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Association of Sensory Loss and Knowledge of Heart Attacks

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Abstract

Introduction: Awareness of heart attack symptoms and best response is a national public health priority, especially among those at higher risk of heart disease. Adults with sensory loss are more likely to develop heart disease than those without, and may be at risk of poor heart attack knowledge due to limited patient–provider communication and access to health information. The aim of this study is to examine the association between sensory loss and heart attack knowledge.

Methods: Cross-sectional, nationally representative data from the 2014 and 2017 National Health Interview Survey were used. Analyses were conducted in 2021. Participants aged ≥20 years were included (N=61,168). Being aware of heart attack symptoms and best response was considered as recognizing the 5 examined symptoms of heart attacks and the proper emergency response, as defined in the *Healthy People 2020* objectives. Functional hearing and vision loss were defined as self-reported trouble hearing and seeing.

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CRedit Statement

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Results: Overall, 16.2% reported functional hearing loss, and 10.1% reported vision loss. Having vision loss was associated with a lack knowledge of heart attacks symptoms or best response (prevalence ratio [PR]=1.08, 95% CI=1.06, 1.11). In a separate model, having vision loss only and dual sensory loss (concurrent vision and hearing loss) were associated with not having this knowledge (PR=1.09, 95% CI=1.06, 1.12 and PR=1.08, 95% CI=1.01, 1.15, respectively), but having hearing loss only was not (PR=1.03, 95% CI=0.99, 1.06).

Conclusions: Non-institutionalized adults with sensory loss may represent a group to target for improving knowledge of heart attacks in the population.

INTRODUCTION

Heart attack awareness is a national public health priority, and was featured as one of the objectives of the *Healthy People 2020* initiative.¹ Although the target of 40% of adults being aware of heart attack symptoms and best response was met, half of adults in the U.S. still do not have that knowledge. Every 40 seconds, 1 American has a heart attack.² The recognition of heart attack signs by its victims and their prompt engagement with emergency services are critical for timely intervention.³

Despite recent gains in heart attack awareness, disparities in knowledge still exist among men, younger adults, people of racial and ethnic minorities, and those with lower educational attainment.⁴ Adults with sensory loss may also be at risk for poor heart attack knowledge as vision and hearing loss are associated with barriers to accessing health information.^{5,6} Characterizing whether sensory loss is a risk factor for poor heart attack knowledge has implications for a large portion of older adults at higher risk of heart disease.^{7,8} This study examines the association between sensory loss and heart attack knowledge using the National Health Interview Survey (NHIS).

METHODS

Study Population

The NHIS is a cross-sectional household survey of non-institutionalized U.S. residents. The National Center for Health Statistics Research Ethics Review Board approved its protocol. Verbal informed consent was obtained from participants. Participants aged 20 years who participated in the NHIS in 2014 or 2017, when a heart disease supplement was available, were included. Participants with missing information (2,271 of 63,349 participants, 3.6%) were excluded.

Measures

Participants were asked to identify heart attack symptoms and best response (survey questions listed in Appendix Table 1). All 5 possible answers for heart attack symptoms were correct. Consistent with previous studies,^{1,9} being aware of heart attack symptoms and best response was defined as correctly identifying all symptoms of heart attacks, and calling 9–1–1 as the way to respond to a heart attack.

Hearing loss was defined as reporting *a little/moderate/a lot* of trouble hearing when asked: *Without the use of hearing aids or other listening devices, is your hearing excellent, good, a little trouble hearing, moderate trouble, a lot of trouble, or are you deaf?* Vision loss was defined as responding *yes* to the question: *Do you have any trouble seeing, even when wearing glasses or contact lenses?* Self-reported sensory measures provide valuable information about day-to-day sensory function and how it impacts each individual's experience. In secondary analyses, dual sensory loss categories (no sensory loss, hearing loss only, vision loss only, dual sensory loss—defined as reporting both vision and hearing loss) were examined.

Statistical Analysis

Self-reported covariates associated with sensory loss and health knowledge were selected.^{4,9} A log-binomial regression model adjusted for age, gender, race/ethnicity, educational attainment, comorbidity count (chronic lung disease, coronary artery disease, arthritis, diabetes, heart condition, hypertension, kidney disease, stroke, cancer), U.S. birth status, and income-to-poverty ratio, examined the association of hearing and vision loss with heart attack knowledge. Secondary analyses examined this association by dual sensory loss categories. Sensitivity analyses adding diabetes and lifestyle factors (smoking, BMI, and alcohol drinking) to the adjusted models were conducted. Study weights were used to account for the NHIS complex design. Analyses were conducted in 2021 using RStudio, version 1.2.1335.

RESULTS

This sample included 61,168 participants with a mean age of 48.2 (SD=17.5) years with 51.9% being women and 65.5% identifying as non-Hispanic White (Table 1). Overall, 16.2% reported hearing loss, and 10.1% vision loss.

In the primary model, having vision loss was associated with a lack of knowledge of heart attack symptoms/best response (prevalence ratio [PR]=1.08, 95% CI=1.06, 1.11). No such association was found for hearing loss (PR=1.02, 95% CI=0.99, 1.05). When examining dual sensory loss (Figure 1), having vision loss only and dual sensory loss were associated with higher prevalence of not having this knowledge (PR=1.09, 95% CI=1.06, 1.12 and PR=1.08, 95% CI=1.01, 1.15, respectively). No association was found for hearing loss (PR=1.03, 95% CI=0.99, 1.06). Estimates were unchanged after adjusting for diabetes or lifestyle factors.

DISCUSSION

In this nationally representative sample of U.S. non-institutionalized adults, vision and dual sensory loss were associated with higher prevalence of not being aware of heart attack symptoms and best response. With the aging of the U.S. population, and the increased prevalence of sensory loss with age,¹⁰ sensory loss is projected to affect a greater proportion of the population over time. Improving heart attack knowledge is even more important in this subset of the population as they are at increased risk of cardiovascular disease.^{7,8}

Sensory loss may have direct and indirect links to limited knowledge of heart disease. The Internet, the primary source of health information for the majority of adults,¹¹ can be inaccessible to those with vision loss or blindness.¹² Moreover, barriers to patient–provider communication could directly affect knowledge of heart disease symptoms and response as talking to doctors is another important source of health information.¹¹ Alternatively, people with sensory loss may be spending more time discussing management of pressing conditions. Individuals with sensory loss are also more likely to experience social isolation,^{13,14} which has been associated with limited knowledge of disease.¹⁵ Though patient–provider communication and social isolation are common among those with hearing loss as well, those with hearing loss were on average 10 years older than those with vision loss, and it could be that they have gained knowledge of heart attacks before developing hearing loss, whereas those with vision had knowledge barriers at younger ages, which limited their access to health information early on. Future studies that take into account the age at which people develop sensory loss could help further examine this relationship.

Importantly, adults in the U.S. with sensory loss may represent a population of adults to target for improving health awareness. Compared with the other determinants of limited knowledge of heart attacks (e.g., lower educational attainment), sensory loss can be more easily addressed through common methods including eyeglasses, hearing aids, cataract surgery, and rehabilitation services. These could improve participation in the community and interactions with the healthcare system, which could lead to greater exposure to health information. Improving communication in healthcare settings by providing simple products to correct hearing/vision (e.g., voice amplifiers, glasses/magnifiers), making information more accessible (e.g., transcribed messages, large-font brochures), and using effective communication techniques (e.g., teach-back methods) could improve understanding of health topics among those with sensory loss.^{5,6}

Limitations

This study has limitations that should be considered when interpreting its results. First, cross-sectional data prevent establishing temporality. It is possible that limited health knowledge predates sensory loss, or that they have a synergistic effect on declined knowledge. Second, none of the possible answers about heart attack symptoms were incorrect, which could affect the reliability of the measure. Finally, self-reported measures of sensory loss may have poor sensitivity, which could underestimate the association examined. The self-reported questions could also be interpreted differently by people from different backgrounds including race/ethnicity, which prevents the authors from examining how sensory loss and race/ethnicity may interact in these associations.

CONCLUSIONS

Adults in the U.S. with sensory loss living in the community may represent a population of adults to target for improving awareness of heart attacks via relatively low-risk methods to improve survival rates and reduce healthcare spending.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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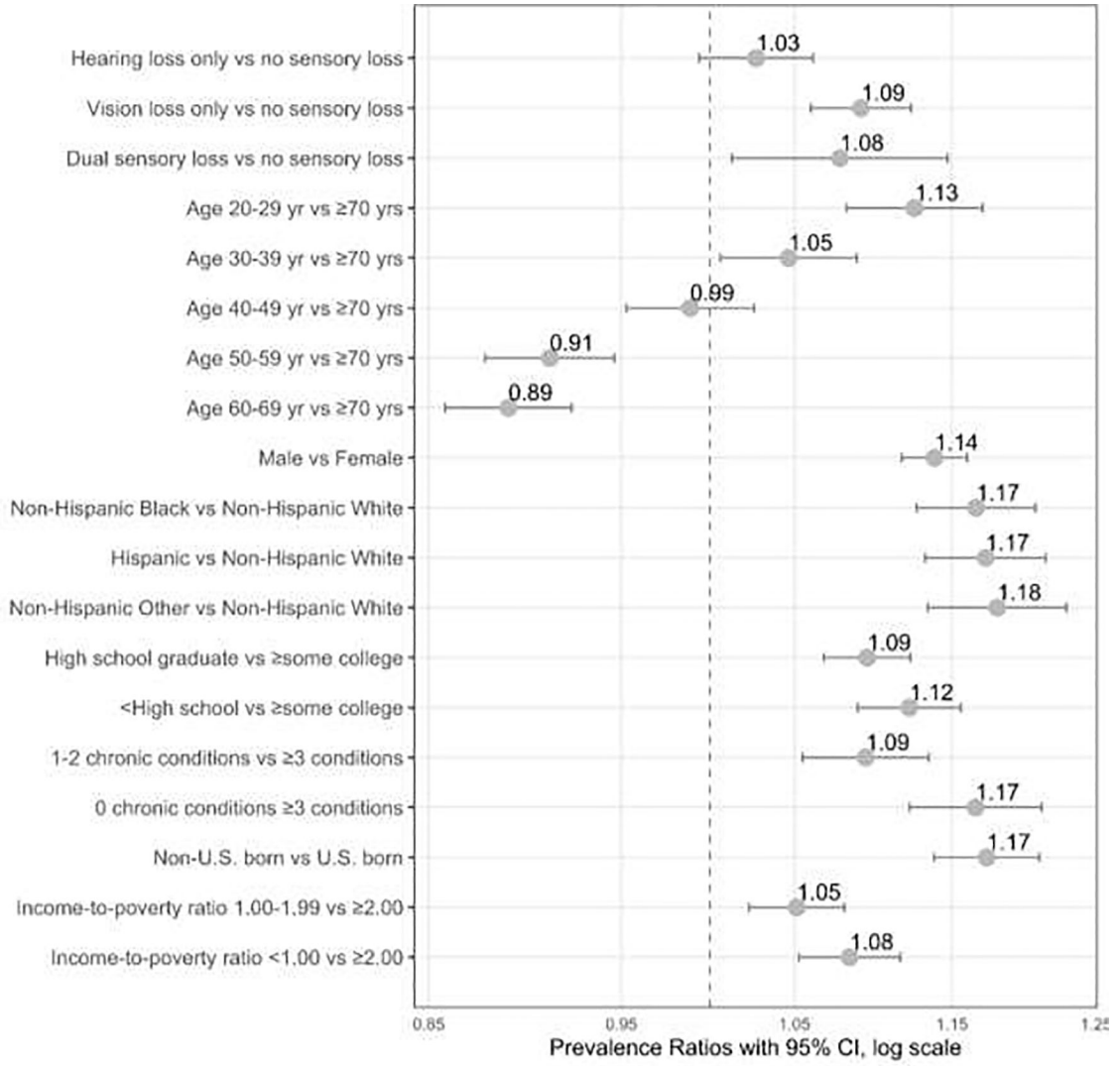


Figure 1. Multivariable-adjusted prevalence ratios of not having full knowledge of heart attack symptoms and best response among U.S. residents. *Source:* The 2014 and 2017 National Health Interview Survey (NHIS). Weighted percentages account for the NHIS complex survey design. Having full heart attack knowledge was defined as correctly identifying each 1 of 5 symptoms of heart attacks (pain/discomfort in the jaw/neck/back, feeling weak/lightheaded/faint, pain/discomfort in the chest, pain/discomfort in the arms/shoulder, shortness of breath) and calling an emergency number as the best response to a heart attack. Hearing loss was defined as self-reported trouble hearing without the use of hearing aids. Vision loss was defined as self-reported trouble seeing, even when wearing glasses/contact lenses.

Table 1.

Study Population Characteristics, the National Health Interview Survey 2014 and 2017

Characteristic	Overall population	No sensory loss	Hearing loss only	Vision loss only	Dual sensory loss	<i>p</i> -value ^a
Weighted %	100	76.6	13.1	6.9	3.1	NA
Age in years, mean (SD)	48.22 (17.49)	45.34 (16.53)	60.40 (16.36)	50.38 (17.04)	61.92 (15.86)	<0.001
Men, weighted %	48.1	47.3	58.6	37.3	46.2	<0.001
Race/ethnicity, weighted %						<0.001
Non-Hispanic White	65.5	62.6	81.8	61.9	73.7	
Non-Hispanic Black	11.5	12.2	5.6	15.5	10.1	
Hispanic	15.2	16.5	7.9	16.7	10.4	
Non-Hispanic other ^b	7.8	8.6	4.7	5.9	5.8	
Educational attainment, weighted %						<0.001
Some college or higher	63.4	65.1	58.9	58.5	51.4	
High school or equivalent	24.7	23.8	28.7	25.0	28.9	
Less than high school	11.9	11.1	12.4	16.5	19.7	
Comorbidity count, ^c weighted %						<0.001
0 conditions	49.7	56.8	24.7	35.4	14.0	
1–2 conditions	37.6	35.1	47.5	43.8	45.0	
3 conditions	12.7	8.1	27.8	20.9	41.0	
Non-U.S. born, weighted %	18.5	20.6	9.3	17.2	9.6	<0.001
Income-to-poverty ratio, weighted %						<0.001
<1.0	12.3	12.0	9.9	17.3	19.2	
1.00–1.99	17.6	16.8	18.2	22.0	24.0	
>2.0	70.1	71.2	71.9	60.7	56.8	
Not having knowledge of heart attack symptoms/best response, weighted %	51.4	52.0	47.1	53.9	49.4	<0.001

Note: Boldface indicates statistical significance ($p < 0.05$).

^aBased on groupwise comparisons using survey-weighted chi-square tests.

^bIncludes American Indian/Alaskan Native, Asian, multiple race, and “other” race.

^cComorbidity count includes self-reported physician diagnoses of chronic lung disease, coronary artery disease, arthritis, diabetes, heart condition, hypertension, kidney disease, stroke, cancer.