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Cultural Adaptation of a Community-Based Hearing Health Intervention for Korean American Older Adults with Hearing Loss

Janet S. Choi, MD MPH[1], **Kyoo S. Shim, MPH**[2], **Na E. Shin, BA**[3], **Carrie L. Nieman, MD MPH**[4,5], **Sara K. Mamo, AuD PhD**[5], **Hae-Ra Han, RN, PhD**[6], **Frank R. Lin, MD PhD**[7]

[1]Department of Otolaryngology-Head & Neck Surgery, Keck School of Medicine of the University of Southern California, Los Angeles, California, USA.

[2]Johns Hopkins Bloomberg School of Public Health, Baltimore, Maryland, USA.

[3]Johns Hopkins University School of Medicine, Baltimore, Maryland, USA.

[4]Department of Otolaryngology-Head & Neck Surgery, Johns Hopkins University, Baltimore, Maryland, USA.

[5]Center on Aging and Health, Johns Hopkins Medical Institutions, Baltimore, Maryland, USA.

[6]Department of Community-Public Health, School of Nursing, Johns Hopkins University, Baltimore, Maryland, USA.

[7]Departments of Otolaryngology-Head & Neck Surgery, Geriatric Medicine, Mental Health and Epidemiology, Johns Hopkins University, Baltimore, Maryland, USA.

Abstract

Although hearing loss is known to be associated with many adverse health outcomes in older adults, current hearing healthcare remains expensive and inaccessible to most ethnic minorities in the US. We aim to adapt an affordable, community-based hearing intervention to older Korean Americans (KAs), describe the cultural adaption process, and report pilot trial outcomes. We undertook the first four stages of Barrera & Castro's cultural adaptation framework: information gathering, preliminary adaptation design, adaptation test, and adaptation refinement in 15 older KAs with hearing loss and 15 of their communication partners. We developed a culturally adapted intervention consisting of provision of an affordable listening device and aural rehabilitative training. Six weeks post-intervention, participants' mean hearing handicap score (range: 0-40) reduced from 15.7 to 6.4. Communication partners demonstrated improved social-emotional

Address correspondence, reprint requests, and proofs to: Frank R. Lin, Johns Hopkins Center on Aging & Health, 2024 E. Monument St, Suite 2-700, Baltimore, MD 21205, Telephone: (410) 502-0150, Fax: (443) 683-8310, flin1@jhmi.edu.

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function. Post-intervention focus group revealed increased hearing benefit, confidence in hearing health navigation, and awareness in hearing health among study participants. The adapted intervention was well-accepted and feasible among older KAs. This study is the first to report the cultural adaptation process of a hearing care model into older KAs and its methodology may be applied to other minority groups.

Keywords

Hearing loss; Korean Americans; Cultural Adaptation; Hearing Healthcare; Disparities

Introduction

Hearing loss affects nearly 70% of adults greater than 70 years of age in the United States (US) (Lin, Thorpe, Gordon-Salant, & Ferrucci, 2011) and is independently associated with social isolation, depression, accelerated decline in physical functioning, and risk of incident dementia (Chen et al., 2015; Lin & Albert, 2014; Lin, Metter, et al., 2011; Livingston et al., 2017; Mener, Betz, Genther, Chen, & Lin, 2013; Mick, Kawachi, & Lin, 2014). Despite its prevalence and burden on society, hearing loss is largely underdiagnosed and undertreated (Centers for Disease Control, 1997; Lin, Niparko, & Ferrucci, 2011; Lin, Thorpe, et al., 2011). Recent initiatives from the National Academies of Science, Engineering, and Medicine (The National Academies of Sciences Engineering and Medicine, 2016) and the White House President's Council of Advisors on Science and Technology (President's Council of Advisors on Science and Technology, 2015) established hearing loss as a critical public health issue and resulted in the passage of the Over-the-Counter Hearing Aid legislation in August 2017.

The current model of clinic-based hearing healthcare in the US remains complex, time-intensive, and highly expensive for most older adults, requiring 3-5 visits to hearing care professionals and out-of-pocket costs averaging $4,700 a pair (Nieman & Lin, 2017; Strom, 2014). The established model of hearing healthcare is additionally challenging for racial and ethnic minorities in the US, where cultural and language barriers increase the difficulty of navigating the hearing healthcare system. Previous studies have demonstrated significantly lower rates of hearing aid use among minorities (10-17.1%) compared to White older adults (28.6-35.4%) (Bainbridge & Ramachandran, 2014; Knudsen, Öberg, Nielsen, Naylor, & Kramer, 2010; Mamo, Nieman, & Lin, 2016; Meyer, Hickson, Lovelock, Lampert, & Khan, 2014); this magnitude of disparity is likely conservative given that immigrant, minority older adults with language barriers, such as Korean Americans, may be underrepresented in these studies.

Korean Americans (KAs) are one of the fastest-growing Asian sub-populations in the US with homogeneous race/ethnicity, language, and culture (Shahid, 2012). Older KAs are predominantly monolingual first-generation immigrants who typically maintain their cultural beliefs and attitudes while in the US. In South Korea, the rates of hearing aid use among older adults is estimated to be 8-11%, lower than rates found in other countries (Korea Centers for Disease Control and Prevention, 2010; National Evidence-Based Healthcare

Collaborating Agency, 2011). A focus group study on a sample of older KAs with hearing loss identified high costs, navigational difficulties, language barrier, and stigma toward hearing loss as barriers for hearing aid use (Choi et al., 2018). Despite a pressing need for more accessible and affordable hearing intervention programs for minority older adults, no such programs have been implemented in KAs. In an effort to deliver a culturally competent hearing intervention that can address KAs' unique barriers, our study team adapted a low-cost, community-delivered hearing intervention called HEARS (Hearing Equality through Accessible Research and Solutions) to older KAs following a validated model of cultural adaptation (Barrera, Castro, Strycker, & Toobert, 2013). HEARS is a theory-driven intervention originally developed to promote hearing health among English-speaking older adults in urban, low-income housing (Nieman et al., 2017).

Cultural adaptation of hearing healthcare interventions that could reach racial/ethnic minority groups of older adults is critical to improving accessibility of effective intervention programs and reducing hearing disparities (Barrera et al., 2013; The American Geriatrics Society Ethnogeriatrics Committee, 2016). While there have been many successful models of culturally-adapted health interventions for other chronic conditions including cardiovascular disease and diabetes (Brown, Garcia, Kouzekanani, & Hanis, 2002; Osuna et al., 2011), there have been few prior efforts reported in the literature to reach and provide care to minority older adults with hearing loss. This paper describes the stages of cultural adaptation of HEARS program, and the feasibility, acceptability, and preliminary efficacy of the culturally-adapted hearing intervention, called K-HEARS, targeting a population of older KAs. We hypothesized that K-HEARS would be well-accepted and feasible with a potential to reduce hearing handicap among older KAs with hearing loss.

Materials and Methods

Study Participants

We recruited community-dwelling older KAs in partnership with a suburban Korean church in Maryland between December 2014 and March 2015. An ethnic church was chosen as our intervention venue since greater than 80% of KAs report going to church regularly (Islam et al., 2013). Study announcements were made by the church pastor and in the church newsletter 2-3 weeks prior to a hearing screening session at the church. Flyers were then distributed at church on the day of hearing screening to invite potential participants to the screening session. Hearing screening was conducted using a portable audiometer (Tremetrics RA 300, CT, USA) in a quiet room at the church. Upon completion of hearing screening, bilingual study staff contacted those who met the eligibility criteria to participate in the pilot study. The study was approved by the [blinded] Institutional Review Board.

Eligibility criteria for participation in the pilot study included 1) age ≥ 55 years, 2) self-identified as Korean American, 3) self-reported ability to read and speak Korean, 4) screening audiometry pure-tone-average (PTA) $_{1,2,4kHz}$ ≥ 25dB HL in worse hearing ear (i.e., hearing loss), 5) report not currently using a hearing aid, and 6) has a communication partner who was able to participate in the study. Communication partners (CPs) were individuals 1) who were aged ≥ 18 years, 2) spoke Korean, and 3) communicated with the participants on a daily basis.

Twenty-five individuals participated in the hearing screening, and twenty-two individuals were eligible to participate in the study. Of twenty-two eligible participants, four could not be reached after screening and three had scheduling conflicts. The remaining fifteen individuals with hearing loss and fifteen of their CPs participated in the pilot study. Written consent in Korean was obtained from all study participants.

Cultural Adaptation Procedures

The original program HEARS was a community-delivered, low-cost hearing intervention developed for English-speaking, low-income older adults (Nieman et al., 2017). The intervention, developed based on Bandura's Social Cognitive Theory with specific emphasis on self-efficacy (Bandura, 1977) and a human factors approach to design for older adults (Fisk, Rogers, Charness, Czaja, & Sharit, 2009), was a one-time session that included selection of an over-the counter personal sound amplification product (PSAP), fitting and orientation to the device, and education on hearing loss and communication strategies. Greater details of the intervention design and development of the program are described elsewhere (Nieman et al., 2017). The program was shown to be effective at improving hearing handicap, communication function, and depressive symptoms among study participants. The K-HEARS intervention was adapted from the original HEARS program to serve older KAs based on the framework of the following the first four cultural adaptation stages proposed by Barrera and Castro (Table 1) (Barrera et al., 2013; Castro, Barrera, & Holleran Steiker, 2010). The final stage of the cultural adaptation trial is to be completed in the future and will be reported separately

1) Information gathering: The bilingual/bicultural study team conducted a literature review to search for evidence of subcultural group differences in hearing healthcare among KAs and previous applications of evidence-based interventions. Next, we conducted two focus groups including older KAs (age ≥55 years) with hearing loss and their CPs (n=11). Findings on the perceptions towards hearing loss and unique barriers to hearing healthcare use among KAs were previous reported (Choi et al., 2018). In this stage, we further explored the acceptability and feasibility of core components of the original HEARS intervention among older KAs and their CPs. Participants responded positively to a proposed hearing program to be delivered in their community, if the program was delivered by a bilingual interventionist who is fluent in Korean and familiar with Korean culture. Among a choice of devices, the over-the-counter listening device with a design resembling a Bluetooth headset instead of a standard hearing aid was highly acceptable to participants.

2) Preliminary Intervention Design: We made preliminary changes to the intervention as informed by the *Information Gathering* stage. Changes were made in intervention staffing, recruitment, demographic and outcome measures, and intervention form and content while preserving the core elements of the original intervention. Specific changes made to the original HEARS intervention are highlighted in Table 1.

3) Preliminary Adaptation Test: A bilingual interventionist (J.C.) delivered the preliminary version of the adaptation. Case studies were conducted where the interventionist delivered the preliminary version to 2 native/bilingual healthcare professionals and 2

community representatives (one older KA with hearing loss and his CP). We received feedback to assess implementation difficulties and satisfaction with the program content and activities.

4) Adaptation Refinement: In response to the feedback from the *Preliminary Adaptation Test* stage, we made changes to further tailor the intervention. Changes included: enhancing cultural values during role play of communication strategies by incorporating short scripts relatable to family/social settings of KA family and adding a visual guide to explain participant's level of hearing loss (e.g. speech banana audiogram with the participant's hearing screening result). Final 1-hour education session of K-HEARS consisted of orientation to the listening device followed by communication education and counseling. Follow-up included a phone call from an interventionist within 5 days of intervention and a group troubleshooting session after 2 weeks of intervention. Details of the characteristics of the final intervention are described in Table 2.

5) Cultural Adaptation Trial: A pilot study of the K-HEARS intervention was conducted using older KAs with hearing loss (n=15) and their CPs (n=15) as an initial step towards the final trial to be completed in the future. We conducted post-intervention focus groups with pilot study participants (n=2, 11 participants) to gather suggestions for future modifications and to determine whether the intervention had a potential to reduce hearing handicap. Details of the pilot trial are summarized in Table 2.

Focus Groups

As part of the cultural adaptation process, we conducted focus groups pre-intervention (n=2, 11 participants) and post-intervention (n=2, 11 participants). The moderator's guide questions were developed in English based on previous literature and the study team's experiences in working with individuals with hearing loss and the KA community. Bilingual study staff translated the questions and their accuracy was confirmed by a certified translator. After informed consent, short demographic data were collected using questionnaires. Two bilingual moderators familiar with Korean culture facilitated each focus group and a separate note-taker was present to audiotape the discussion and record notes. Moderators and a note-taker reviewed the discussion notes after each focus group and audiotapes were transcribed verbatim.

The focus group interview data was analyzed using qualitative content analysis with an inductive coding approach (Hsieh & Shannon, 2005; Knudsen et al., 2012; Thomas, 2006). Two coders independently reviewed the transcripts and field notes multiple times to understand each focus group and documented initial coding to identify themes and subthemes of the group responses. Then, the research team discussed the discrepancy of the themes and subthemes until a consensus was reached in iterative fashion. After a series of team discussions, final categories of themes and subthemes were determined. Only final results of themes, subthemes, and supporting quotes were translated to English (Barnes, 1996; Suh, Kagan, & Strumpf, 2009).

Measures

Assessments of the participants were obtained at baseline and 6 weeks after receiving the intervention. Baseline measures included questions on demographics, acculturation, and potential covariates including hearing history. The primary outcome was self-reported communication difficulties assessed by using the validated, Korean version of the Hearing Handicap Inventory for the Elderly (HHIE-S) (Y. Kim et al., 2001; Park et al., 2011; Ventry & Weinstein, 1983). Scores range from 0 to 40 with higher scores indicating higher levels of hearing handicap. An HHIE-S score ≥8 is considered indicative of a significant hearing handicap (Lichtenstein, Bess, & Logan, 1988). Participants were also assessed on social-emotional function using Korean language versions of the UCLA Loneliness Scale (O. S. Kim, 1997) and the Patient Health Questionnaire (PHQ-9) (C. Han et al., 2008), and health-related quality of life using Short-Form General Health Survey (SF-12) (Nam et al., 2007). Psychosocial factors associated with listening device use were assessed by using the Attitudes towards Loss of Hearing Questionnaire (ALHQ) among participants with hearing loss (Saunders & Cienkowski, 1996). Components of the ALHQ include denial of hearing loss, negative associations with listening device, negative coping strategies, self-reported difficulties with manual dexterity and vision, and hearing-related self-esteem. Third-party disability was assessed among CPs by using the Significant Other Scale for Hearing Disability (SOS-HEAR) (Scarinci, Worrall, & Hickson, 2009). Overall program, device use, and satisfaction were measured with the International Outcome Inventory-Alternative Interventions (IOI-AI) (Chu et al., 2012) and self-reported willingness to pay (Yueh et al., 2001). Validated Korean versions were used for all available questionnaires. SOS-HEAR questionnaire was not available in a validated Korean version. As such, the questions were translated to Korean by a native speaker with an expertise in hearing loss to ensure that the questionnaire addressed the needs of the target population. The translations were further verified by a certified translator (Hall et al., 2018).

Statistical Analyses

Descriptive statistics were used to characterize the cohort and to summarize outcome measures before and after the intervention. Mean and standard deviation were used to summarize continuous variables and frequency was used for categorical variables. The primary outcome was change in HHIE-S scores from baseline to 6 weeks post-treatment. Hypothesis tests were not conducted given the study was a feasibility pilot study with a small sample size. All analyses were conducted using Stata 11.1 (StataCorp, College Station, Texas).

Results

Our study cohort included 15 dyads comprised of 15 older adults with hearing loss and their 15 CP counterparts (Table 3). The mean age of participants with hearing loss was 67.9 years (range: 57-82 years) and 62.9 years for CPs (range: 30-75 years). Most participants with hearing loss had an annual household income less than $25,000 (73%) and an education level of high school or less (60%). Period of residency in the US varied among participants from 9 to 40 years, and all participants with hearing loss moved to the US when they were 22 years or older (Table 3). Most participants with hearing loss and their CPs reported

speaking only Korean at home (83%). Seven participants had mild hearing loss (PTA $_{1,2,4kHz}$ 25-39dB HL in worse hearing ear), 7 had moderate hearing loss (PTA $_{1,2,4kHz}$40-59dB HL), and 1 participant had normal hearing in one ear and severe hearing loss in the other ear (PTA $_{1,2,4kHz;}$ ≥60 dB HL). Ten CPs were spouses of the participants with hearing loss (67%), and 5 CPs were either a child, sibling, or fellow parishioner.

Pre- versus Post-Intervention Changes in Outcome Measures

At baseline, the participants with hearing loss reported relatively high levels of communication difficulties with mean HHIE-S scores of 15.7 (SD: 13.1, range: 2-34). After intervention, the HHIE-S scores decreased to 6.4 (SD: 6.9, range 0-22) (Table 4). For psychosocial factors associated with listening device use, mean scores in 4 out of 5 components of ALHQ (score range 0-5) improved after intervention: reduced negative associations with listening device use (2.5 to 1.8), reduced negative coping strategies (2.6 to 2.2), reduced difficulties with manual dexterity and vision (2.5 to 2.1), and improved hearing-related esteem (3.3 to 3.8). Among participants with hearing loss, there were minimal changes in mean scores of social-emotional function measured by UCLA Loneliness Scale (31.8 to 32.7) and PHQ9 (7.9 to 7.6). For quality of life, there was a slight improvement in mental component SF-12 scores after intervention (45.4 to 49.6) while change in physical component scores was minimal (40.5 to 40.0).

Among CPs, the mean scores in SOS-HEAR questionnaires assessing their third-party disability (score ranges 1-5) decreased from 2.0 at baseline to 1.7 after intervention. Reductions in mean scores of UCLA Loneliness scale (31.6 to 28.6) and PHQ9 (4.7 to 3.0) were relatively more substantial than the mean score changes among their partners with hearing loss. Similar to the changes observed among participants with hearing loss, mental component of SF-12 scores slightly improved (47.5 to 51.8) and there was minimal change in physical component scores (43.1 to 42.3).

Intervention Feasibility and Acceptability

All participants completed the study without adverse events. Most participants reported using the listening device and communication strategies regularly (Supplement A). The majority of the participants, both older KAs with hearing loss and CPs, reported moderate or greater benefit from the program, slight to no limitation in residual activity, high satisfaction, and slight or higher improvement in quality of life (Supplement A). All participants reported slight or significant benefit from the K-HEARS program and that they would recommend the listening device and the K-HEARS program to others. Eighty seven percent of participants with hearing loss and 93% of CPs felt more connected with others. Ninety three percent of participants with hearing loss and 87% of CPs felt less lonely. Ninety tree percent of participants with hearing loss and 100% of CPs found having a CP to go through the program with to be helpful. Seventy eight percent of participants with hearing loss who attended the follow-up group session reported great benefit from the session. The mean amount for the K-HEARS program that the participants were willing to pay were $139 (range $0-$500) and $115 (range $30-$500) for the older KAs with hearing loss and CPs, respectively.

Post-intervention Focus Groups

Focus groups were conducted after the 6-week follow-up session with the intervention participants (n=2, 11 participants) to explore their experiences with the program, the intervention impact, and further modifications needed for future programs. Qualitative content analysis revealed four themes 1) Intervention impact on participants, 2) Facilitators for program participation, 3) Barriers to listening device use, and 4) Plans for future studies (Table 5).

Firstly, participants discussed impact of the program on themselves, family members, and their community. Emergent subthemes included: hearing benefit, improved confidence in hearing care navigation, and increased awareness of available listening devices and hearing health. One participant noted,

> "The most important [change] is that I can hear things that I couldn't hear before. I've felt joy and hope … that I can hear anything I want to hear. I would recommend this program to anyone in my situation [with hearing loss]" *PHL 001*

Participants with hearing loss reported significant hearing benefit in many situations including social and religious gatherings and at work. These were situations in which they previously could not effectively hear CPs confirmed their partners' hearing benefit by noting reduced TV volume at home and improved ease when conversing with their partners. Furthermore, CPs noted their own change in attitudes when dealing with the residual frustrating situations due to their partner's hearing loss. In addition to the hearing benefit, participants expressed increased confidence in dealing with potential problems with their listening device and navigating the related hearing care system. Interestingly, participants discussed that the impact of the intervention was not solely limited to the older adults who participated in the program but rather, the impact also included their family and friends. One CP stated,

> "Now that this program exists [in our community], people around me who didn't have any thoughts [on hearing loss] are getting interested, talking about it, and asking me questions about it, so I get to answer their questions." *CP 002*

The community-delivered intervention has increased awareness of listening devices and hearing care among the broader social network of the participants.

Facilitators for program participation were discussed in the context of study enrollment and program components. Emergent subthemes were price, accessibility, face-to-face interaction, and group session. Participants reported that the affordability and accessibility of the program aided in their enrollment in the program. One older adult with hearing loss described the K-HEARS program that was offered in the community as a gateway to the standard hearing care that had been previously inaccessible.

> "[In order to get a hearing test], I have to make a trip to an ENT clinic. Here [through the K-HEARS program] I can just stop by and get my hearing tested. I will go to an ENT clinic if I find something's wrong." *CP 003*

In addition to the convenient location of the program, participants also appreciated accessibility to a reliable listening device provided through the program. Many participants

also appreciated the face-to-face interaction with the interventionist throughout the intervention, which allowed the participants to easily and efficiently learn how to use the new listening device. The group follow-up session was discussed as another component of the intervention that has enhanced their learning through open discussions and social support.

Given that the number of hours of listening device use varied among the participants, we extensively discussed barriers to listening device use. Emergent subthemes include shame, sound and physical discomfort, and forgetfulness. Some participants who used the listening device selectively identified shame as a barrier to device use. Participants were often self-conscious about other people noticing them wearing the device. For example, one participant noted,

> "I feel like the other person often feels that I'm being disrespectful or weird because I'm wearing this device." *PHL 007*

Participants were well-aware of the stigma of hearing loss in their community, and subsequently the presence of the listening device, that is associated with aging and disability. Younger participants with hearing loss tended to express more shame towards wearing a noticeable device in social situations. Discomfort in the context of long hours of device use and noise was also identified as a barrier. Participants who reported physical discomfort tried to maximize the benefit from the device by using the device only in situations where they deemed it important to hear. Device feedback and loud background noise were other contributing factors for limited device use. Participants noted that they had taken the device off in settings where device feedback arose or where background noise was overwhelming, and subsequently forgot to put the device back on later.

As for plans for future studies, participants discussed different ways to raise program awareness and expand the program. Firstly, use of resources at church such as the weekly Sunday newsletter was emphasized. Participants stated that an advertisement through different churches in KA community would be an effective and efficient way to reach out to more KA older adults with hearing loss considering high rates of church attendance among older KAs. The cost for participating in the program, source of funding, and reliable affiliation were identified as the most important information that needed to be stated clearly and explicitly on the flyer to attract more participants, provided that older KAs are typically wary of commercial flyers. Participants agreed that the program would benefit many older KAs in similar situations once the program can be advertised to older adults in the community. One older adult with hearing loss stated,

> "I hope this program can expand more. Have it be done more by the community, like welfare benefit, to reach out to the older population, including the older folks that live alone. I hope this can help more people." *CP 004*

Given that older KAs share similar experiences of hearing loss and barriers that could be addressed by a culturally competent intervention, the older KAs in our study group supported expansion of the program to help additional older KAs by reaching out to more churches and KA senior centers. Further suggestions included expanding the eligibility criteria (e.g. include younger adults and those without an identifiable CP).

Discussion

To our knowledge, this is the first study to describe the cultural adaptation of a community-based hearing care intervention for older KAs. The adapted intervention incorporating the first four stages of Barrera and Castro's cultural adaptation framework was well-accepted and feasible among the community-dwelling older KAs with hearing loss and their CPs.

The findings related to change in hearing handicap in our pilot trial demonstrated the potential impact of the adapted intervention on reducing hearing handicap. The improvement in mean scores in HHIE-S after the adapted intervention was comparable to changes in mean scores achieved with the original HEARS intervention and, most importantly, after standard-of-care hearing interventions including hearing aid fitting and cochlear implantation which range from 8 to 16 (Chisolm et al., 2007; Newman, Jacobson, Hug, Weinstein, & Malinoff, 1991; Vuorialho, Karinen, & Sorri, 2006). Further testing of the K- HEARS intervention is needed, including an appropriate control group to determine efficacy. At baseline, the measures in denial of hearing loss and negative associations with listening device use were higher among the KA study participants than the average scores from the previously published normative data of the Attitudes towards Loss of Hearing Questionnaire (ALHQ) (Saunders, Cienkowski, Forsline, & Fausti, 2005). There have been no previous studies in the literature exploring changes in scores of ALHQ after hearing treatment. In the current study, study participants demonstrated improved scores in most components of ALHQ including negative associations and negative coping strategies. In terms of social-emotional function and quality of life, the impact of the intervention on short-term outcomes was inconsistent as in previous studies (Acar, Yurekli, Babademez, Karabulut, & Karasen, 2011; Hickson, Meyer, Lovelock, Lampert, & Khan, 2014; Mulrow et al., 1990).

CPs were a vital component of the intervention where they systematically enhanced social support and allowed examination of the intervention's impact on third-party disability. Inclusion of family and friends has been an effective strategy utilized by many aural rehabilitation programs (Hawkins, 2005) and health interventions targeting older adults (Brown et al., 2002; Irene J. Kim, 2006; Whittemore, 2007). We found trends toward improved third-party disability, improved social-emotional function, and improved mental component of quality of life among CPs after the intervention. During post-intervention interviews, many CPs noted increased awareness of age-related hearing loss and the effectiveness of communication strategies at home. Increased understanding of their partner's hearing loss from the intervention may have changed their attitudes toward hearing loss from frustration to consideration. While the absence of a CP should not inhibit older adults with hearing loss from receiving hearing care, participation of family and friends in their aural rehabilitation process should be highly encouraged in the KA community.

K-HEARS was developed using a theory-driven model of cultural adaptation. Cultural adaptation has emerged as a promising intervention strategy in response to diversification of the American population and the growing demand to reach subcultural groups (Castro et al., 2010). Previously introduced interventions with cultural adaptation were effective in promoting many health behaviors and improving health disparities in diverse health conditions, including diabetes (Glazier, Bajcar, Kennie, & Willson, 2006; Hawthorne,

Robles, Cannings-John, & Edwards, 2010), mammography use (H. R. Han et al., 2009), and HIV/AIDS (Darbes, Crepaz, Lyles, Kennedy, & Rutherford, 2008). Adapted interventions that were built upon theoretical foundations, using both quantitative and qualitative efforts (e.g. needs assessments, focus groups, and pilot studies) to validate the cultural appropriateness and efficacy, were more effective than unadapted interventions (Darbes et al., 2008). Hearing loss and its treatments involve diverse cultural health beliefs and varying degree of stigma associated with aging and disability, particularly in older KAs (Choi et al., 2018). Systematic cultural adaptation could be an effective way to capture and address the culture-specific hearing care beliefs among ethnic minorities.

Shame, discomfort, and forgetfulness were identified as remaining barriers to device use during post-intervention focus groups. Hearing loss is an invisible disability that is rarely brought up by either patients or health providers in KA community (Choi et al., 2018). There is a need for collective efforts from both the health professionals and the KA community to support of the idea of seeking help for hearing loss and to support the use of listening devices. It is also important to understand that hearing loss is a chronic health condition requiring long-term rehabilitative process involving regular listening device use and coping strategies (Laplante-Lévesque, Hickson, & Worrall, 2010). Actively involving the older adults in intervention decision making process and enhancing the expected management may improve the intervention uptake and adherence as in many chronic conditions (Barlow, Wright, Sheasby, Turner, & Hainsworth, 2002).

There are several limitations to this study. First, our study was a preliminary pilot study with a small cohort of older adults. Inference testing or statistical comparisons were not performed. Future studies must include a larger number of participants and a control group to test the efficacy and effectiveness of the adapted intervention as part of the final trial of the cultural adaptation framework. Second, participants were recruited in partnership with a Korean church, limiting the generalizability of the results to participants recruited in other faith-based or non-faith based organizations. However, nearly 80% of KAs are estimated to attend church, and the church setting has been identified as an optimal environment facilitating participation in health-related activities among KAs (Jo, Maxwell, Yang, & Bastani, 2010; Juon, Kim, Shankar, & Han, 2004; Ma, Shive, Wang, & Tan, 2009). Study participants were required to involve CPs, which may have limited participation of the older KAs without identifiable CP, and therefore, at particular risk for experiencing negative social-emotional consequences of hearing loss. In this study, participants mostly had mild to moderate hearing loss and our results may not be representative of the results from the participants with severe or profound hearing loss. Finally, the intervention including provision of a listening device and the education sessions was delivered to all study participants at no cost as part of the research study. Program participation and satisfaction with the device may be different with varying costs for participation.

In summary, our study suggests that K-HEARS, encompassing culturally-adapted hearing counseling and an affordable listening device, is a feasible intervention for older KAs with hearing loss. This community-based hearing care model may be an effective way to address poor access to hearing care among other racial/ethnic minorities with language and cultural barriers. With the coming changes in the regulation of hearing aids and the creation of over-

the-counter hearing aids, models such as HEARS and K-HEARS are of particular importance in connecting older adults with the technology they need. The next step of research will need to include the final trial of the cultural adaptation framework to examine the efficacy and effectiveness of the adapted intervention, efforts to address the remaining barriers to listening device use, and to explore the sustainability and widespread implementation of a community-based intervention.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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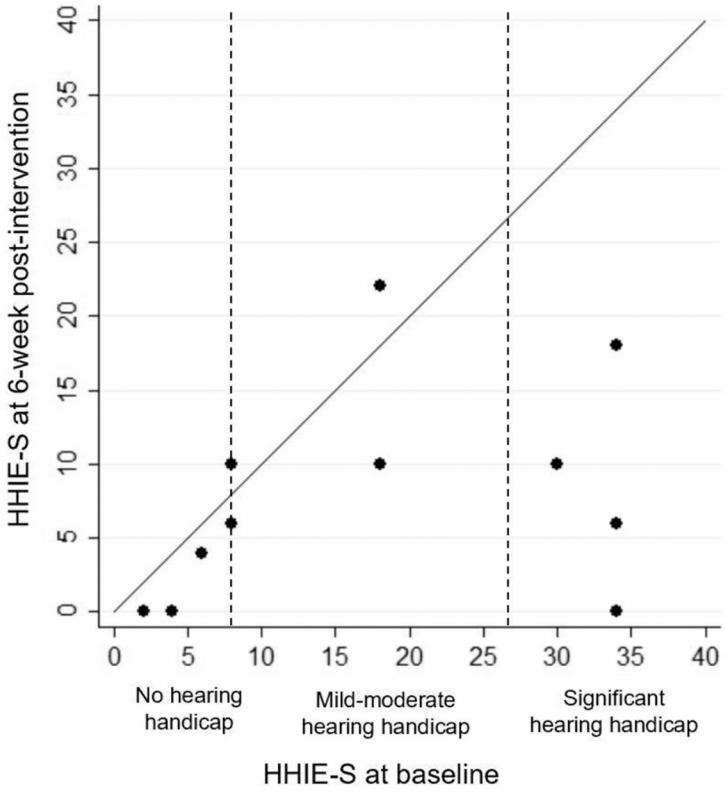

Figure 1.
Hearing Handicap Inventory for the Elderly (HHIE-S) scores at six weeks post-intervention versus baseline (n=15)

Table 1.

Stages in the Cultural Adaptation of the Hearing Intervention and Adaptation Activities

Stage	Adaptation Activities	Findings & Cultural Adaptation Components
Information gathering	Literature review	*Findings from literature review:* • Low rates of hearing aid use among Korean older adults • Barriers to hearing healthcare include stigma towards hearing aid use associated with aging and disability in addition to price, navigational difficulties, and language barrier • Previous community-based, culturally tailored interventions have been well-accepted and successful in promoting cardiovascular and mental health among older Korean American
	Focus groups	*Findings from focus groups (n=2, 11 participants):* • Participants lacked knowledge of available options to address their hearing loss • Participants were positive about a program delivered in their community by a bilingual interventionist and a listening device resembling a Bluetooth headset • Participants preferred group sessions over individual sessions • Displayed high levels of technology use and self-efficacy
Preliminary adaptation design	Preliminary changes to the intervention	• Staff: addition of bilingual staff and data collector • Recruitment: change in recruitment setting to a local Korean American church • Demographics: addition of relevant questions (years in US, language at home, etc) • Outcomes: addition of measures for psychosocial factors associated with hearing aid use (ALHQ) • Intervention form: addition of group follow-up session, shortening intervention length • Intervention content: addition of ethnic lifestyle elements during intervention such as incorporating Korean TV shows and music when practicing adjusting volume
	Intervention materials translation	• Training workbook, a complete reference manual, and quick tips book were functionally translated by bilingual staff
	Preserve core elements of original intervention	• Community-delivered approach • Emphasis on face-to-face interaction and self-efficacy • Integration of affordable hearing device • Integration of aural rehabilitation including communication strategies • Involvement of communication partners
Preliminary adaptation tests	Delivery of a preliminary version	• Trained interventionist delivered the preliminary version to 2 native healthcare professionals and 2 community experts (1 with hearing loss)
	Assessment of implementation difficulties, content/ activities, and satisfaction	*Findings from the case studies:* • Preliminary version was well-accepted without any significant difficulties noted with implementation or the program content • Participants expressed desire to learn more about level of their own hearing loss • Suggestions were made on cultural features (type of popular Korean TV shows and music, examples of role playing scripts)

Stage	Adaptation Activities	Findings & Cultural Adaptation Components
Adaptation refinement	Revision of intervention based on the feedback	• Addition of visual guide (speech banana audiogram with the participant's hearing screening result) • Enhancement of cultural values during role play of communication strategies
Cultural adaptation trial	Pilot trial of the revised intervention	• A pilot trial conducted to older Korean Americans with hearing loss (n=15) and their communication partners (n=15) with primary outcome measure in hearing handicap
	In-depth interviews of participants	• Focus groups conducted with intervention participants (n=2, 11 participants) to explore their experiences with the program, determine the intervention impact, and inform further modifications
	Final trial (to be completed)	• Final trial to test the effectiveness of the cultural adaptation in engaging participants and changing health outcomes. • Quantitative outcome research phase often involving two-armed studies with a control group

Table 2.

Characteristics of the Intervention delivered as the Final Stage of the Cultural Adaptation

	Intervention Content
30-min Screening [a] (P)	• Basic ear examination with otoscope • Audiometric screening with automated screening protocol in a quiet room (Tremetrics RA 300) • Key clinical history of ear and hearing that may require additional evaluation • Review limitations of hearing screening and personal sound amplifier products (PSAPs) used in the study (versus professionally-fit hearing aids)
1-hour Education (P and CP) [a]	*Device Provision & Orientation* • Introduction to PSAP device features. • User selects own device from two devices [b] • Listening device fitting • Hands-on demonstration and real-life functional practice based on daily use *Communication Education & Counseling* • Hearing loss basics on how hearing works and why communication strategies are needed • Mini-aural rehabilitation session with communication strategies and expectation management • Provision of take-home education materials including training workbook, complete reference manual, and quick tips book
Follow-up (P)	• Follow-up phone call from an interventionist within 5 days of intervention regarding any initial questions or difficulties with the listening device – Duration: 5-15 minutes • Follow-up group session for all participants with hearing loss after 2 weeks of intervention – Open-ended discussions starting with questions: What changes have you noticed since participating in the program? Have you encountered any issues or problems? – Duration: 30-45 minutes

P: Participants with hearing loss, CP: Communication Partners

[a] Screening session was followed by the education session in one-sitting

[b] Participants selected from two devices: the Sound World Solutions CS-50® (Park Ridge, IL; approximate retail price $350) or the Williams Sound Pocketalker Ultra Duo Pack® (Eden Prairie, MN; approximate retail price $120). The devices were selected by the medical and audiological team based on the quality of output, features, and price point. Devices were provided free-of-charge as part of the study.

Table 3.

Participants characteristics of the pilot trial (n=30)

Characteristics	Participants with HL (n=15)	Communication Partners (n=15)
Age, years (S.D.)	67.9 (8.1)	62.9 (11.6)
[Range]	[57-82]	[30-75]
Sex (%)		
Female	5 (33%)	13 (87%)
Education (%)		
Some college	6 (40%)	4 (36%)
Annual income, US Dollar (%)		
<$25,000	11 (73%)	8 (53%)
Insurance (%)		
Medicare/Medicaid	8 (53.3%)	9 (60.0%)
Other insurance	7 (46.7%)	6 (40.0%)
Period of residency in the US, years (S.D.)	27.1 (9.7)	27.1 (8.9)
[Range]	[9-40]	[9-40]
Age when first came to the US, years (S.D.)	41.5 (12.2)	36 (13.8)
[Range]	[22-64]	[3-61]
Language use at home[a] (%)		
Only Korean	13 (87%)	12 (80%)
More Korean than English	1 (7%)	3 (20%)
Both equally	1 (7%)	0 (0%)
Assessment of HL using speech-frequency pure-tone audiometer[b] (%)		
No hearing loss[c]	1 (6.7%)	-
Mild	7 (46.7%)	-
Moderate	7 (46.7%)	-
Self-reported trouble hearing[d]		
Good	2 (13%)	-
A little trouble	5 (33%)	-
Moderate	4 (27%)	-
A lot of trouble	4 (27%)	-
Ever received hearing exam (%)	9 (60%)	-
Ever hearing aid user (%)	3 (20%)	-
Current hearing aid user (%)	0 (0%)	-
Relationship with participant with HL (%)		
Spouse	-	10 (67%)
Child/sibling	-	3 (20%)
Parishioner	-	2 (13%)

HL=Hearing Loss

[a] Participants were asked, “what language(s) do you usually speak at home? Only Korean, more Korean than English, both equally, more English than Korean, or only English?”

[b] Audiometry-measured hearing status is defined by a speech-frequency pure tone average of hearing thresholds at 1, 2, and 4 kHz in the better-hearing ear (normal PTA <25dB, mild hearing loss 25-39dB, moderate or greater ≥ 40dB).

[c] One older adult with unilateral severe hearing loss included in the study

[d] Participants were asked, “Which statement best describes your hearing (without a hearing aid)? Would you say your hearing is excellent, good, that you have a little trouble, moderate trouble, a lot of trouble, or are you deaf?”

Table 4.

Outcomes at Baseline and 6-week follow-up

Measures (score range)	Participants with HL (n=15)			Communication Partners (n=15)		
	Baseline Mean (SD)	6-week follow-up Mean (SD	Mean Change	Baseline	6-week follow-up	Mean Change
Communication Function						
HHIE-S (0-40)	15.7 (13.1)	6.4 (7.0)	−9.3	-	-	-
Attitudes towards Loss of Hearing (ALHQ)						
Denial of Hearing Loss (0-5)	3 (0.7)	3.1 (0.5)	0.1	-	-	-
Negative Associations (0-5)	2.5 (0.8)	1.8 (0.8)	−0.7	-	-	-
Negative Coping Strategies (0-5)	2.6 (0.8)	2.2 (0.6)	−0.4	-	-	-
Manual Dexterity and Vision (0-5)	2.5 (1.0)	2.1 (0.8)	−0.4	-	-	-
Hearing-related Esteem (0-5)	3.3 (0.7)	3.8 (0.8)	0.5 *	-	-	-
Third-party Disability (SOS-HEAR)						
SOS-HEAR Total Score (0-5)	-	-	-	2.0 (1.5)	1.7 (1.2)	−0.3
Social-Emotional Function						
UCLA Loneliness Scale (20-80)	31.8 (12.7)	32.7 (13.5)	0.9	31.6 (9.5)	28.6 (8.3)	−3.0
PHQ9 (0-30)	7.9 (6.5)	7.6 (7.8)	−0.3	4.7 (3.4)	3.0 (3.5)	−1.7
Quality of Life						
SF-12 Physical Component (0-100)	40.5 (10.6)	40.0 (11.8)	−0.5 *	43.1 (11.7)	42.3 (11.4)	−0.8 *
SF-12 Mental Component (0-100)	45.4 (12.2)	49.6 (11.1)	4.2 *	47.5 (10.2)	51.8 (8.4)	3.8 *

* Measures with high scores representing better function

Table 5.

Post-intervention Focus Group Themes, Subthemes, and Supporting Quotes

Subthemes	Sample Quotes
Theme 1: Intervention Impact on Participants	
Hearing Benefit	[Before the program] I couldn't hear well at work when the customers say their phone numbers. Now I try to wear this device at work as much as possible. *PHL 001*
	One time during sermon, I experimented taking off the amplification device to see the difference. It's definitely better to keep the device on. I am very satisfied. I used to not to be able to hear the sermon very well. *PHL 002*
	[Before participating in the program] I only guessed and thought to myself that [my partner] had hearing problems. Now I clearly know how severe his hearing loss is, so I try to enunciate, speak more clearly and slowly, and make sure that he understands… I've become more considerate. I used to grumble over thinking to myself, 'wow why can't he understand this' but now I don't feel that way anymore. *CP 001*
Confidence in hearing health navigation	I've earned this basic knowledge in listening device [from the program]. Since I've used it once, I have confidence. … I can ask appropriate questions if I were to buy another one. The experience gave me confidence. *PHL 002*
	I don't worry much about [future] problems [with follow-up care or the device], I can always come back here [to the K-HEARS program for those problems]. *PHL 002*
Increased awareness of listening device and hearing health	None of us knew that this thing called an amplification device existed. We only knew about hearing aids. [Through the K-HEARS program], we learned about the device, how to use the device, and actually have been using the device. I'm glad that I didn't miss this opportunity to know about this useful device. *CP 004*
	Many of my friends do have hearing difficulties but they live on as if nothing's wrong. … Now those friends want me to contact the program staff so they can enroll in the program. *CP 002*
Theme 2: Facilitators for Program Participation	
Price	I knew that my hearing was bad enough to have to use hearing aids. But I didn't have [money] to purchase hearing aids that were thousands of dollars. I came here [to participate in the program] for a listening device. *PHL 001*
	Since my partner got older, he has been saying that he can't hear well. We were going to get him tested anyways and I heard that there was a free hearing screening. We thought why not as it's free. *CP 004*
Accessibility	I liked that [the education sessions] were done at church. I didn't have to make any extra trips as they were scheduled before or after mass on Sundays. *PHL 001*
	I wouldn't know who to trust if I were to buy an amplification device from the market myself. I'm sure there are many types of amplification devices and I can't try and wear every single one out there. I could use this amplification device because I got it from the program. I would be afraid if I had to choose one from the market myself. *PHL 002*
Face-to-face interaction	I don't know how I feel about [learning how to use the amplification device] myself. But [the interventionist] explained and set up everything for us in-person [in this program] … I feel more comfortable [about using the device]. *PHL 002*
	In fact, it is a lot easier for us to listen and see [how to use an amplification device] than trying to read a book. *CP 003*
Group Session	Only when you're starving do you understand others' hunger. Similarly, unless you are hard of hearing, you won't understand the pain of someone that is hard of hearing. When I first met everyone [at the group session] and even now, I feel that [we understand each other]. *PHL 001*
	[During the group session], I could listen to other people's stories and see everybody's different circumstances. Since some people had worse hearing than others, I learned what it would be like to be in their situation and what I need to do if my hearing ever got that bad. The group session was helpful because I could plan out what to do in the future and learn from others. *PHL*
Theme 3:	**Barriers to Listening Device Use**
Shame	During mass or conversations, I need to say 'This is a listening device,' because they're going to think 'Why is that person wearing that?' I actually feel more intimidated and shrink away when I'm wearing this device, since I need to tell people that my hearing has gotten so bad that I need to wear this now. *PHL 001*
Discomfort	Most people don't acknowledge that I've gotten older, but when I'm wearing this device they comment, 'You're already wearing that? *PHL 003* I can't wear this all day. I don't know if it's the shape of my ears, but it's very uncomfortable to wear it and I've only worn it up to 7 hours. *PHL 001*
	If the device is tightly on, it's okay. But if something touches it, like when I'm driving and the window is close to the device, there's all these noises. So I take it off. *PHL 004*
Forgetfulness	When I'm working, this device can fall out. So I don't wear it at work. Since I shouldn't lose it, I sometimes just leave it at home or put it in my bag and only wear it when I need to. *PHL 007*

Subthemes	Sample Quotes
Theme 4:	**Plans for Future Studies**
Raise program awareness	You need to be able to advertise. If you include a pamphlet in the Sunday bulletin [at the church] about what an amplification device is, everybody can see it. Then, you can put information about when you will be doing this program and who to contact. Having a pamphlet would be the best. *PHL 002*
	Everything in this project costs money, right? Even [the amplification device] is expensive. So even though it was explained that this program was for research, I was wondering if this was a ploy by the amplification device company to sell their product. I'm sure many people had the same thought and didn't participate in this even if they wanted to." *CP 002*
Expansion of the program	There are a lot of older people that are hard of hearing, but there are also a fair amount of younger people with the same problems. Even in my case, my hearing problem started from a long time ago. *PHL 001*