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Multiple Instrument Translation for Use with South Asian Indian Immigrants

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Abstract

The purpose of this study was to describe translation of five measures (physical activity, acculturation, discrimination, self-efficacy, and depression) from English into Hindi using the committee translation method, focus group, and think-aloud interviews. Two South Asian Indian (SAI) immigrant bilingual translators and a moderator reached consensus on 93 of 102 items, using the committee method. Discrepancy in nine items was resolved with a focus group conducted with five bilingual SAI immigrants. Ten other bilingual SAI immigrants participated in think-aloud interviews to assess understanding and interpretation of the questions. More than 10 additional changes were made following the think-aloud interviews. Sequential use of multiple translation techniques improved translation with culturally acceptable language, thereby maintaining equivalence with original versions.

Keywords

Physical activity; South Asian Indians; translation; think-alouds; cross-cultural research; cognitive interviewing

South Asian Indian (SAI) immigrants to Western countries from the Indian subcontinent are known to have a disproportionately higher prevalence of cardiovascular disease (CVD; Bhansali, Nagaprasad, Agarwal, Dutta, & Bhatia, 2006), diabetes mellitus (Venkataraman, Nanda, Baweja, Parikh, & Bhatia, 2004), and central (abdominal) obesity (A. Misra & Vikram, 2004) than Whites. Central obesity is a significant risk factor for CVD and diabetes in SAI immigrants (Dudeja et al., 2001), even though they average a lower body mass index (BMI) than Whites (A. Misra & Vikram, 2004). Regular physical activity (PA), including lifestyle PA (leisure-time, household, and occupational PA), is essential for reducing the risk factors for CVD, diabetes, and obesity (Nelson et al., 2007). Studies conducted in the United States (R. Misra, Patel, Davies, & Russo, 2000) and other Western countries such as Britain (K. B. Misra, Endemann, & Ayer, 2005) and Canada (O'Loughlin, Maximova, Tan, & Gray-Donald, 2007), however, indicate that many SAI immigrants fail to meet the recommended physical activity guidelines.

SAIs' adoption of a sedentary lifestyle following immigration to Western countries may contribute to their increased risk of CVD and diabetes (McKeigue, Shah, & Marmot, 1991). The acculturative changes that immigrants experience in values, attitudes, customs, and identity influence their health as well as their health behavior (McKeigue et al., 1991).

Acculturation is a complex process of changes that occurs during accommodation to a host culture (Teske & Nelson, 1992). Acculturation can lead to anxiety, depressed mood, and somatic symptoms (Miller, Sorokin, Wilbur, & Chandler, 2004; Mui & Kang, 2006; Oh, Koeske, & Sales, 2002), especially in immigrants who lack access to their pre-immigration culture (Weine et al., 1998).

Further, racial discrimination experienced by persons from the nondominant culture is positively associated with physical health issues such as high blood pressure (Dressler, 1990; Guyll, Matthews, & Bromberger, 2001), coronary artery disease (Troxel, Matthews, Bromberger, & Sutton-Tyrrell, 2003), and psychological health issues related to stress (Jones, 2000; Krieger, 1990; D. R. Williams, 1996) and anxiety disorder (Kessler, Mickelson, & Williams, 1999). It has been hypothesized that increases in psychological health problems, such as depressed mood associated with discrimination, may lead to reduced physical activity rates (R. Misra et al., 2000), placing persons at additional risk for CVD. Further, in a study of British SAIs at risk for CVD, psychological problems such as sadness and depression at a subclinical level were found to be associated with low levels of leisure-time physical activity (R. Williams, Bhopal, & Hunt, 1994).

The U.S. Behavioral Risk Factors Surveillance System surveys from 2001 and 2003 indicated that, on average, only 38.6% of Asians and Native Hawaiians or other Pacific Islanders met recommended levels of lifestyle physical activity, compared with 45.8% of the total U.S. population (Centers for Disease Control and Prevention, 2004). It is important to identify the influence of acculturation, discrimination, and depression on self-efficacy and lifestyle physical activity behavior of SAI immigrants. Identification of physical activity behavior of SAI immigrants may help guide the development of strategies to increase lifestyle physical activity and subsequently decrease disparities in CVD, diabetes, and central obesity in this at-risk population. This will require that researchers use measures that are culturally acceptable and appropriately translated in order to retain equivalence with original versions of instruments.

To maximize accuracy of research findings, researchers need to document the content equivalence (semantic, conceptual, and experiential equivalence) of translated measures prior to using those measures in studies. Semantic equivalence refers to words meaning the same thing in alternate versions of measures. Conceptual equivalence refers to words holding the same conceptual meaning in alternate versions of measures. Translation techniques that address conceptual equivalence capture the etic (across cultures) and emic (specific to a culture) perspectives of concepts from the target population's point of view (Johnson, 2006). Experiential equivalence refers to a task given in a questionnaire being experienced in alternate cultures (Beaton, Bombardier, Guillemin, & Ferraz, 2000). Translators' insufficient knowledge about etic and emic distinctions can lead to lack of experiential equivalence (Cha, Kim, & Erlen, 2007).

In addition, measures with previously documented reliability and validity with certain populations are not necessarily reliable and valid with a different population (Knudsen et al., 2000). Problems arise when questionnaires developed for native English speakers are simply translated into other languages without cultural adaptation (Cha et al., 2007; Fischbacher, Hunt, & Alexander, 2004). To provide evidence that translated measures are valid, researchers should use translation techniques that maintain content equivalence between original and translated versions of the measures (Cha et al., 2007). Only four cross-sectional studies of physical activity were located that used instruments translated into one of the predominant SAI languages (Hayes et al., 2002; Hine, Fenton, Hughes, & Velleman, 1995; Lip, Luscombe, McCarry, Malik, & Beevers, 1996). Interestingly, in none of these studies

was a combination of translation methods used followed by further validity checking with the population group of interest (Harkness, Van de Vijver, & Mohler, 2003).

The purpose of this paper is to describe the comprehensive, sequential use of multiple methods (committee translation method, focus group technique, and *think-aloud interviews* [defined below] with cognitive probing) to translate five measures (physical activity, acculturation, discrimination, self-efficacy, and depression) from English into Hindi, the national language of India.

Methods and Procedures

Committee Translation Method

The committee translation method uses two to three bilingual translators who each independently translate the measures from the original or source to the target language. Then these translators meet to discuss discrepancies in order to reach consensus on an integrated version (Harkness & Schoua-Glusberg, 1998).

Procedure—The measures were translated independently by two bilingual translators whose native language is Hindi. After the independent forward translations were made, the translators and bilingual fist author met to discuss discrepancies, identify poor wording choices, and resolve the discrepancies in order to reach an integrated version based on the committee consensus. The first author served as the moderator for the committee meeting. Differences identified between translated versions were discussed by the team until agreement was reached on 93 out of the total 102 items. The discussion among the translators focused on clear use of words in a question in order to guarantee conceptually equivalent versions of the measures (English and Hindi).

Focus Group Technique

A focus group involves discussion among 5 to 10 people, led by a skilled interviewer, to listen and gather information. The participants are selected based on certain characteristics related to the topic of discussion, such as meeting the study inclusion criteria (Krueger, 2009). A focus group can be used to resolve any discrepancies in translation that may remain after the committee method step. The goal in consulting with the focus group was to create a semi-final version of the translated measures.

Procedure—An interview guide for conducting the focus group was developed to address the nine unresolved items from the translation committee method. Decisions were made regarding retention of the English versions of the words used commonly in the Hindi language and which Hindi words to choose when there were multiple Hindi word equivalents. Items where there were such word choices were read to the focus group members, and they were asked whether to retain the words in their English version in the translated measure, and if not, to provide the Hindi translation. Participants were asked for the most appropriate, commonly used, and easily understood Hindi translation. The moderator took notes about the session process and participants' contributions and developed a report immediately after the discussion.

Think-Aloud Interviews with Cognitive Probing

In think-aloud interviews with cognitive probing, interviews are conducted during which participants express their thoughts out loud as they answer the questions and tell the interviewer each step they take in their minds as they understand, interpret, and figure out how to answer the questions. Expressing thoughts out loud includes participants' paraphrasing, defining the meaning of words, and discussing how they decide on the

answers to the questions (Heesch, Uffelen, Hill, & Brown, 2010). In addition, they explain their responses and identify areas of the questionnaire that caused difficulty in understanding, interpreting, and completion (Willis, DeMaio, & Harris-Kojetin, 1999).

Procedure—Semi-structured one-on-one interviews were conducted in order to assess participants' understanding of the measures. For each of the five measures, the participants were asked to paraphrase the items/questions, define the meaning of words used in questions, and discuss how they reached the answer (Heesch et al., 2010). They were asked to go through the questionnaires speaking their thoughts out loud and telling the investigator everything that they were thinking as they formulated their answers. They were given the option of reading the questionnaires themselves or having questionnaires read to them.

The participants received a reminder call 1 day before the meeting. At the meeting, the purpose of the study was described in detail. After participants signed a written informed consent, the think-aloud interviews with cognitive probing were conducted in Hindi. The investigator demonstrated the use of the think-aloud technique prior to beginning the interviews and used the pre-scripted probes in order to obtain in-depth information regarding participants' thoughts in answering questions (Dillman, 2000). All interviews were audiotaped.

Interviews were transcribed in their entirety. Respondents' understanding and interpretation of questions, their selection of a response, and mapping of their response into the pre-specified response options were then assessed (Jobe & Mingay, 1990). The interviews were analyzed using a taxonomy matrix (Conrad & Blair, 1996; Table 1). The columns in the matrix correspond to three response stages (understanding, task performance, and response formatting) that classify the strategies that respondents use in order to address their detailed think-aloud process to respond to a question. The rows in the taxonomy matrix correspond to four types of problems (lexical, temporal, logical, and computational) that could occur at each of these three response stages. Lexical problems refer to knowing the meaning of words. Temporal problems refer to selecting the frequency for some activity during a specified period. Logical problems refer to understanding logical connectors (and/or, presuppositions, and contradictions). Computational problems refer to recall and mental arithmetic (Conrad & Blair, 1996).

The first author conducted and transcribed the interviews. Two coders (the first two authors) knowledgeable about the questionnaires used the taxonomy matrix and the transcripts to analyze the data independently. After assigning participants' responses in the applicable problem categories and analyzing the transcripts, coders used consensus to identify appropriate categories for the type of problem identified (Heesch et al., 2010).

Instruments

Physical Activity Behavior

Physical activity behavior refers to engaging in lifestyle physical activity, which includes household, leisure time, transport, and occupational activities. The 41-item Community Healthy Activity Model Program for Seniors (CHAMPS) questionnaire measures household, leisure time, and transportation physical activity (Stewart et al., 2001). The CHAMPS can be used to estimate weekly frequency and energy expenditure in a variety of activities reported for the past 2 weeks. This scale was developed for underactive populations, primarily older adults. Frequency of activity is assessed in times per week, and duration is classified into six categories ranging from <1 hour/week to ≥9 hours/week. The frequency score is calculated by summing the frequency per week across all relevant activities. Durations per week for each activity are calculated by multiplying frequency (times per week) by duration (each

time in the given week). Estimated caloric expenditure is calculated by multiplying estimated duration of each activity by metabolic equivalence intensity code (MET, with 1.0 being approximately equal to energy cost while lying quietly) values and summing these scores across all activities (Ainsworth et al., 2000). Higher scores indicate more caloric expenditure and, thus, a higher level of PA.

Previous studies using the original CHAMPS questionnaires with older adults found both Pearson and intraclass correlation coefficients (ICCs) of .62 and .76 with 2-week test-retest reliability for total activity and moderate-intensity activity (Harada, Chiu, King, & Stewart, 2001). The ICC was .67 and .66 for the 6-month reliability for moderate and greater caloric expenditure for total activity (Stewart et al., 2001). The internal consistency of the Spanish version of CHAMPS for older Puerto Rican adults was .76 (Rosario, Vazquez, Cruz, & Ortiz, 2008). Validity of the shortened version was supported in a study of young and middle aged African American adults by significant with estimated VO_2max and was reported to be stronger for individuals with lower income (.56–.75; Resnicow et al., 2003).

Acculturation

Acculturation refers to the cross-cultural adaptation process that maintains and reflects the host and traditional cultural values and beliefs. The 20-item self-report Vancouver Index of Acculturation (VIA) measures heritage culture and mainstream (host) culture orientations (Ryder, Alden, & Paulhus, 2000). Examples of items include “I often participate in my heritage (South Asian Indian) cultural traditions,” and “I often participate in mainstream North American cultural traditions.” The items are scored on a 9-point ordinal scale from *strongly disagree* (1) to *strongly agree* (9). Acculturation scores are summed and divided by the total number of items for each subscale (Heritage and Mainstream), giving a possible range of 1.0 to 9.0. Higher scores on each subscale indicate stronger acculturation. The Cronbach’s alpha for Chinese and non-Chinese East Asians was .92 for the Heritage subscale and .85 for the Mainstream subscale (Ryder et al., 2000), and was .79 for the Heritage subscale for Korean immigrants (Choi, Wilbur, Miller, Szalacha, & McAuley, 2008). Concurrent validity was demonstrated by significant correlation between other acculturation measures and VIA subscales (Ryder et al., 2000).

Discrimination

Discrimination refers to differential actions toward others because of their race/ethnicity (Kressin, Raymond, & Manze, 2008). The 9-item Experiences of Discrimination (EOD) scale measures experiences (9 situations plus frequency) of discrimination (Krieger, 1990). Sample items reflect perceived discrimination at school, work, getting a job, getting services in a store or restaurant, in a public setting, and from the police. Frequency is measured with a 4-item ordinal scale ranging from *never* = 0, to *four or more times* = 5. Two questions are related to response to unfair treatment, both perceived and experienced. The frequency score is obtained by assigning the value of 0 for *never*, 1 for *once*, 2.5 for *2–3 times*, and 5 for *4 or more times* and is summed across items. The Cronbach’s alpha was .74 and test-re-test reliability coefficient over 2–4 weeks was .70 in a sample of African Americans and Latinos (Krieger, Smith, Naishadham, Hartman, & Barbeau, 2005). Further, the correlation coefficient of EOD with William’s Major and Everyday Discrimination measure was $> .55$ (D. R. Williams, Yu, Jackson, & Anderson, 1997).

Self-efficacy

Self-efficacy refers to confidence in one’s ability to perform some task: in this case, physical activity tasks. McAuley’s Self-Efficacy Scale in Overcoming Barriers to Physical Activity is composed of 17 items reflecting beliefs in ability to continue to be physically active in the face of barriers (McAuley, 1992). Six items were modified to better reflect lifestyle physical

activity rather than structured exercise. Responses to scale items are scored from zero (*not confident*) to 100 (*completely confident*) to overcome each barrier. The items are summed and divided by the total number of items for an average self-efficacy score. The Cronbach's alpha scores for the measure was .94 in a sample of midlife African American and White women (Wilbur, Miller, Chandler, & McDevitt, 2003). The Cronbach's alpha for the Spanish version of the measure was .92 with Latinos (Marquez & McAuley, 2006), and .89 for the Korean version (Choi et al., 2008). Validity was demonstrated through positive correlation between self-efficacy and participation in an exercise program (McAuley, 1992).

Depression

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977) measures psychological distress. Responses to items are given on a 4-point scale from *rarely or none of the time* (0) to *most or all of the time* (3). Higher scores reflect higher levels of depressive symptomatology. Examples of items include "I felt that I could not shake the sadness even with the help of my family or friends," and "I thought my life had been a failure." The scores are summed, giving a possible range of 0 to 60 across 20 items. Higher scores indicate more depressive symptoms. The original 20-item CES-D has been used in different population groups including Latinos (Grzywacz, et al. 2010), Jordanians (Al-Modallal, 2010), Koreans (Kim, Seo, & Cain, 2010), African Americans (Canady, Stommel, & Holzman, 2009), Russians (Miller & Chandler, 2002), and Armenians (Kazarian, 2009). The Cronbach's alpha was .87 for the Korean version (Choi et al., 2008).

A 12-item CES-D scale for South Asian Indians was derived from the original 20-item CES-D in a previous study conducted in India (Gupta, Punetha, & Diwan, 2006). It was translated into Hindi and pilot tested with 12 SAIs followed by review by a panel of experts, and confirmatory factor analysis. The Cronbach's alpha was .74 for Asian Indian caregivers. The correlation coefficient between depressive symptomatology and current life satisfaction was $-.35$. That translation was only available in hard copy and is now lost (R. Gupta, personal communication, 2011). Therefore, the 12-item instrument was translated into Hindi again.

Sample

Committee Translation Method

The translators engaged in the committee translation method were women who had been born in India, and who were 23, 38, and 42 years of age. The length of stay in the US was 10 years, 14 years, and 21 years, respectively. Two were from the northern region and one from the central region of India to assure diversity in language, clothing, diet, and customs in the translator sample. All three had at least an undergraduate university degree. Two had received an undergraduate degree in India and were registered nurses (RNs). The third received a degree from a university in the US. They all visit India every 1 to 4 years, which helps them maintain their understanding of both cultures. Although their language preference was Hindi at home, speaking English at school and work enabled them to communicate fluently in Hindi and English.

Focus Group Technique

Eligibility criteria for the focus group participants were: SAI men and women, born in India, bilingual in Hindi and English, and 40 to 65 years of age. The focus group included a moderator (first author) and five participants (three male and two female) who were recruited by social networking. The highest level of education for two of the participants was a high school diploma and for three a college degree. Of the three college graduates, one worked as an elementary school teacher in India, one is an RN in the U.S., and the third is a church minister in the US. Two participants were from the northern region, two from the

central region, and one participant was from the eastern region of India. Their length of stay in the U.S. was from 10 to 21 years.

Think-Aloud Interviews with Cognitive Probing

For the think-aloud interviews, eligibility criteria were: SAI men and women, born in India, bilingual in Hindi and English, and 40 to 65 years of age. The primary recruitment site was a SAI church in the Chicago metropolitan area. In addition, social networking was used for recruitment. After the church announcement about the study, men and women who were interested met with the researcher. The study purpose was further explained, and, if interested, they were screened in person or at a later time over the telephone. For eligible and interested persons, a time and place of their choosing was identified for the think-aloud interviews (home, place of employment, or at their relatives' home). Ten SAI immigrants (four men, six women) were interested and eligible. They had a mean age of 53, were from the northern, southern, western, and middle regions of India, and had immigrated to the U.S. directly from India (first generation). They had lived in the U.S. for 9 to 36 years ($M = 23$).

Results

Committee Translation Method

During the consensus meeting, the committee decided that two measures needed additional modification (Table 2). The CHAMPS questionnaire was modified by adding/substituting traditional Indian activities. Two additional SAI religious institutions (*gurudwara* and *mandir*) were added to represent churches. Traditional Indian sport activities (cricket and hockey) were added to soccer and racquetball. Three traditional Indian types of dances (*bhangra*, *giddha*, and dance with songs from Indian movies) were substituted for “square and line dance.” A new item was added to the Vancouver Index of Acculturation: “felt self-conscious about my traditional Indian clothing while participating in physical activity.”

The committee could not reach consensus on nine items from four of the measures (CHAMPS, acculturation, discrimination, and self-efficacy; Table 3). Consensus was not reached on how to translate four items of the CHAMPS: “doing volunteer work,” “attending other club or group meetings,” “playing cards, bingo, or board games with other people,” and “doing aerobics or aerobic dancing.” For the Vancouver Index of Acculturation measure, consensus was not reached on the word “mainstream” for two items: “mainstream American cultural traditions” and “mainstream American values.” For the Experiences of Discrimination measure, consensus was not reached for “discrimination in a public setting.” For the McAuley self-efficacy measure, consensus was not reached for “work schedule conflicting with physical activity.” In addition, consensus was not reached on the title of the self-efficacy questionnaire. These measures/items were brought to the focus group discussion.

Focus Group

The results from the focus group led to changes in the four questionnaires (Table 3). In the CHAMPS measure, the word “volunteer” was retained, but its Hindi translation was also provided in parentheses (agreement of 3/5). The English word “club” was retained (consensus of 3/5). The final Hindi translation was determined for “board games” (consensus of 3/5). The English word “aerobics” was retained (agreement of 5/5). For the Vancouver Index of Acculturation scale, the final Hindi translation of “mainstream” was determined (agreement of 3/5). For the Experiences of Discrimination scale, the final Hindi translation of the term “public setting” was determined (agreement of 3/5). For the Self-Efficacy in Overcoming Barriers to Physical Activity scale, the final Hindi translations of “schedule” and “self-conscious” were identified, but consensus was not reached on the item

“being self-conscious about appearance while participating in physical activity.” Also the Hindi word for self-efficacy in the title of questionnaire was determined (agreement of 3/5).

Think-Aloud Interviews

Following the think-aloud interviews, final changes were made to the instruments (Table 4). For the CHAMPS questionnaire, 11 items were revised based on the understanding response stage, and five items were revised based on the task performance response stage for lexical problems. Better Hindi words were identified for the following 11 items: “group meeting,” “type of dance with songs from Indian movies,” “woodworking and other arts and crafts,” “singles tennis,” “doubles tennis,” “walking or hiking uphill,” “swimming moderately,” “flexibility,” “Yoga,” and “strength training.” For the task performance stage, new words were added to four of the items. These included: Gujarati folk dance “*garba*” to the dance item, “*Karom board*” to board games, and “*Badminton*” to “singles tennis” and “doubles tennis.” The concept of inline-skating was not understood, so the translation was revised to convey the meaning of skating rather than word-for-word translations of different types of skating.

For the acculturation measure, the word “heritage” culture was changed to “SAI culture” based on the understanding response stage for lexical problems. This term occurred in 10 items. Based on the understanding response stage for lexical problems, the translation was revised for a clearer understanding of the words in the discrimination scale for the items “public setting,” “personal stress,” and “took too much time” in the self-efficacy scale. For the depression measure, the translation was revised based on the task performance stage for lexical problems for the items “I felt hopeful about the future” and “people were unfriendly.” No temporal, logical, or computational problems were identified for any of the measures.

Discussion

This study demonstrates the systematic, sequential use of committee translation, focus groups, and think-aloud interviews with cognitive probing to foster the construction of Hindi instruments that are culturally appropriate and maintain semantic, conceptual, and experiential equivalence. Changes were made at each step in the sequence, leading to an increasingly precise and coherent final version, and suggest that each method added depth to the previous rendition. Multiple translation techniques have been used by others to achieve content equivalence between original and translated measures (Cha et al., 2007; Miller & Chandler, 2002; Pasick, Stewart, Bird, & D’Onofrio, 2001).

The committee method was found to be a reliable method for translation, demonstrated by the relatively few changes that were suggested during the focus group and think-aloud interview phases. Semantic equivalence was obtained by preserving the meaning of the questions during translation and at the consensus meeting. Conceptual equivalence was addressed by modifying words as deemed necessary in order to preserve the conceptual meaning of the questions, such as revising the items reflecting different types of skating to one item that conveys the overall activity of skating, and adding an item to reflect self-consciousness about traditional Indian clothing while participating in physical activity. Experiential equivalence was maintained by assuring that the task given in the questionnaires was experienced in the target culture by substituting names of traditional Indian sports and dances in the CHAMPS.

The opportunity for the translators to discuss alternatives resulted in a strong target document that received consensus from Hindi-speaking translators from a variety of backgrounds. Utilizing translators from different regions of India was important for

assessing accuracy of translation and resolving discrepancies, because SAIs from different regions of India vary in their language, clothing, diet, and customs (Pinto & Sahu, 2001). Further, the bicultural translators' knowledge of both SAI and U.S. cultures and languages facilitated comparability of translation rather than performing literal word-for-word translation. Diverse educational and professional backgrounds of translators were important to reflect the language used by the target population more accurately (Guillemin, Bombardier, & Beaton, 1993). For example, one of the three translators did not have a background in the health care field, which made it more likely for that translator to look at things from a different perspective. The translators were efficient in making decisions about accuracy in punctuation, adding the tone in which the question/item was to be addressed (Chen & Boore, 2009), and using terms that are easy to understand even by SAI immigrants with lower levels of education (Banville, Desrosiers, & Genet-Volet, 2000).

Unlike back-translation (Brislin, Lonner, & Thorndike, 1973), committee translation produces a translated version of the instrument by using a small number of bilingual people who simultaneously and independently conduct forward translations. A strength of the method is the consensus meeting, in which translators discuss their viewpoints to obtain an integrated version (Harkness & Schoua-Glusberg, 1998). Although back-translation is a well-recognized technique for instrument validation in cross-cultural research (John, Hirsch, Reiber, & Dworkin, 2006), it is not easy to establish whether problems originate in the forward translation into the target language or the back translation into the source language (Martinez, Marín, & Schoua-Glusberg, 2006). The back-translation method does not indicate explicitly why and how changes were made.

The committee method is being increasingly recommended in several disciplines (Vinokurov, Geller, & Martin, 2007) and has been used successfully in cross-cultural studies across ethnic groups in nursing research (Miller & Chandler, 2002; Thato, Hanna, & Rodcumdee, 2005). An instrument translation conducted by Carlson (2000) using the back-translation method resulted in close to one-third of the items needing revision. The committee method was used to translate the Pittsburgh Sleep Quality Index (PSQI) from English to Arabic, and only one word needed further refinement in a subsequent comparison with back-translation (Suleiman, Yates, Berger, Pozehl, & Meza, 2010).

Adding the focus group further contributed to maintaining semantic, conceptual, and experiential equivalence. In order to enhance the reliability and generalizability of findings, the focus group was constructed to represent the target population (Krueger, 2009) by including participants from both genders as well as diverse age, income, education, employment status, and Indian regional backgrounds. They identified issues that were not noted by the bilingual translators, who by virtue of their education and background almost always differ somewhat from the target sample. The focus group component of translation has been recommended as an important addition to the committee method (Martinez et al., 2006; Miller & Chandler, 2002; Vinokurov et al., 2007). The insight gained to assess comparability, readability, and clarity of the questionnaires from the focus group was consistent with a study that used focus groups to test content validity of the Chinese Version of the Early Childhood Oral Health Impact Scale (Lee, McGrath, Yiu, & King, 2009).

Finally, the think-aloud interviews identified several issues that were not brought up in the previous two stages and clarified some issues that remained ambiguous after use of the other methods. Though time-consuming, this was the only method that allowed the investigators to grasp the nature of the potential problems and how the instruments were understood by the participants. Participants did not have any technical problems with the questionnaires regarding length and structure of the questions and response options (Knudsen et al., 2000). The insight gained into potential or unanticipated problems was similar to in a study by

Heesch et al. (2010), who used think-aloud interviews to examine older adults' understanding of questions from the International PA Questionnaire (IPAQ).

For analysis of the cognitive interviews, a taxonomy matrix was used to plot potential translation issues (Conrad & Blair, 1996). This taxonomy guided us in assigning problems to the applicable problem type categories and the response stages. The taxonomy matrix increased objectivity, avoiding the researcher's subjective opinions and impressions from influencing the quality of data analysis (Drennan, 2003); standardized the identification and recording of problems; and assisted in promoting solutions. The CHAMPS, Vancouver Index of Acculturation, self-efficacy, and discrimination measures had lexical/understanding problems. CHAMPS and CES-D had lexical/task performance problems. In general, however, the participants were able to paraphrase the questions, define the meaning of words used in questions, describe how they decided on answers, explain their responses, and identify areas of the questionnaire that caused difficulty in understanding, interpreting, and completion of the questionnaire (Drennan, 2003). These findings suggest that construct equivalence was maintained because the given concepts in the translated measures represented the same meaning and function as in the original version of the measures (Harkness et al., 2003).

One limitation of the study is that this sample may not be representative of the SAI immigrant population due to lack of diversity in educational level, because they all had a college degree. Also, in this phase of the study, we did not collect psychometric validation data on the translated scales, and this report is limited to the description of the translation process. Although the think-aloud interviews provided insight into how questions were interpreted, this information is not sufficient to confirm the construct validity of the instruments (Beaton et al., 2000). In the next phase of our study, the instruments will be tested for validity, internal consistency, and other forms of reliability (e.g., stability and alternate forms/equivalence reliability with original scales) in a larger sample of SAI immigrants. Once the reliability and validity of these instruments is established, we can compare our results with those obtained in other cultures to identify risk factors and disparities.

Conclusion

In summary, translation of these measures into Hindi is a first step in developing intervention strategies targeted and tailored to characteristics such as acculturation, discrimination, self-efficacy, and health status that could influence lifestyle physical activity behavior of SAI immigrants at risk for cardiovascular disease, diabetes mellitus, and central obesity. Three important guidelines were followed in this study: (a) instruments were selected that had documented reliability and validity; (b) bilingual translators were identified who had knowledge of both languages and understanding of both cultures; and (c) sequential use of multiple translation techniques was employed to promote equivalence between source and target languages. We recommend committee translation, focus groups, and think-aloud interviews as a comprehensive, "best practice" approach to translation for cross-cultural research.

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Table 1

Taxonomy Matrix with Sample Questions for Think-Aloud Interviews

Problem type	Response stage		
	Understanding: understanding the question	Task performance: process used to make a decision in answering the question	Response formatting: making a decision about which answer to choose
Lexical: knowing the meaning of the words in questions in general	What is your understanding of the question?	Why did you respond the way you did?	How did you decide which response category was closest to your answer?
Temporal: time period to which a question applies	What time frame is this question covering?	Why did you respond the way you did?	How did you decide which response category was closest to the time period?
Logical: logical connections (e.g. and/or), presuppositions, contradictions, and tautologies	Tell me what is your understanding of this question based on your experience related to this item.	Why did you respond the way you did?	Based on your experience, how did you decide which response category was closest to your answer?
Computational: memory of one kind or another and mental arithmetic	Tell me what is your understanding of the number of times you performed this item?	Why did you respond the way you did?	How did you decide which response category was closest to number of times you performed the item?

Table 2

Committee Method Results: Changes in the Instruments

Measures	Items	Changes in instruments
CHAMPS	Attend church or take part in church activities?	Added: SAI religious institutions (<i>gurudwara</i> and <i>mandir</i>) to church
	Dance (such as square, folk, line, ballroom)?	Substituted: traditional Indian dances for square and line dance (<i>bhangra</i> , <i>giddha</i> , and dance with songs from Indian movies)
	Play basketball, soccer, or racquetball?	Added: traditional Indian sport activities (cricket and hockey) to soccer, or racquetball
Acculturation	new item	Added a new item: "felt self-conscious about my traditional Indian clothing while participating in physical activity"

Table 3

Focus Group Technique Results: Consensus on Retaining/translating English and Changing Hindi Words

Consensus on retaining English words or to translate	Retained English word	Translated into Hindi	Changed Hindi word	Consensus
CHAMPS				
Volunteer - Do volunteer work	x	x		3/5
Club - Attend other club or group meetings?	x			3/5
Board games - Play cards, bingo, or board games with other people?		x		3/5
Aerobics - Do aerobics or aerobic dancing?	x			5/5
Self efficacy				
Schedule - My work schedule conflicted with my physical activity.		x		3/5
Title- Self efficacy			x	3/5
Self consciousness - I felt self- conscious about my appearance when I was participating in physical activity.			x	3/5
Vancouver Index of Acculturation				
Mainstream			x	3/5
I often participate in mainstream American cultural traditions.				
I believe in mainstream American values.				
Experiences of Discrimination				
Public setting - Have you ever experienced discrimination, being prevented from doing something or being hassled, or made to feel inferior in any public setting because of your race, ethnicity, and color?			x	3/5

Table 4
Cognitive Interview Results: Changes Made in Hindi Translation Using Taxonomy Matrix

Problem type	Response stage				
	Understanding		Task performance		Response formatting
	Measures	Changes	Measures	Changes	
Lexical	CHAMPS	11 items (e.g. group meeting, movie dance, woodworking, flexibility, etc.)	CHAMPS	Added: Gujarati dance, karom board, badminton Omitted : ice, roller blade, and line skating (changed to skating)	-
	Acculturation	Heritage culture	CES-D	Changed : felt hopeful about the future and people were unfriendly)	-
	Discrimination	Public setting	-	-	-
	Self-efficacy	Personal stress, took too much time	-	-	-
Temporal	-	-	-	-	-
Logical	-	-	-	-	-
Computational	-	-	-	-	-