for first-, second-, and third-generation immigrants because factors such as living experiences, spoken and written languages, and formal language education might differ over time.

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CONFLICT OF INTEREST STATEMENT

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CONSENT STATEMENT

Consent was not necessary.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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