Perception of COVID-19 physical distancing effectiveness and contagiousness of asymptomatic individuals: A cross sectional survey of deaf and hard of hearing adults in U.S.

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Abstract

Background: During the COVID-19 pandemic, there has been a rapid increase in the amount of information about the coronavirus on the Internet. If the language used in the video message is not clear or understandable to deaf and hard of hearing (DHH) people with a high school degree or less, they can create confusion and information gaps among DHH people during a health emergency.

Objective: To gather a baseline of DHH people's perceptions related to effectiveness of physical distancing (PD) and asymptomatic individuals.

Methods: A cross-sectional study of COVID-19 (N=445). Items included questions pertaining to COVID-19 knowledge were administered to US deaf adults from April 17, 2020, to May 1, 2020 via a bilingual ASL/English online survey platform.

Results: The sample consisted of 445 DHH adults aged 18 to 88 years old, with 74% identifying as White and 54% as female. About 88% of the sample felt they knew most or a lot about PD. This figure dropped to 73% for the effectiveness of PD in reducing the spread of coronavirus and 72% for the contagiousness of an infected person without symptoms. PD awareness along with education were significant predictors of PD effectiveness (adj OR for PD awareness=5.00; 95% CI: 2.09, 11.95; adj OR for education=1.89; 95% CI: 1.13, 3.16). In a separate model, education and PD effectiveness significantly predicted knowledge of asymptomatic individual. Race, gender, and age did not contribute to both models for PD effectiveness and knowledge of asymptomatic individual.

Conclusions: This study results point to the strong connection between education and coronavirus-related knowledge. Therefore, the information that DHH organizations and public health agencies quickly disseminate information during emergencies and pandemics must be clear, contain adequate and reliable information, and are timely in concordance with other information being disseminated.

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Introduction

Deaf and hard of hearing (DHH) people have been experiencing health disparities in general as well as related to the COVID-19 pandemic. DHH people have not been receiving equitable access to health information, especially during emergencies [1–3], which further contributes to low perceived quality of life outcomes and associated health disparities. [4] For DHH people who speak American Sign Language (ASL), access to health information requires an interpreter to translate between spoken English and ASL in addition to captioning for equitable communication access, including information given during live broadcasts about an emergency. To date, not all COVID-19-related video media have included sign language interpreters. However, most DHH ASL speakers, particularly DHH people with a high school degree or less, depend on information presented in ASL in videos as the go-to source for health information, with Facebook being the most often used. [5] Studies have shown that DHH people with a high school degree or less have lower HPV knowledge, genetic testing awareness, and HIV screening uptake, all of which can be remedied with greater accessibility of pertinent information in ASL. [6-8]

While the American public tends to rely on social media to keep up with news [9],

social media can also be used as an informal source of information about others' experiences with the health care system or as a means to gain knowledge about specific health information shared by individuals. But when health information is reproduced and shared informally without oversight by experts, potential misinformation can occur, including sharing of misinformation related to the ineffectiveness of certain social behaviors in reducing the spread of infections (e.g. presenting inaccurate evidence against the use of masks). People who demonstrate low eHealth (electronic health communication) literacy often fall victim to misinformation as they are not able to verify the accuracy of health information. They may also dismiss the severity of certain diseases that were shared by reliable sources on the Internet. [10-13] While the prevalence of misinformation about health on social media is harmful, it is far more problematic to correct this misinformation. [14] Consequently, DHH people who have low eHealth literacy and rely on social media to learn information about the coronavirus may be at risk for believing misinformation regarding health-related awareness and risk perceptions.

During the COVID-19 pandemic, there has been a rapid increase in the amount of information (e.g. infodemics) about the coronavirus on the Internet. The deluge of these infodemics makes the identification of accurate COVID-19 information from reliable sources difficult.[15-17] DHH people who do not have the requisite background and training in emergency preparedness may attempt to select certain infodemics for translation in ASL and post these ASL videos on social media for other DHH people to watch. If the content relayed in these ASL videos is inaccurate or the language used in the ASL video is not clear or understandable to DHH people with a high school degree or less, they can create confusion and information gaps among DHH people during a health emergency. These gaps can cause direct harm to medically underserved DHH groups (e.g. low education, low income, and low literacy) that are already at risk for disparity.[18] Critical and accurate

health information may also not be adequately disseminated to DHH people whose primary language is ASL. These concerns suggest a need to gather a baseline of DHH people's awareness and risk perceptions related to the current pandemic. Specific research aims for this study include investigating 1) the relationships between DHH people's awareness of physical distancing and perception on the effectiveness of physical distancing in reducing the spread of the coronavirus and 2) the relationship between DHH people's perceived effectiveness of physical distancing and contagious level for an asymptomatic person.

Methods

A COVID-19 knowledge and risk perception survey in ASL were created by a team of experts in DHH health, translation, and survey development.[19-20]   The web link to participate in this survey was disseminated via social media as well as direct email invitations to those who previously took Deaf Health surveys.

Data Collection Procedure

        Following IRB approval RB-FY20-80 by Gallaudet University, research staff recruited DHH individuals throughout the US, both on social media and through email invitation to past survey participants. Participation in this study required access to a computer and the Internet to complete an online bilingual ASL/English survey about knowledge of PD and asymptomatic individuals. As a result, the findings are limited to DHH people with access to computer technology and to the internet/WiFi connectivity. Only those who self-reported using ASL as their primary language were included because this group was identified as a medically underserved group [21-23]; exclusion criteria included being under the age of 18 years old or losing hearing ability due to aging. After the participant viewed the information in ASL and English online, the participant was directed to a page where they could choose to provide consent to participate or decline. Following consent, the online survey presented in both ASL and English took approximately ten minutes to complete. No names or

identifying information were included in the online survey and a unique identifier was used to avoid storing personal information in the same online survey dataset.

Data Source

Data for this study was drawn from two sources: anonymous participation through survey link shared via Facebook and recruitment database pool that was sent an invitation email to take the survey on a website. The COVID-19 knowledge and risk perception survey included physical distancing awareness (PD awareness), physical distancing effectiveness (PD effectiveness), and contagious level of an infected person without symptoms items that were administered to US Deaf adults from April 17, 2020, to May 1, 2020. Prior to survey administration, all items were translated into ASL with coaching from a Deaf researcher with expertise in translating survey items and the final translations were captured on film.

Survey items

For the purposes of this study, awareness of PD and perceived effectiveness of PD were assessed with the following questions, *"How much do you know about physical distancing?"* and "*How effective do you think physical distancing is for the prevention of the spread of the coronavirus (in other words: to what extent does your physical distancing behavior contribute to other people not getting sick)*?" with response options of "not at all effective," "little effective," "somewhat effective," "mostly effective," "very effective." Perception of the ability for an infected person without symptoms to spread COVID-19 was assessed with the question, "*Based on what you know, how contagious is someone who has been infected with the coronavirus but who shows no symptoms (no coughing; no fever)?"* with response options of "not at all contagious", "little contagious", "somewhat contagious", "contagious", and "very contagious."

Statistical analyses

Weighted descriptive statistics, such as cross-tabulation and percentage procedures, were used to summarize the sample. Because a logistic regression model required a binary response variable, responses to the perceived effectiveness of PD and contagious level of an infected person without symptoms questions were recoded into binary low and high groups. Response options of "not at all effective," "little effective," and "somewhat effective" were recoded into the low group, while "mostly effective" and "very effective" were recoded into the high group. Response options of "not at all contagious", "little contagious", and "somewhat contagious" were recoded into the low group, while "contagious" and "very contagious" were recoded into the high group. A backward elimination variable selection procedure was performed on a logistic regression model, using age, gender, race, education, and baseline PD awareness to predict the odds of having a high perception of PD effectiveness in reducing the spread of coronavirus (referent group). The criteria for retaining predictors was a p value less than .05. Finally, all variables including PD awareness and PD effectiveness were entered as explanatory sets to assess their relationships with knowledge of contagiousness of an infected person without symptoms (high knowledge of contagious level was the referent). For observational, cross-sectional studies, a minimum sample size of 400 is recommended for analyses with six predictor variables in the final model.[24] SPSS version 25.0 (IBM Corp., Armonk, NY) was used for all analyses.

Results

The weighted sample that answered all questions for this study consisted of 475 adults aged 18 to 88 years old, with 74% identifying as White and 60% as female (see Table 1). When asked about preferred language on a daily basis (response options: ASL, English, both ASL and English), just over half of the sample preferred ASL only. About 88% of the sample felt they knew most or a lot about PD. This figure dropped to 72% for the

effectiveness of PD in reducing the spread of coronavirus and 70% for the contagiousness of an infected person without symptoms. Bivariate correlation analysis indicated positive associations among PD awareness, PD effectiveness, and contagiousness variables (r=.24 to .38; p<.001).

In the first model, a backward elimination variable selection procedure was used to identify the significant predictors for perceived PD effectiveness in reducing the spread of coronavirus. In this model, PD awareness and education emerged as significant predictors of PD effectiveness (adj OR for PD awareness=5.00; 95% CI: 2.09, 11.95; adj OR for education=1.89; 95% CI: 1.13, 3.16). Race, gender, and age did not predict PD effectiveness (p=NS). In the second model, both PD awareness and PD effectiveness were entered as a set in the first block. All demographics were entered as a set in the second block. According to Table 1 with adjustments for correlates, results showed that only PD effectiveness and education were significant in their relationships with perceived contagiousness of asymptomatic individuals. Compared to DHH respondents who had 12 years of education or lower, DHH respondents with a college degree were nearly five times more likely to report that asymptomatic individuals are contagious (adj OR=4.67; 95% CI: 2.22, 9.80). Again, age, gender, and race did not predict knowledge of contagiousness for an infected person without symptoms.

Discussion

A majority of this U.S. DHH study sample had heard of physical distancing, but not all believed that physical distancing was effective in reducing the spread of the coronavirus or that an asymptomatic individual was contagious. Above and beyond sociodemographic variables and PD awareness, DHH people who had a college degree were almost twice as likely to believe that physical distancing was effective at reducing the spread of coronavirus compared to DHH people who did not have a college degree. Whereas both education and

PD awareness strongly predicted PD effectiveness, this study did not find evidence for the contribution of age, gender, and race to the development of appropriate perception of PD effectiveness. This finding is consistent with research studies that reported a connection between more years of education and greater level of health-related awareness or screening uptake. [6-8] Our study also showed that DHH people who have a college degree, coupled with knowledge of PD effectiveness, were much more likely to believe that an infected person without symptoms is contagious compared to DHH people who did not have a college degree and demonstrated low knowledge of PD effectiveness.

The disparity in PD and coronavirus knowledge among DHH people who do not have a college degree may be in part explained by inadequate, inaccessible or misleading information in ASL on social media. According to the 2020 WHO's situation report on novel coronavirus, the COVID-19 outbreak has been accompanied by global infodemic on social media. As a result, some social media sources may be of low-quality and can potentially translate into reproduction of unreliable information by members in the community. At the same time, social media has been cited as an essential tool for health information seeking among DHH people who do not have a college degree [5] and can reliably be used to promote rational social health behavior in face of emergencies and pandemics. Thus, for all social media postings, ASL videos about health during a pandemic must actively cite and include trusted information sources for further information. Given the strong connection between education and eHealth literacy [25] and the importance in readability of content in online health information to accommodate people with low level of education [26], our community has a responsibility to ensure that the social media health videos are fully accessible in ASL and understood by all, including those who have only a high school degree. Clinicians have a responsibility to incorporate patient-centered care and communication to ensure that DHH patients understand what they need to do to take care

of their health and treatment, as appropriate. Next, we provide recommendations on the development of videos to help increase ASL comprehension for DHH people with a high school education or less.

DHH people with limited access to written English due to language delay/deprivation and DHH immigrants whose first language is not English often have limited ASL fluency. [27] To best accommodate this underserved subgroup's language needs, ASL videos should be screened for readability for DHH with a high school education or less. This may include avoiding reliance on fingerspelling to describe concepts, but instead utilize visual descriptions and illustrations to enhance ease of understanding information. Specific concepts might need more elaboration, such as how germs are spread and how masks help prevent the spread of germs. Increasing the use of visual descriptions and elaboration of concepts would be key components in providing clear and well-conceived emergency messages. Videos in ASL that include visual descriptions and elaboration of concepts are likely to support comprehension, be effectively transmitted, and ultimately help ensure public health safety to stop the spread of COVID-19.

According National Association of the Deaf Position Statement on the Accessible Emergency Management for Deaf and Hard of Hearing People [28], the best practices to disseminate awareness training to DHH citizens during the pandemic are: 1) ensuring that the materials are accessible in a language that they understand; 2) including medical and public health experts who use ASL in interactive panels; 3) providing training to qualified sign language interpreters; 4) ensuring that all news and notification systems are accessible by any forms of telecommunication technology.

Conclusion

This study results point to the strong connection between education and coronavirus-related knowledge. Therefore, the information that DHH organizations and public health

agencies quickly disseminate information during emergencies and pandemics must be clear, contain adequate and reliable information, and are timely in concordance with other information being disseminated. As for online streaming of time-sensitive news, such as state and local government updates, live captioning in addition to sign language interpreting would provide DHH people with full access to information. ASL videos that are created for social media or Internet must include features that support ease of understanding, which fosters higher knowledge and perceptions. Information in ASL disseminated through other sources such as TV and news must also be clear and accessible to the whole DHH community.

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Supplementary Files

TOC/Feature image for homepages

COVID-19 in American Sign Language.