

Self-Efficacy for Health-Related Behaviors Among Deaf Adults

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Abstract: The purpose of this quasi-experimental, pre-post-test study was to test the effectiveness of the Deaf Heart Health Intervention (DHHI) in increasing self-efficacy for health-related behaviors among culturally deaf adults. The DHHI targets modifiable risk factors for cardiovascular disease. A sample of 84 participants completed time-1 and time-2 data collection. The sign language version of the Self-Rated Abilities Scale for Health Practices (SRAHP) was used to measure self-efficacy for nutrition, psychological well-being/stress management, physical activity/exercise, and responsible health practices. Total self-efficacy scores were significantly higher in the intervention group than in the comparison group at time-2, controlling for scores at baseline ($F [1, 81] = 26.02, p < .001$). Results support the development of interventions specifically tailored for culturally deaf adults to increase their self-efficacy for health behaviors. © 2007 Wiley Periodicals, Inc. *Res Nurs Health* 30:185–192, 2007

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The purpose of this study was to test the effectiveness of the Deaf Heart Health Intervention (DHHI) in increasing self-efficacy for health behaviors related to risk for cardiovascular disease (CVD) among culturally deaf adults. There are an estimated two million adults who are members of a deaf cultural community. Culturally deaf adults typically experience significant hearing loss at an early age, communicate primarily through sign language in adulthood, and participate in deaf community activities (Dolnick, 1993; Stebnicki & Coeling, 1999). American Sign Language (ASL) is the primary language for culturally deaf communities who are often considered a linguistic minority. Adults with hearing loss beginning in adulthood (“late-deafened” or hard-of-hearing)

face communication issues different from culturally deaf adults. Late-deafened and hard-of-hearing adults typically continue to rely on spoken language. They are usually literate in their first language and rarely learn sign language.

CVD remains a leading cause of premature death and disability in the United States (Centers for Disease Control and Prevention [CDC], 2005a). There are no data specifically about health status or CVD, in particular, among culturally deaf adults. People with hearing loss are included together, with no distinction between culturally deaf, late-deafened, or hard-of-hearing people, in health statistics of people with physical disabilities. In general, people with disabilities are at greater risk for CVD than people without

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disabilities. For example, 19% of people with disabilities have high total blood cholesterol, compared to 17% of people without disabilities (CDC, 2005b). In addition, many culturally deaf adults are from ethnic minority groups who are known to have greater CVD risk than White non-Hispanic populations. For example, CVD mortality rates are consistently higher among Black Americans than White Americans (CDC, 2005a) and many deaf persons are Black (Gallaudet Research Institute, 2005).

There have been extensive efforts to promote health behaviors to decrease modifiable risks for CVD in varied populations specifically related to heart-healthy diets, physical activity, and stress management. Deaf adults may lack the prerequisite behavioral capabilities (knowledge and skills) for achieving high levels of self-efficacy for health-related behaviors to decrease their risk for CVD (Advocate Health Care [AHC], & Sinai Health System [SHS], 2004; Jones, Renger, & Firestone, 2005), yet no published reports exist of interventions specifically targeting self-efficacy for heart-health behaviors among culturally deaf adults.

AHC and SHS (2004) collaborated to survey 203 culturally deaf adults in the Chicago area about their health status, health care experiences, communication styles, barriers to accessing health care and health knowledge and behaviors. Overall, about 44% of respondents said they were overweight. Participants were asked how many days per week they exercised at least 20 minutes. AHC participants averaged 3.4 days and SHS participants averaged 1 day per week. Regarding cholesterol, 31% of the total sample said they had been told that they had high cholesterol, but only 38% could correctly define the term *cholesterol* and many participants (42% at SHS and 12% at AHC) were unable to name any ways to control blood cholesterol levels. Many could not identify any risk factors for a heart attack or stroke (47% at SHS and 16% at AHC). The researchers concluded that deaf participants who were more educated, reported a higher household income, and who were non-Hispanic and White had higher levels of knowledge than their less educated, poorer, and non-White counterparts consistent with correlates of poor health in other groups. In addition, the researchers noted that the deaf adults in their study were receiving health care from deaf-friendly organizations and that the health knowledge and health status of deaf adults who have less access to health information, are likely worse than their study sample.

Jones et al. (2005) reported results of interviews (in sign language) with 111 culturally deaf adults regarding CVD risk factors. Nearly half (49%) reported diets that were moderate-high fat, and 43% were overweight (BMI > 25) or obese. The majority (54%) said they exercised less than three times each week. In response to questions about how often they had felt angry or frustrated in the last month (to assess stress), more than half said "some of the time," and 13% said "most of the time." Most (82%) thought their cholesterol was normal because no one had told them it was high. Yet, the data collectors were unsure whether the participants were familiar with the term *cholesterol*. Results of this community analysis provided the foundation for developing and pilot testing the DHHI, which is the only intervention we are aware of specifically designed to lower culturally deaf adults' CVD risk factors.

BARRIERS TO ACCESSING HEALTH INFORMATION IN DEAF ADULTS

For many culturally deaf adults, English functions as a second language, and for a variety of reasons, the average reading level of many culturally deaf adults is at the third to fourth grade level. The most recent study of literacy among deaf and hard-of-hearing students found that the median reading comprehension subtest scores for 17–18-year-old deaf/hard-of-hearing students corresponded with a fourth grade level for hearing students (Gallaudet Research Institute, 1996; Holt, Traxler, & Allen, 1997). Many culturally deaf adults are, therefore, virtually unable to access information available to hearing adults through sound or written language. With television, radio, computers, newspapers, and health professionals relying on spoken or written English, a limited number of culturally deaf individuals can benefit from health-related information as typically provided. Closed captioning may be useful for late-deafened persons or for the minority of truly bilingual (Sign/English) deaf adults. Basic health information and skills are prerequisite to gaining the self-efficacy (confidence) necessary to enact behaviors linked to positive health (Baranowski, Perry, & Parcel, 2002). In addition to communication barriers, culturally deaf adults' lower average socioeconomic status (Olkin, Abrams, Preston, & Kirshbaum, 2006) and membership in ethnic minority groups may compound their risk for poor health outcomes (Adler & Newman, 2002).

Deaf adults are more often unemployed or underemployed and often have less education than

their hearing counterparts (McCrone, 1990; Olkin et al., 2006). The ethnic composition of the culturally deaf community reflects the ethnic composition of the general public (Foster & Kinuthia, 2003), however, most deaf adults' primary language is ASL, rather than the language of their ethnic group. Despite the numerous risk factors for poor health outcomes, culturally deaf adults, like other groups with physical disabilities or language barriers, are rarely included in health promotion research.

SELF-EFFICACY FOR HEALTH-RELATED BEHAVIORS

Defined as the belief in one's ability to perform a certain task, self-efficacy is a key construct in understanding and modifying health behaviors (Bandura, 1986, 1995). Self-efficacy is a major factor in decisions to adopt healthy behaviors among people with varying health states, ages, and ethnic groups (Maase & Anderson, 2003; Resnick, 1998; Sohng, Sohng, & Yeom, 2002; Taylor, 2000). Yet self-efficacy may vary with the specific health behavior in question (Faryna & Morales, 2000; Hickey, Owen, & Froman, 1992; Horan, Kim, Gendler, Froman, & Patel, 1998). Self-efficacy in engaging in one health behavior does not guarantee self-efficacy when engaging in another. For example, the skills needed to manage stress (more psychological) are different from those needed to engage in exercise (more physical). A high degree of self-efficacy for a specific health behavior correlates strongly with actual enactment of that behavior (Yarcheski, Mahon, Yarcheski, & Cannella, 2004).

Two studies of health-related self-efficacy among adults with physical disabilities provided data relevant for comparison to culturally deaf adults' scores for health-related self-efficacy. Stuijbergen and Becker (1994) included measures of self-efficacy for specific health behaviors in a sample of 117 adults with 22 disabilities, 10 of whom were hearing-impaired. Scores of the hearing-impaired participants were not reported separately. The mean age of the sample was 44 years (range 20–74). The sample included approximately equal numbers of men and women; 85% had at least some college education. The majority (88%) were Anglo, and the ethnicity of the remaining subjects was not reported. The mean Self-Rated Abilities Scale for Health Practices (SRAHP) score was 79.87 (range 41–112, $SD = 7.03$). In addition, self-efficacy scores for

specific health behaviors were highly correlated with scores for actual health behaviors. The researchers concluded that interventions designed to strengthen perceptions of self-efficacy could be successful in promoting higher rates of health behaviors in nutrition and exercise among persons with disabilities.

Tate et al. (2002) included assessment of health-related self-efficacy in their study to evaluate the effectiveness of a wellness program for men and women with spinal cord injury ($n = 68$ at baseline). Forty-four completed post-testing: 23 in the intervention group and 21 in the control group. The mean age of the sample was 47 years (range 22–80); the majority were men (68%) and White (93%). A minority (23%) had high school education, 40% had some college education, and 37% were college graduates. The intervention was a series of six 4-hour workshop sessions. The SRAHP was used as the pre and post-test measure of health-related self-efficacy. The mean score at baseline was 88 ($SD = 17.8$) for the intervention group and 92.8 ($SD = 12.7$) for the control group. There was a significant improvement in the SRAHP scores for the intervention group (increased to a mean of 95.4; $p = .03$), while the control group scores showed no significant change ($p = .88$).

THE DEAF HEART HEALTH INTERVENTION

The DHHI was designed specifically for implementation with culturally deaf adults whose preferred communication was in sign language (Jones et al., 2005). Its health content draws heavily from recommendations from the American Heart Association (2006b) for primary prevention of CVD. The teaching learning strategies incorporated in the DHHI were based on principles of health behavior change in social cognitive theory (Bandura, 1986, 1995) and research on preferred teaching-learning strategies among culturally deaf adults (Lang, McKee, & Conner, 1993; Lang, Stinson, Basile, Kavanagh, & Liu, 1999). Participants attended class once each week for 2 hours over 8 weeks. Classes were highly interactive and were taught entirely in sign language by a trained deaf lay heart-health teacher. The training for the deaf DHHI teacher consisted of 12 hours of didactic instruction about modifiable CVD risk factors and principles of health behavior change, followed by supervised teaching of the entire 16 hour DHHI with three deaf volunteers.

The DHHI begins with discussion of heart disease, CVD risk factors, and discussion of reasons for joining the classes and goals for participation. Activities to increase self-efficacy for heart-healthy eating include a presentation about the food pyramid (knowledge building), practice in planning heart-healthy daily menus and reading food labels (skill building), and discussing strategies for overcoming barriers to healthy eating (problem solving). Activities to strengthen self-efficacy for exercise and physical activity include information about safety during exercise and physical activity (American Heart Association, 2006a), practice counting heart-rate and discussion about overcoming barriers to exercise and physical activity. Activities related to stress and stress management include discussion of the effects of stress on health, practice with guided relaxation using a lava lamp, and discussions about different stress management strategies. The final class focuses on celebrating progress and planning strategies for maintaining health behaviors over time. The study hypothesis was that culturally deaf adults who receive the DHHI would demonstrate greater self-efficacy for targeted health-related behaviors than deaf adults who did not receive the DHHI.

METHOD

We used a quasi-experimental, pre-post-test design. Participants were recruited through networking within the deaf community and advertising on a web site frequented by deaf individuals. A sample of 105 deaf adults was recruited in Phoenix and Tucson, Arizona. The 84 participants who completed both time-1 and time-2 data collection included more women (58%) than men, and had a median education level of high school and a mean age of 51 years (range 18–85, $SD = 18.34$). There was a significant difference between the intervention and comparison groups in ethnic composition (composition ($\chi^2[1, N=84] = 8.17, p = .004$), with more participants in the intervention group (37%) who were members of ethnic minorities (mainly Mexican-American) than in the comparison group (8%). American Sign Language is used throughout the deaf community, regardless of ethnic or language background. The mean SRAHP scores for deaf participants from ethnic minorities were lower (71.9, $SD = 21.3$) than the mean scores of the White/non-Hispanic (81.5, $SD = 15.0$) deaf participants, but the differences did not reach statistical significance.

The intervention group in Tucson received the 8-week (16 hours) DHHI, and the Phoenix

comparison group received an alternative treatment of 16 hours of social activities, such as movies, game nights, and potluck dinners over 8 weeks. Both the DHHI and the social activities were conducted in small group meetings, in cohorts of 5–10 persons, at locations in the community.

During the study, the PI visited selected classes to ensure fidelity in conducting the DHHI. The DHHI teacher completed evaluation forms after each class, reporting time spent on each topic (dose), and any deviation from the class plans. The social activities for the comparison group were designed to enhance their interest in continued participation in the study and control for the Hawthorne effect by engaging participants in activities unlikely to affect their heart health behaviors over the course of the study.

Participants in Tucson and Phoenix were not randomly assigned to intervention versus comparison groups because the deaf community in each city is relatively small and close-knit. Cross-talk would probably occur between deaf adults assigned to different treatment groups within the same city. Tucson was selected as the site for conducting the intervention group because the intervention group required more intensive supervision than the comparison group, and the majority of the research team resided in Tucson.

Sample

Selection criteria included: (a) 18 years or older and (b) self-identified as a member of deaf culture. Persons under 18 years of age were not eligible for participation because the content and teaching strategies of the intervention were designed for adults. Persons who had a prior diagnosis of CVD were disqualified for participation because the DHHI is a primary prevention intervention. Participants in the comparison group were invited to free presentations about heart-health at the conclusion of the study. The study was approved by the University of Arizona Institutional Review Board for Protection of Human Subjects prior to subject recruitment. The consent form was translated into ASL, presented to potential participants on videotape, and any questions were answered in sign language as part of the consenting procedure.

Instruments and Procedures

Self-efficacy for the targeted health behaviors was measured with the SRAHP (Becker, Stuijbergen,

Oh, & Hall, 1993; Stuijbergen & Becker, 1994). The SRAHP is a 28-item self-report questionnaire designed to measure self-efficacy in the areas of nutrition, psychological well-being/stress management, physical activity/exercise, and responsible health practices. Individuals are asked to rate their ability to perform a health behavior on a five-point scale from 0 (*not at all*) to 4 (*completely*). The stem for each item is "I am able to..." The Cronbach's alpha for the total scale was .94 in two samples, totaling 298 subjects, and 2-week test-retest reliability for a sample of 70 students was $r = .70$.

The Nutrition Subscale has seven items to measure beliefs about ability to perform practices in nutrition. The Psychological Well-Being (Stress Management) Subscale has seven items to measure psychological well-being. These questions correspond to stress management skills taught in many stress management classes, such as the DHHI. For example, one question on the psychological well-being scale asks how confident the individual is that he/she can "change things in my life to reduce my stress" or "figure out things I can do to help me relax," and "get help from others when I need it." The Physical Activity Subscale has seven items to measure beliefs about ability to perform physical activity/exercise. The Responsible Health Practices Subscale has seven items about the individual's confidence in interacting effectively with health providers: for example, "I am able to find a doctor or nurse who gives me good advice about how to stay healthy." Although this last subscale was not specifically relevant to the targeted modifiable CVD risk factors, it was administered along with the other items to enable us to make comparisons to total SRAHP scores from other study samples.

The SRAHP scale was previously used with a sample of 117 adults with disabilities, including 10 hearing-impaired persons. The original written English SRAHP was translated into ASL on videotape (Jones & Kay, 1992; Jones, Lee, Phillips, Zhang, & Jaciedo, 2001; Jones, Mallinson, Phillips, & Kang, 2006) and administered to 24 adults who were bilingual in English and ASL prior to use in pilot testing the DHHI. The correlation between total scores on the original written English SRAHP and the signed-SRAHP was excellent ($r = .92$), and internal consistency was high (Cronbach's alpha of .91 and .90, respectively), supporting the comparability of the written English and signed SRAHP. We assessed the psychometric soundness of the signed-SRAHP with the larger sample of deaf participants ($n = 105$) before proceeding to

analyze scores. The internal consistency remained high (Cronbach's alpha = .92) and item-total correlations ranged from .39 to .79.

Data Analysis

Data were analyzed using SPSS 12.0. Chi-square was used to assess demographic differences between the intervention and comparison groups. *T*-tests were performed to identify differences in self-efficacy scores at baseline between the intervention and comparison groups. ANCOVA was used to control for initial difference on self-efficacy scores between the intervention and comparison groups and to test the effectiveness of the DHHI in increasing self-efficacy for targeted health-related behaviors. Statistical significance was set at a *p* value < .05 for a two-tailed test.

RESULTS

A sample of 105 deaf adults was recruited in Southern Arizona for participation in this study: 41 in the Tucson intervention group and 64 in the Phoenix comparison group at baseline (Time 1). Eighty-four participants completed data collection at time 2 (Table 1): 32 from the intervention group and 52 from the comparison group, representing an 80% return rate at time 2 or, conversely, a 20% attrition rate for time 2 data collection. Only participants who completed both time-1 and time-2 data collection were included in data analysis to evaluate the effectiveness of the DHHI in increasing self efficacy for health-related behaviors.

The hypothesis was supported. The mean total SRAHP score for the total sample ($n = 84$) was 77.87 (range 38–107, $SD = 17.85$) at time 1. SRAHP scores of total and of each subscale at time 1 were significantly higher in the comparison group ($p < .05$) than in the intervention group. Therefore, ANCOVA was used to test the effectiveness of the DHHI controlling for self-efficacy score at time 1. Assumptions of ANCOVA were met. Total self-efficacy scores were significantly higher in the intervention group than in the comparison group after the DHHI, controlling for the total self-efficacy score at baseline ($F [1,81] = 26.02, p < .05$). Scores of each subscale were significantly higher in the intervention group than in the comparison group at time 2, controlling for scores of self-efficacy at baseline: the nutrition subscale ($F [1,81] = 42.51, p < .05$),

Table 1. Demographic Characteristics of Participants

Variable	Intervention Group (<i>n</i> = 32)	Comparison Group (<i>n</i> = 52)
Age		
<i>M</i> ± <i>SD</i> (range)	51.3 ± 15.4 (18–83)	50.6 ± 20.1 (22–85)
Education		
<i>M</i> ± <i>SD</i> (range)	11.8 ± 2.9 (5–18)	11.9 ± 3.5 (4–20)
Sex		
Men	14 (43.8%)	21 (40.4%)
Women	18 (57.2%)	31 (59.6%)
Ethnicity		
White (NH*)	20 (62.5%)	45 (86.5%)
Hispanic (MA**)	10 (31.3%)	2 (3.8%)
African American	0 (0.0%)	2 (3.8%)
Other	2 (6.2%)	2 (3.8%)
Missing	0	1 (2.1%)
Living situation		
Married/partnered	15 (46.9%)	17 (32.7%)
Single	16 (50.0%)	34 (65.4%)
Missing	1 (3.1%)	1 (1.9%)

NH* = Non-Hispanic; MA** = Mexican American.

the psychological well-being/stress management subscale ($F [1,81] = 9.86, p < .05$), the physical activity/exercise subscale ($F [1,81] = 29.06, p < .05$), and the responsible health practices subscale ($F [1,81] = 12.90, p < .05$). SRAHP scores in the intervention and comparison group at both time 1 and time 2 are presented in Table 2.

DISCUSSION

A comparison of self-efficacy scores of deaf participants in our study with other research

suggests that deaf adults may have lower levels of self-efficacy for health behaviors than other groups. The mean SRAHP scores of the total DHHI sample were lower at baseline than mean SRAHP scores of adults with physical disabilities in two other studies (Stuifbergen & Becker, 1994; Tate et al., 2002). The mean total SRAHP score in the Stuifbergen and Becker study of adults with diverse physical disabilities ($n = 117$) was 79.87 (range 41–112, $SD = 7.03$), and the mean scores in the Tate et al. sample ($n = 68$) of adults with spinal cord injuries was 88 at baseline ($SD = 13$) and 92 ($SD = 18$) after an intervention.

Table 2. The Self-Rated Abilities Scale for Health Practices: Intervention Versus Comparison Groups

	Pre-Test		Post-Test	
	<i>M</i> (<i>SD</i>)	Range	<i>M</i> * (<i>SE</i>)	Range
Intervention group (<i>n</i> = 32)				
Total	65.85 (18.06)	38–99	83.90 (2.17)	59–104
Nutrition	16.34 (5.60)	5–26	22.00 (0.58)	12–26
Psychological well-being	17.23 (5.01)	4–26	20.55 (0.69)	10–27
Physical activity	13.89 (7.13)	2–26	20.26 (0.79)	9–27
Responsible health practices	18.39 (4.76)	4–27	20.84 (0.71)	9–27
Comparison group (<i>n</i> = 52)				
Total	85.27 (13.20)	59–107	80.78 (1.64)	60–112
Nutrition	20.89 (3.84)	12–28	19.94 (0.44)	12–28
Psychological well-being	20.83 (3.89)	12–28	20.29 (0.53)	13–28
Physical activity	21.00 (5.53)	5–28	20.07 (4.86)	7–28
Responsible health practices	22.55 (4.07)	14–28	21.71 (0.54)	13–28

*M** = Corrected Mean.

The mean score of the total sample of deaf adults ($n = 84$) was lower at baseline in the DHHI study (77.87, range 38–107, $SD = 17.85$). After receiving the DHHI, the intervention group means total scores were increased to 83.90, while the mean total scores of the DHHI comparison group remained virtually unchanged at 80.78.

Limitations of this study include a relatively small sample of culturally deaf adults and non-randomized assignment to groups, precluding meaningful analysis of interactions between multiple demographic characteristics (such as ethnicity and age) and SRAHP scores. Results support our hypothesis that the DHHI is effective in increasing Deaf adults' self-efficacy for health behaviors to improve modifiable risk factors for CVD.

CONCLUSIONS

The DHHI was effective in increasing culturally deaf adults self-efficacy for targeted health behaviors related to modifiable CVD risk factors. A clinical trial of the DHHI will be necessary to evaluate the theoretical correlations between self-efficacy and targeted behaviors, and the effectiveness of the DHHI in decreasing risk for CVD among culturally deaf adults. Further study also is needed to learn more about the relationships among ethnicity, socioeconomic status, health-related self-efficacy, and health behaviors in culturally deaf communities.

The DHHI represents synthesis of cultural competency and scientific evidence to create an effective theory-based intervention for an underserved population. However, the difficulty experienced by culturally deaf adults in accessing health-related information (Barnett, 2002), deficits in health knowledge (Steinberg, Wiggins, Barmada, & Sullivan, 2002), and vulnerability to poor health outcomes are apparent in many other areas: breast cancer education (Sadler et al., 2001), maternity services (Underwood, 2004), mental health services (Munro-Ludders, Simpatico, & Zvetina, 2004), prostate and testicular cancer screening (Folkins et al., 2005), and end of life care (Allen, Meyers, Sullivan, & Sullivan, 2002). The DHHI prototype could be used in designing interventions targeting other urgent health issues, and advancing the national health agenda.

The DHHI supports the National Institute of Nursing Strategic Plan (2006) for research (a) focusing on risk reduction (b) eliminating health disparities (c) using community-based

approaches to facilitate risk reduction and (d) behavior interventions to achieve biological outcomes. However, a great deal more effort will be necessary to eliminate disparities in health care for culturally deaf Americans.

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