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Evaluating a Skin Cancer Education Program for the Deaf Community

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Abstract

Skin cancer is the most common, preventable, and treatable cancer, so public education has been a priority. Unfortunately, for the Deaf community, most skin cancer information is difficult to access, so tailored approaches are needed. Participants ($N = 136$) were randomly assigned to view either a skin cancer education video in American Sign Language (ASL) ($n = 75$) or an alternate video ($n = 61$). All participants completed skin cancer knowledge questionnaires at baseline, immediately post-intervention, and two-months post-intervention. Control group participants could then transfer to the experimental condition, using their two-month follow-up data as their baseline. Participants who saw the skin cancer video gained significantly more knowledge than control participants, demonstrating the video's effectiveness in increasing skin cancer control knowledge. There was no difference between the original experimental group and the delayed intervention group on knowledge gains.

MeSH

Deaf community; Education; Prevention; Skin cancer

Introduction

Skin cancer, a disease in which malignant cancer cells are found in the outer layers of the skin, is the most common type of cancer, accounting for 41% of all cancers and affecting over one million Americans every year [1]. There are three types of skin cancer: basal cell carcinoma, squamous cell carcinoma, and melanoma. Basal and squamous cell carcinomas are the most commonly diagnosed skin cancers and are so rarely fatal that they are not included in tumor registries. However, both of these cancers and their surgical treatment can cause disfigurement. Malignant melanoma, in contrast, while less common, is among the

cancers with increasing incidence and most likely to be fatal if not treated before metastasis [2]. All three forms of skin cancer can be effectively prevented by reducing the skin's exposure to the sun and effectively treated when detected early. In addition, skin cancers have well established, visible early warning signs the public can learn to identify. These characteristics make skin cancer education programs of great value in cancer control efforts.

While 'deaf' is a medical diagnosis and an audiologic classification, 'Deaf' with a capital "D" is used to designate a social group with its own unique culture, beliefs, practices, and language, American Sign Language [ASL] [3]. Generally, those who self-identify as culturally Deaf experienced hearing loss before the age of three and use ASL as their preferred mode of communication [4]. While the medical community views deafness from the perspective of a disability, the Deaf community regards it as a natural characteristic [3].

Approximately 20 million people in America have some form of hearing loss, with about 1.2 million being completely without hearing [5]. The exact size of the Deaf Community is unknown, but it is estimated to be between 550,000 and one million adults in the United States and Canada [6]. The Deaf community is at risk for health disparities because they do not have the same access to health information and care as those with normal hearing. For example, research has shown that Deaf patients have a difficult time properly identifying and describing medical terms [5]. With limited access to family conversations, the media, and properly adapted educational materials, many Deaf Americans experience information gaps that can compromise their health status and care [7]. Better-aligned health education materials are necessary to enhance access to health-promoting information. Previous studies have found that members of the Deaf community believe that educational materials need to be culturally and linguistically aligned if they are to address optimally the health disparities pervasive in the Deaf community [8]. Other studies have shown that the mode by which health care information reaches the Deaf community is key to the receipt of information and that programs should be presented in ASL with open captioning and graphics [9]. The present study used a randomized controlled trial to evaluate a skin cancer educational video in ASL developed specifically for the Deaf community.

Hypotheses

It was predicted that participants who were exposed to the skin cancer video (*Be Smart, Beat Skin Cancer*) would show greater immediate positive change in skin cancer knowledge than the control group. It was also predicted that those in the experimental condition would demonstrate significantly greater skin cancer knowledge two months post-intervention, compared to the control group.

Methods

Eligibility Criteria, Recruitment Strategies, and Consenting Process

Men and women who were at least 18 years of age, had at least modest proficiency in American Sign Language, and self-identified as members of the Deaf community were eligible for this study. Participants were recruited via an IRB-approved flyer and snowball sampling strategies [10] that included personal hand-offs and emails, mailing via Deaf

affinity listservs, and posting and pick-up at Deaf affinity organizations and events. The participants' written consenting process and all other aspects of this study were conducted in ASL (there is no written form of ASL).

Skin Cancer Education Video

The 60-minute video used for this study, entitled *Be Smart, Beat Skin Cancer*, was produced in 2006 through a community-campus partnership composed of Deaf Community Services of San Diego, Inc. (DCS), the Moores University of California San Diego (UCSD) Cancer Center, Gallaudet University, the National Association of the Deaf, and Bovee Productions. The ASL educational video's format shows a guest lecturer providing answers to four audience members' questions (<http://cancer.ucsd.edu/deafinfo>). This Socratic, question-and-answer format was chosen because it makes it easy to start and stop the video at key points in order to engage viewers in a discussion to facilitate complete understanding of the content. When uploaded on the Internet, this question-and-answer format makes it easy for viewers to see the topic questions and selectively view the segments of greatest interest in the order that they preferred. The smaller files also download faster, a characteristic anticipated to help to retain viewers' attention. However, for this study, participants were told that the video would be shown without pausing for discussion to assure that each participant would have the same experience. Participants were told that, instead of pausing between segments, a discussion would be held at the end to address any questions, concerns, or observations. Participants had blank paper on which they could record items for this discussion phase.

Measures

At baseline, participants completed 1) a survey with questions regarding socio-demographic data, such as age, ethnicity, level of education, and if their family, friends, or co-workers had cancer; and 2) the *Skin Cancer Knowledge Questionnaire (SCKQ)*. At post-intervention and two-month follow-up, only the *SCKQ* was completed. A medical advisory committee consisting of oncology nurses and doctors, public health and medical students, and the Deaf research team at Moores UCSD Cancer selected all of the questions for the *SCKQ* based on content derived from the skin cancer video. The questions were organized so that they would cater to learning style preferences and reported literacy levels of the at-large Deaf community. The *SCKQ* consisted of multiple-choice and true/false questions related to the content of the video. An ASL translation was provided. Because the questions were directly related to the video's specific content, a standardized survey could not be used. The *SCKQ* was extensively piloted tested prior to inclusion in the study. The *SCKQ* consisted of 11 multiple-choice and 29 true/false questions pertaining to the skin cancer topics presented in the video, such as the danger of cancer, skin cancer terms, risk factors for skin cancer, self-examination techniques, dangerous sun times, meaning/use of content the sun protective factor (SPF) ratings, and UV protection. Altogether, there was a possible total score of 40 for each participant, with higher scores indicating more questions answered correctly.

Procedure

Potential participants were told that they would be helping to evaluate an education program that had been specifically designed to improve the Deaf community's access to health information and care. Half of the consented participants were randomly assigned to the experimental condition and were shown the skin cancer education video. The participants in the control condition were shown an alternate video program in ASL on *Cancer Patients and Family Support* (http://cc-stream2.ucsd.edu:8080/ramgen/Webcasts/ASL_Web_03.rm), but were not shown any information pertaining to skin cancer.

The videos were shown to participants in small groups and settings that promised minimal visual disruptions. One or more of the facilitators who were members of the Deaf community and whose preferred language was ASL administered the intervention in a consistent manner. Following the post-intervention survey, staff discussed each participant's randomly assigned topic. Two months later, meetings were set up for completion of the final surveys and done according to each participant's preferred mode of communication, e.g., video phone, in-person.

Delayed Intervention

At the two-month follow-up, control participants were invited to transfer to the experimental condition and view *Be Smart, Beat Skin Cancer*. Their original two-month follow-up data were used as their new baseline, and they subsequently completed another post-test immediately after viewing the skin cancer video. Two months later, they completed the final follow-up survey.

Sample

Enrolled participants were 141 Deaf men and women who used ASL as their preferred mode of communication. They were recruited from San Diego County's 5,000 square mile region, designated as "mixed urban/suburban/rural." The participants were recruited in collaboration with the local community partner, Deaf Community Service of San Diego, Inc.

Of the participants, 55.3% ($n = 78$) were randomly assigned to the experimental condition and 44.7 % ($n = 63$) were assigned to the control condition. Due to missing data at pre-test, three participants in the experimental condition ($n = 75$) and two participants from the control condition ($n = 61$) were excluded from data analysis, yielding a final sample size of 136. All controls accepted the invitation to transfer into the experimental condition after completing their roles in the control condition. They all completed the post-test, but six delayed intervention participants did not complete the two-month follow-up. An *a priori* power analysis showed adequate power to uncover medium effects for the planned analyses with a minimum sample size of 135 (greater than .90 for the t-test and .83 for the ANCOVA) [11].

Results

Sociodemographics

The sample of Deaf participants ($N=136$) was split evenly between men ($n=68$; 50%) and women ($n=68$; 50%) (see Table 1).

Skin Cancer Knowledge

Knowledge score means and 95% confidence intervals for the experimental, control, and delayed intervention groups at pretest, post-test, and two-month follow-up are shown in Table 2. A graphic depiction of scores at the three time points can be found in Figure 1.

Post-Intervention

Original Experimental Group. ($n=75$) versus Control Group ($n=61$): An independent samples t-test revealed that at baseline, there was no significant difference in knowledge scores between the experimental group and the control group, $t(134) = .620, p = .536$. To test the impact of the intervention video, an independent samples t-test was first done to compare knowledge change scores (post-test minus pre-test) for the experimental group versus the control group. This test supported the first hypothesis: participants who were exposed to the skin cancer video showed more positive change from pre-test to post-test on the skin cancer questionnaire (M difference = 7.00) compared to control participants (M difference = .84) who did not see this video, $t(134) = 11.23, p < .001$.

Next, the groups' knowledge scores were compared at post-test, controlling for pre-test scores. A univariate analysis of covariance (ANCOVA) comparing post-test knowledge scores after controlling for pre-test scores, found that the experimental group scored higher immediately post-intervention than did the control group, $F(1, 133) = 156.45, p < .001$. On average, the participants in the experimental group answered seven more questions correctly from pre-test to post-test, while the control group showed no significant increase in knowledge from baseline to post-intervention.

Delayed Intervention: The skin cancer knowledge of participants who transferred from the control group to the experimental group also significantly increased from pre-test (i.e., their scores from their two-month follow-up responses while in the control group) to post-test, $t(60) = 12.95, p < .001$. A univariate ANCOVA was done to compare the post-test knowledge scores of the combined experimental groups (the participants after delayed intervention combined with the original experimental participants: $n=136$) to the scores of the original control group ($n=61$), controlling for pre-test scores. The analysis showed that, after controlling for pre-test scores, participants who had seen the skin cancer video (both original experimental and delayed intervention) scored higher at post-test than the original group of control participants had scored before they received the delayed intervention, $F(1,194) = 166.45, p < .001$.

A comparison of the original experimental group to the delayed intervention group was conducted to see whether the delayed intervention group's repeated exposures to the *SCKQ*

might have beneficially affected its members' response to the video. An ANCOVA showed that there was no difference between the two groups, $F(1,119) = .000, p > .993$.

Two-month Follow-up

Original Experimental versus Control: An independent samples t-test was conducted to measure the retention of knowledge at the two-month follow-up. Results indicated that there was a significant knowledge difference between the experimental group and control group at two-month follow-up, $t(126) = 4.35, p < .001$. As hypothesized for the experimental group, participants who had viewed the video had significantly more knowledge at the two-month follow-up than at pre-test, $t(71) = 8.48, p < .001$. As hypothesized for the control group, there was no significant difference between pre-test and two-month follow-up, $t(55) = 1.79, p = .078$.

Delayed Intervention: Participants who had seen the skin cancer video (the original experimental group combined with those who received the delayed intervention) had significantly higher scores at two-month follow-up compared to the control group, $tF(181) = 4.67, p < .001$. Participants in the delayed intervention group had significantly higher scores at two-month follow-up than at pre-test, $t(54) = 5.45, p < .001$. There was no significant difference in knowledge retention at two-month follow-up between the original experimental group and the delayed intervention group, $F(1, 125) = .240, p = .625$.

Discussion

This study tested the hypothesis that members of the Deaf community who were exposed to the skin cancer educational video would increase their knowledge of skin cancer more than those who saw a different video. Consistent with the community-campus partnership's previous cancer education research findings [6,8–10,12], this study provides evidence that those who watched the culturally and linguistically adapted education video learned significantly more about skin cancer than those in the control group. Equally important, this gain was achieved with only a single viewing of the video. Measuring the retention of health-related knowledge [13] is important because increased health literacy is believed to facilitate the adoption of health-promoting life styles. The present study showed that, at the two-month follow-up, those who saw the skin cancer video still retained significantly more knowledge compared to their baseline scores.

It was anticipated that the delayed intervention group might demonstrate greater knowledge gain and/or knowledge retention as a result of having read the *Skin Cancer Knowledge Questionnaire* three times before viewing the video. However, no differences were noted, in either the amount of knowledge gained immediately post-intervention or the retention of the gained information at the two-month follow-up. Hence, it was noteworthy that repeated exposures to questions on the skin cancer knowledge questionnaire did not enhance participants' response to the video as had been anticipated. These findings support the efficacy of the *Be Smart, Beat Skin Cancer* video for increasing the Deaf community's knowledge about skin cancer, while suggesting that there may be no supplemental value to giving viewers the content questions, the equivalent of a study guide, ahead of time. However, future research could evaluate whether there is any benefit to specifically asking

viewers to “read the questions ahead of time because the answers will be given in the video.”

Qualitative Measure

It was anticipated that a high quality video would command more confidence and respect from viewers than one of lesser quality and promote a greater likelihood that the video would be shared with others. International, professionally juried video competitions were chosen to address this assessment. The six awards the video won at competitions during its 2007–2008 release year offer evidence of this video’s aesthetic and professional qualities (2007 MarCom Awards, Gold; 2007 The International Davey Awards, Silver; 2007 Ava Award, Platinum; 2008 Communicator Award of Distinction for Health and Wellness; 2008 Communicator Award of Distinction for Editing; and 2008 Telly Award, Bronze).

Limitations of this Study

This study was conducted in a single geographic area, and one in which the partnership has been creating and testing the effectiveness of its Deaf community health literacy promotion programs since 1997. Hence, the participants in this study may represent a cohort that has had greater access to health literacy training than the nation’s Deaf community at large. This suggests that the baseline data reported in this study may overestimate the actual skin cancer literacy of the at-large Deaf community, underscoring the need for more Deaf-friendly health education programs.

Applications and Dissemination of this Research Project

The present study’s findings support the value of producing culturally adapted and linguistically aligned videos for the Deaf community. With the proven success of such videos, they can serve as a model for the creation of future education programs to promote the Deaf community’s health and well being.

The video’s question-and-answer format also makes it possible for Internet viewers to stream the video segments quickly, download segments to their personal computers, and access the information on-demand. The question-and-answer format also makes it possible for the research team to upload the brief segments to social networking forums, such as YouTube, for wider dissemination of the video.

With funding from the National Cancer Institute, the video has also been disseminated free to the partnership’s country-wide network of Deaf-friendly churches and copies can be borrowed from the National Association of the Deaf’s free lending library. It has also been made available to the American Cancer Society, Deaf community service agencies, and schools for the Deaf individuals. Others can purchase the video at cost.

Future Research

Other studies are warranted to investigate whether increased knowledge foreshadows an increased use of the prevention, screening, and the early treatment measures taught. It would also be beneficial to determine the impact of a second viewing of this video on study participants’ knowledge gain and retention, attitudes, and health promoting behaviors.

Another relevant exploration would be to assess whether stopping the video after each segment to give viewers time to discuss the content, as the video was intended to be shown, might increase the acquisition and retention of knowledge.

The video recording of these programs had been requested by Deaf community leaders so that the information could be more widely disseminated through a train-the-trainers model. Additional study is warranted to evaluate the feasibility of using the videos in such manner.

Conclusion

This study demonstrated that providing skin cancer control information via a linguistically and culturally aligned Deaf-friendly video can increase viewers' knowledge of skin cancer control options, reinforcing the findings of the research team's earlier studies.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.
Skin Cancer Knowledge Questionnaire Means by Group

Table 1

Sample Characteristics

Characteristic	Number (%)
Participants	136
Experimental	75
Control/Delayed Intervention	61
Mean age, years (SD)	37.56 (12.73)
Gender	
Male	68
Female	68
Race	
African American	9 (6.6)
Asian/Pacific Islander	6 (4.4)
Caucasian	93 (68.4)
Hispanic	22 (16.2)
Mixed	4 (2.9)
Other	2 (1.5)
Education	
High School	28 (20.6)
Vocational training	5 (3.7)
Some College	33 (24.3)
Completed College	40 (29.4)
More than College	30 (22.1)

Table 2

Skin Cancer Knowledge Questionnaire Scores by Group

Data Collection Time Points	Survey Score* [Mean (95% CI)]		
	Control Group	Experimental Group	Delayed Intervention Group
Baseline	27.93 (26.74, 29.13)	28.55 (27.06, 30.03)	29.02 (27.74, 30.29)
Immediately Post-Intervention	28.77 (27.57, 29.97)	35.55 (34.23, 36.87)	35.82 (34.63, 37.01)
Two-Month Follow-up	28.82 (27.65, 30.00)	32.75 (31.45, 34.05)	32.29 (31.00, 33.58)

* Out of 40 possible points