UCOA Quarterly Aging Summit Agenda
Thursday – August 11, 2022

12:00 PM - 01:30 PM
Community Partner and Member Networking Meeting
Join Zoom Meeting https://zoom.us/j/640416337
Or Dial 669 900 6833
Meeting ID: 640 416 337
(Zoom conference information will remain the same for all UCOA quarterly meetings)

Agenda

12:00 Welcome to members and partners — Andrew Jackson

12:10 Executive Director Report — Rob Ence
- Website Updates
- UCOA Annual Report FY 2021-22
- Community Calendars
- Partner Updates (Traci Lee, Wid Covey, etc.)

12:20 Age Friendly Communities Symposium Preview
Valerie Greer, AIA, LEED - Asst Professor Architecture, UofU
Linda Edelman, RN, PhD - Professor Nursing, UofU

12:40 The Intersection of Culture, Disability, and Cognitive Functioning Among Hispanic Older Adults with Sensory Impairments
Corinna Trujillo Tanner PhD, RN – Asst Professor, BYU

01:10 State Aging Plan 2023-2030 Launch
Darlene Curley, Project Chair
Rob Ence, UCOA Exec Dir

01:30 Adjourn

Next meeting Thursday – November 10, 2022, at Noon – via Zoom

(Public and partner comment and input welcomed throughout. Session will be recorded.)

College of Nursing
10 South 2000 East
Salt Lake City, UT 84112

August, 2022

Update to UCOA

- The Special Committee on Family Caregiving (SCFC), continues to work on the **Family Caregiving Plan**. Currently seeking legislative support. Watch for a final version of the plan with professional graphics soon.
    - If you would like to sign onto the Plan as a **Supporter**, please follow this link: https://forms.gle/hR34pPD8HQrN7Lru7
- **National Alliance on Caregiving** has highlighted Utah as one of three states that are currently working on developing a State Plan for Family Caregiving
- FCC has been working with the Kem C Gardner Public Policy Institute on a report based on Utah's 2020 BRFSS data. Watch for **"Utah's Silent Workforce: The Contributions and Health Impacts of Family Caregiving"** to be released soon. This report includes projections of the need for family caregivers by 2030 with details on:
    - The number of care recipients across health conditions
    - The care situations faced by caregivers
    - Comparisons of caregivers and non-caregivers
    - The impacts of caregiving, both physical and mental health
    - Comparisons of caregiving in rural versus urban areas
    - Comparisons of caregiving in families with and without children under 18.
- FCC received a grant from Community Catalysts and Grantmakers of America called **Changing the Care Conversation.** With this grant, FCC has created a **Family Caregiver Community Advisory Board**. Members represent the diversity of caregivers across Utah, including health conditions and disabilities of the persons for whom they care, geographic local, and ethnicity. Members will receive advocacy training, provide input on the Utah Family Caregiving Plan and do projects supporting family caregivers in their communities.

LOCAL AGING ADVISORS

We build free CUSTOMIZED CARE PLANS for aging adults so everyone is on the same page

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www.localagingadvisors.com

Senior Housing

- Independent Living
- Assisted Living
- Memory Care Assisted Living
- Rehabilitation Facilities
- Skilled Nursing Facilities
- Low Income Housing
- Relocation & Real Estate
- Stay-at-Home w/ Modifications

Care Services

- Non-medical Home Care
- Home Health Care
- Hospice Care
- Medical Alerts & Monitoring
- Medical Equipment & Supplies
- Behavioral/Mental Health
- Hearing/Vision/Dental
- Advisors & Case Management
- Senior Clinics & Doctors

Community Resources

- Respite/Adult Day Centers
- Fitness & Wellness
- Caregiver Support
- Funeral Services/ Pre-planning
- Alzheimer's & Dementia
- Meals & Transportation
- Veterans Services
- Elder Abuse Prevention
- Legal Services; Wills, Trusts, Power of Attorney

How to Pay For it All

- Medicare Help
- Medicare Supplement Insurance Plans
- Medicare Advantage
- Prescription Drug Plans
- Dental, Vision, Hearing
- We are Licensed Insurance Agents not w/ Government
- Medicaid Help
- Social Security Information
- Veterans/ Aid & Attendance
- Financial Service Providers

"If there is one thing I can say is that they are more than helpful. They are an absolute lifeline. I truly do not know what we would have done without them and I will forever be grateful." M.Campbell - Caregiver

Age-Friendly Communities as Platforms for Equity, Health & Wellness

Virtual Symposium September 22-23, 2022

The Age-Friendly Communities Symposium brings together individuals from the Intermountain West to identify innovations and opportunities that will transform how neighborhoods, campuses, and health environments foster the independence, productivity, and wellbeing of older adults.

THE UNIVERSITY OF UTAH

Keynote Address – The keynote address will be delivered by **Terry Fulmer**, PhD, RN, FAAN, President of The John A. Hartford Foundation in New York City, whose vision is catalyzing the Age-Friendly Health Systems movement.

Expert Panelists

Age-Friendly Health Systems by **Patricia M. D'Antonio**, BSPharm, MS, MBA, BCGP
Gerontological Society of America

Age-Friendly Neighborhoods by **Mike Watson**, MPP, Director
Livable Communities, AARP

Age-Friendly Campuses by **Joann M. Montepare**, PhD
RoseMary B. Fuss Center for Research on Aging and Intergenerational Studies at Lasell University

REGISTER HERE

Look for updated information on the Age-Friendly Communities Symposium website or scan the QR code

If you would like more information on the symposium, please contact Linda Edelman at linda.edelman@nurs.utah.edu

Age Friendly Communities Symposium

THE UNIVERSITY OF UTAH

Thursday & Friday, September 22 & 23, 2022

The Age-Friendly Communities Symposium brings together individuals from the Intermountain West to identify innovations and opportunities that will transform how neighborhoods, campuses, and health environments foster the independence, productivity, and wellbeing of older adults.

Symposium Highlights

Keynote: "Creating an Age Friendly Ecosystem"
Dr. Terry Fulmer, President, John A Hartford Foundation

Panel Discussions
Age Friendly Neighborhoods, Mike Watson, AARP Livable Communities
Age Friendly Campuses, Joann Montepare, Lasell University
Age Friendly Health, Patricia D'Antonio, Gerontological Society of America

Knowledge Café
An interactive session hosted by Dr. Sarah Canham, University of Utah

Student Ideas Competition
"Koi Pond Think Tank: Age Friendly Futures"

Networking Reception – Salt Lake City
Spy Hop Digital Media Arts Center

Walk to End Alzheimer's
Join our team at the annual walk

Focus on the Intermountain West

Panel Discussion & Knowledge Café Hosts: Beth Fauth, Rob Ence, Nels Holmgren, Katarina Felsted, Keith Diaz Moore, Tim Farrell, Sarah Canham







The virtual symposium is designed to convene national and regional experts and key community stakeholders to envision age-friendly futures through knowledge exchange, generating ideas and expanding networks.

Outcomes include online resources, a chapter book, podcasts of student ideas & a directory of participants.

SYMPOSIUM STRUCTURE

Thursday, September 22nd

2:00p	Welcome & Overview
	Goals & Vision for the Symposium
2:20p	Introduction of Keynote Speaker
2:30p	Keynote: Creating an Age-friendly Ecosystem (Dr. Terry Fulmer)
3:30p	Questions & Answer Session
4:00p	Small group reflections: What are key issues in your community to creating an age friendly ecosystem?
	(Break out room discussions facilitated by Advisory Board members)
4:30p	Facilitators share key issues identified by participants
5:00p	Conclude

_____

5:30p	In Person Reception & Networking (Optional for participants in SLC)
7:30p	Conclude

Friday, September 23rd

9:00a	Welcome & Overview
9:10a	Introduction of Panelists
9:15a	Panel 1: Age-friendly Neighborhoods (Mike Watson)
	(Discussion/Q&A with 2 regional panelists)
10:00a	Panel 2: Age-friendly Campuses (Dr. Joann Montepare)
	(Discussion/Q&A with 2 regional panelists)
10:45a	Break
11:00a	Panel 3: Age-friendly Health Systems (Patricia D'Antonio)
	(Discussion/Q&A with 2 regional panelists)
11:45a	Participant Perspectives: World Café (Dr. Sarah Canham)
	(3 rounds @ 20 minutes each)
1:15p	Break
1:30p	Online awards luncheon: Student ideas competition awards
2:00p	Facilitators share key ideas from World Café /Discussion & Reflections
3:00p	Conclude

Symposium Event Details

Thank you!

September 22nd & 23rd

Keynote: Th, Sep 22, 2:00-5:00p (Online)
Networking Reception: Th, Sep 22, 5:30-7:30p
Panels & Knowledge Café: Fri, Sep 23, 9a-3p (Online)
Student Ideas Competition Awards: Fri, Sep 22, 1:30p (Online)
Join our team @ Walk to End Alzheimer's: Sat, Sep 24, 11:00a

Registration

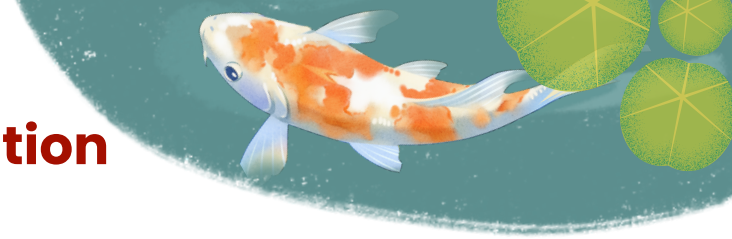
https://www.utahgwep.org/age-friendly-communities-symposium

Sponsorship Opportunities

If you would like to learn more about opportunities to donate to this event, or if you have questions, please contact:

Linda Edelman at linda.edelman@nurs.utah.edu
Valerie Greer at valerie.greer@Utah.edu

“Koi Pond” Age-Friendly Communities Student Competition



What is the “Koi Pond” Age-Friendly Communities Student Competition?

The “Koi Pond” Age-Friendly Communities Student Competition will be hosted by the Age-Friendly Communities Symposium. The goal of the Koi Pond student competition is for teams of 2-4 students to come up with an innovative idea or solution to a current aging issue that exist within their communities, neighborhoods, campuses, health care, and/or environments. Teams will be asked to create and submit a 3-5-minute video to pitch an idea or solution.

Why is it called a “Koi Pond” competition?

You’ve heard of the television show, Shark Tank, where budding entrepreneurs showcase their business ideas and compete for funding. We wanted to do something similar focused on creative ideas and solutions to aging issues. At 226 years old, koi Hanako was the oldest koi fish ever recorded and longest living freshwater fish to ever exist on record making Koi Pond the perfect name for this age related competition.

Why should I participate?

Here is list of perks for signing up for the competition:

1. Cash prizes for video winners
2. Free registration to the Age-Friendly Communities Symposium
3. Great networking opportunity
4. A chance to connect and work with students from different schools
5. Looks great on a resume/CV

Winners will be announced, and cash prizes will be awarded at the symposium on Friday, September 23.

How do I learn more?

Find more information and sign up for the competition by visiting the Koi Pond student competition webpage here.

Register for the symposium and invite your friends to do the same! It’s free for students.

Scan for Webpage

Scan for Registration

THE UTAH GERIATRIC EDUCATION CONSORTIUM (UGEC) AGE-FRIENDLY ECHO IN PARTNERSHIP WITH COMAGINE HEALTH PRESENTS

Immunizations Updates and Best Practices for Long Term Care

Adrienne Butterwick &
Karen Taubert, RN, BSN, ,MBA

Thursday, August 18, 2022
2:00 PM - 3:15 PM (MT)

Adrienne Butterwick is a Senior Improvement Advisor at Comagine Health. She is currently working on quality improvement efforts directed by the Centers for Medicare & Medicaid Services (CMS) to improve quality of care for residents living in post-acute and long term care as well as assisted living and home health, as well as an initiative to increase advance care practices in those settings. She completed her Bachelors of Science degree in Behavioral Science and Health at the University of Utah in 2007 and her Master's in Public Health at Westminster College in 2014. She has also earned recognition as a Certified Healthcare Education Specialist (CHES). In her 15 years of public health project management she has also worked in rural health research, provider education programs and care management. She has a strong passion for quality improvement and public health.

Karen Taubert, RN, BSN, MBA possesses 40 years of clinical and administrative leadership experience in acute, home health, nursing facility, and safety net settings. She is currently a Senior Consultant for Comagine Health, a position in which she provides a variety of technical assistance activities related to the company's medical home consulting engagements.

Registration:

• Register for the UGEC Age-Friendly LTSS ECHO series through this link:
https://utah.zoom.us/meeting/register/tJEvc-GsrjwuHdPZyXyZ3dUPxhmGy7j3b8lr

ECHO Passcode: 968680

• After registering, click on "Add to Calendar" to add the meeting series to your calendar

CME Credit:

Before midnight, call 801-478-5852 and submit today's code: **230254**
For more information on how to claim CME credit, please visit the UGEC website.

Questions:

• Contact Jacquie Telonidis at jacqueline.telonidis@hsc.utah.edu

Visit us at **utahgwep.org**
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Alzheimer's Disease and Related Dementias (ADRD) Online Education Program

Four modules to increase knowledge about ADRD and improve care of residents with dementia. These modules are designed for patients, family members, and direct care workers employed in long-term services and supports (LTSS).

1. Overview of dementia

What are common types of dementia?

2. Effective communication within LTSS

How does communication impact care?

3. Understanding behaviors and your approach

How does dementia impact language, visuospatial skills, and personality?

4. Communication and understanding behaviors

How can you promote physical mobility while reducing the risk of falls and unsafe wandering?

Self paced and takes only **3 hours** to earn your Utah Geriatric Consortium Certificate!

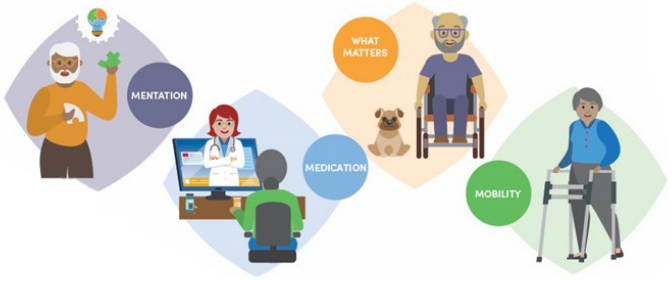
Along with the covered topics, each module includes a case study of "Mrs. Jones" that is used to demonstrate the skills and techniques raised in each module.

Participants will be asked to complete an anonymous survey both before and after completion of the modules. To get started, visit utahgwep.org/trainings/dementia-training.

This program is supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under grant number U1QHP28741 as part of an award totaling 3.5 million dollars with 0% financed with non-governmental sources. The content of this program do not necessarily represent the official views of, nor an endorsement, by HRSA, HHS, or the U.S. Government.

UTAH GERIATRIC EDUCATION CONSORTIUM
UGEC

Connecting Care Through Telehealth for Long-Term Services and Supports



An online course designed using the Age-Friendly Health Systems 4Ms framework to inform and improve best practices about telehealth and virtual services for providers and care-teams, patients/residents, and families and caregivers in long-term services and supports (LTSS) settings through the following modules:

- Telehealth and Virtual Services in LTSS
- Connecting and Setting up a Telehealth Visit
- Facilitating a Successful Telehealth Visit
- Tele-Visit Tutorials for Patients, Families, and Caregivers
- Monitoring and Quality Improvement of Telehealth Programs

This course also includes checklists, technology troubleshooting tips, and communication guidelines that can be modified for your LTSS setting.

TO ENROLL IN THIS COURSE, CLICK HERE

For more information about the Utah GWEP, visit our website at https://utahgwep.org

This course is supported by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) under grant number T1MHP39052 as part of an award totaling $90,625 with 0 percentage financed with non-governmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by HRSA, HHS, or the U.S. Government

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UTAH GERIATRIC EDUCATION CONSORTIUM

UGEC

The Utah Geriatric Education Consortium (UGEC) is a Health Resources and Services Agency (HRSA) funded Geriatric Workforce Enhancement Program. First funded in 2015, the goal of the UGEC is to expand educational and training programs on the 4 M's of Age-Friendly Health Systems - mobility, medications, mentation and what matters across health profession training programs, Long-Term Services and Supports (LTSS) and ambulatory care settings.

UGEC programs for students, LTSS health care providers and staff, and the community include:

- Age-Friendly LTSS ECHO
- LTSS Nurse Residency Program
- Alzheimer's Disease and Related Dementia Online Training Modules
- Interprofessional Education Courses about Long-Term Care and Communicating with Older Adults
- Gerontology Interdisciplinary Program Graduate Certificates with an Emphasis in LTSS
- Serious Illness Conversation Guide Training
- Community Fireside Chats promote Age-Friendly Health Care and Dementia-Friendly Communities
- Opioid Use in Long-Term Care Training Modules
- Implementing the 4M's Framework in Ambulatory Care settings
- Connecting Care Through Telehealth for Long-Term Services and Supports
- Serious illness Conversation Guide Training
- Motivational Interviewing
- GOC Training

We are honored to include the following LTSS and ambulatory care partners in our work: Mission Health Services, Avalon Health Care, Cascades Healthcare, Legacy Retirement Communities, Community Nursing Services, Aspire Home Health, Homecare & Hospice Association of Utah, Envision Home Health and Solstice Home Health, Hospice and Palliative Care and the University of Utah Ambulatory Care Clinics.

Our community partners include Comagine Health, the University of Utah, the Salt Lake Veterans Affairs Geriatric Research Education and Clinical Center, the Utah Commission on Aging, Utah Department of Health, the Utah Chapter of the Alzheimer's Association, and the Utah Health Care Association.

The UGEC is funded by the Health Resources and Services Administration (HRSA) of the U.S. Department of Health and Human Services (HHS) as part of an award totaling $3,750,000 with zero percentage financed with non-governmental sources. The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by HRSA, HHS or the U.S. Government.

ROLES IN LONG-TERM SERVICES AND SUPPORTS

Free Video Modules Available

The following video modules were produced by Utah's homecare and hospice, skilled nursing, and assisted living associations with the support of the Utah Geriatric Education Consortium.

Learn more about the long-term care and end-of-life industries from those who work in them. Presenters describe typical work responsibilities, discuss important qualifications and characteristics of successful employees, and give tips on where to learn more or get started. Workers share what they love about their jobs as well as its challenges, while care beneficiaries share why their care team means so much to them!

Working in Hospice - https://vimeo.com/576512191

Working in Home Health as a Licensed Professional - https://vimeo.com/576561070

Working in Home Health as a CNA - https://vimeo.com/576554155

Working in Personal Care - https://vimeo.com/576566297

Working in Skilled Nursing as a Licensed Professional - https://vimeo.com/576529589

Working in Skilled Nursing as a CNA - https://vimeo.com/576525420

Working in Assisted Living - https://vimeo.com/576519406

Homecare & Hospice Association of Utah

UHCA UTAH HEALTH CARE ASSOCIATION

UTAH ASSISTED LIVING ASSOCIATION

UGEC UTAH GERIATRIC EDUCATION CONSORTIUM

Opioid Use in Long-Term Services and Supports Online Modules

The overarching purpose of the Utah Geriatric Education Consortium's interprofessional Opioid Use in Long-Term Services and Supports online modules is to educate students, health care providers and long-term services and supports staff about appropriate opioid use in the nursing home resident population.

Module topics and objectives include:

Module 1: Opioid use in long-term care

- Summarize the prevalence of pain and opioid use in long-term care.
- Review the complexities and potential ill effects of long-term informal caregiving.
- Address family's role in supporting the goals of the facility provider's recommendations.

Module 2: Opioids and risks in older adults

- Summarize risk factors for opioid toxicity associated with older adults, including polypharmacy, comorbidities, drug interactions, and physiologic changes
- Identify factors to consider when prescribing opioids in older adults

Module 3: Opioid use in older adults with dementia

- Summarize the incidence of opioid prescribing in LTC in persons with dementia
- Identify risks of opioids use in persons with dementia in LTC
- Describe how to assess pain in persons with dementia

Module 4: Recommendations and strategies for opioid use in older adults

- List select key guideline recommendations relating to prescribing opioids in older adults
- Formulate strategies to minimize risk of opioid toxicity in older adults

Module 5: Applying opioid wisdom to long-term care

- Discuss opioid stewardship strategies in nursing homes
- Describe an approach to minimize the risk of adverse events, dependency and diversion

Module 6: SBIRT- A hammer or screwdriver? Choosing the right tool

- Describe an approach for screening for alcohol and other drug problems
- List available resources for screening tools

Module 7: Non-opioid pharmacological & non-pharmacological pain management techniques

- Identify recommended non-opioid pharmacological interventions
- Identify evidenced-based non-pharmacological interventions
- Review connection between depression and pain in older adults
- Identify ways to screen for depression and anxiety in LTC

Module 8: Motivational Interviewing

- Identify the differences between traditional and patient-centered patient education
- Describe the worst and best case scenarios in behavior change counseling
- Apply motivational interviewing principles and strategies to a case study

The modules each take about 20 minutes to complete. Instructions for delivering the modules as a group educational activity are included.

To access the modules, visit www.utahgwep.org/trainings/managing-opioid-use-in-long-term-services-and-support

This work was funded by the Health Resources & Services Administration (HRSA), U.S. Department of Health and Human Services (HHS) grant number U1QHP28741 Geriatrics Workforce Education Program (GWEP)

UGEC UTAH GERIATRIC EDUCATION CONSORTIUM

Original Research Article

The Longitudinal Association of Late-Life Visual and Hearing Difficulty and Cognitive Function: The Role of Social Isolation

Journal of Aging and Health
2022, Vol. 0(0) 1–10

DOI: 10.1177/08982643211063338
journals.sagepub.com/home/jah
SAGE

Jeremy B. Yorgason, PhD[1], Corinna Trujillo Tanner, PhD, RN, MSN[2], Stephanie Richardson, BA[1], Melanie M.Y. Serrao Hill, PhD[1], Brian Stagg, MD, MPH[3], Markus Wettstein, PhD[4], and Joshua R. Ehrlich, MD, MPH[5]

Abstract

Objectives: Sensory impairments are prevalent among older adults and have been associated with cognitive challenges in later life, yet mechanisms are less well understood. We examined the mediating role of social isolation in the longitudinal relationship between self-reported sensory difficulty and impaired cognitive functioning among older adults.

Methods: Data were taken from the NHATS Study, an annual survey of Medicare beneficiaries' age ≥ 65. Participants (N = 6, 338) provided data at Rounds 5, 6, and 7 (2015, 2016, 2017). Structural equation models were estimated to test longitudinal direct and indirect associations.

Results: All sensory difficulties were negatively associated with all cognitive functioning measures cross-sectionally through social isolation. Longitudinally, vision difficulty and dual sensory difficulty were indirectly associated with cognitive functioning across time. Hearing difficulty had no longitudinal indirect associations with cognitive functioning through social isolation.

Discussion: Social isolation is an important pathway through which late-life vision difficulty is associated with decreased cognitive function.

Keywords

hearing, vision, cognitive function, social factors, longitudinal analysis

Introduction

Sensory impairments, including visual, hearing, and dual sensory impairment, are highly prevalent among older adults, and the number of individuals affected is rapidly increasing as the population ages (Swenor et al., 2013). Self-reported visual impairment (VI), which affects 9% of adults 65 and older in the U.S. (Patel et al., 2020), and self-reported hearing impairment (HI), which affects 31% of adults age 60–69 and 63.1% of those 70 and older (Goman & Lin, 2016), have a negative impact on many domains of health, including cognitive functioning (Bainbridge & Wallhagen, 2014; Swenor et al., 2020; Shah et al., 2020; Shukla et al., 2020; Whitson et al., 2018; Lin & Albert, 2014). These challenges are compounded in the case of dual sensory impairment, which is present in up to 11% of adults age 60 and older (Swenor et al., 2013).

All sensory impairments increase risk for social isolation (Shah et al., 2020; Shukla et al., 2020), which cross-sectional research has demonstrated to be an important mediator of the relationship between sensory impairment and cognitive impairment (Whitson et al., 2018). However, when considering whether the association of sensory impairment with cognitive decline occurs via social isolation, it is essential to consider longitudinal data to provide evidence of processes that develop over time and to establish directionality. Establishing these associations in a nationally representative sample may allow for greater generalizability of findings. This study examined longitudinal associations between self-reported sensory difficulty and cognitive impairments

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indirectly through social isolation in a nationally representative sample of older adults.

Direct Links Between Sensory Impairment and Cognitive Functioning

VD, HD, and DSD are independently associated with cognitive impairment (Lin & Albert, 2014; Whitson et al., 2018; Zheng et al., 2018). The relationships between sensory impairments and cognitive impairment are complex, and numerous mechanisms have been hypothesized. Sensory impairments and cognitive impairment may share common causes, such as changes of the central nervous system (Baltes & Lindenberger, 1997), vascular disease, and neurodegeneration (Dichgans & Leys, 2017). Sensory impairments may also increase the cognitive load required for sensory processing, which may lead to poor cognitive outcomes (Pigeon et al., 2019) or result in direct alteration of brain structure, including both regional and whole-brain atrophy, due to decreased afferent sensory input (McEwen, 2000). Conversely, preserving sensory function may be protective of cognitive function and brain structure in vision (Tamura et al., 2004) and hearing (Dawes et al., 2015).

Sensory Impairment and Cognitive Functioning: The Role of Social Isolation

Social isolation has been proposed as a potential mediator of the association between decreased sensory and cognitive functions (Livingston et al., 2020). Vision and hearing are basic forms of interchange between individuals and their environment. When typical forms of communication are interrupted, there is evidence that social isolation often results (National Academies of Sciences, Engineering, and Medicine, 2020; Shah et al., 2020; Shukla et al., 2020). Individuals with self-reported vision impairments are less likely to engage in out-of-home leisure and social activities (Heyl et al., 2005). Socially engaging activities provide cognitive stimulation, which may protect against cognitive decline (Lövdén et al., 2005). This is consistent with the cascade hypothesis, in which cognitive decline is driven by a lack of cognitive stimulation related to sensory loss (Varadaraj et al., 2020). Established literature suggests that a lack of social engagement, or *social isolation,* may be a key modifiable risk factor that links sensory impairment with later cognitive impairment (Livingston et al., 2020). The current study fills this gap by providing a longitudinal perspective of social isolation as a mechanism linking sensory difficulty and cognitive functioning among older adults.

Current Study

In this study, we examined the longitudinal relationship between self-reported vision difficulty (VD), hearing difficulty (HD) and dual sensory difficulty (DSD), and cognitive function using a nationally representative sample from the National Health and Aging Trends Study (NHATS). We hypothesized that having one or more self-reported sensory difficulties would be associated with poorer cognitive functioning cross-sectionally, and longitudinally, across 1 and 2 years and that these relationships would be associated indirectly through social isolation.

Methods

Study Sample

The National Health and Aging Trends Study (NHATS) is a nationally representative panel study of Medicare beneficiaries' age ≥ 65 years. The study began in 2011 with a total of 8,245 persons. In 2015, the sample was replenished, including 8,334 persons. The current analysis utilized 3 years of data spanning Round 5 in 2015 to Round 7 in 2017. Because NHATS data are publicly available and de-identified, the institutional review board at the first author's institution deemed this study exempt. To decrease potential confounding and endogeneity, we excluded those individuals who did not live in a community setting (n = 1264) and those who additionally had probable dementia at Round 5 (n = 732), thus allowing for the inference of directionality of the effect of social isolation on later cognitive functioning. The remaining participants made up the analytic sample (N = 6338). Among the analytic sample, there was some attrition over time, with approximately 1% missing on measures of cognitive functioning at Round 5, approximately 14% missing on those measures at Round 6, and approximately 24% missing at Round 7.

Measures

Cognitive Function Measures

We employed cognitive measures collected in NHATS corresponding to orientation, executive function, and learning/memory (Kasper et al., 2013). To measure orientation, respondents were asked to recite the date, president, and vice president of the United States. Executive function was assessed using a clock-drawing test. Learning/memory was evaluated using a delayed word-recall test.

Measures of Sensory Difficulty

Three separate variables were used to assess self-reported VD, HD, and DSD. VD was measured using a total of three items. If the participant reported being blind, or that they were unable to see well enough (including when using corrective lenses—glasses or contacts) to recognize someone across the street or to read newspaper print, they were then coded as having a VD. This method was used in prior studies using NHATS data (Ehrlich et al., 2019; Frank et al., 2019; Xiang et al., 2020).

A dichotomous measure of HD was constructed using four items. If the respondent reported difficulty with any of the items, they were then coded as having hearing impairment. Hearing impairment questions related to whether respondents could "hear well enough to carry on a conversation in a quiet room," "hear well enough to carry on a conversation in a room with a radio or TV playing," and "hear well enough to use the telephone," and an item assessing whether participants were deaf ("yes" coded as 1 and "no" coded as 0). Individuals were characterized as having HD only if hearing problems were severe enough to impact their functioning (whether or not they wore a hearing aid). People with hearing aids but who did not report problems with these listed items were not coded as having a hearing difficulty for this study.

Self-reported DSD was indicated if the participant reported having both HD and VD. In the current sample, 10% (n = 578) reported HD, 6% (n = 343) reported VD, and 3% (n = 140) reported DSD.

Social Isolation

Social isolation was assessed using a 5-item scale validated in NHATS (Cudjoe et al., 2020). Social isolation scores represent a count of whether or not participants endorsed specific situations. Participants were coded as having some social isolation if they (a) lived alone, (b) if they talked to one person or fewer about "important matters" during the last year, (c) if they did not attend religious services in the past month, (d) if they did not attend clubs/classes/organized activities in the past month, and (e) if they did not participate in volunteer work during the past month. Points were summed so that higher scores indicated greater social isolation, with scores ranging from 0 to 5.

Covariates

We included conceptually relevant covariates, including age, gender, marital status, race, education, smoking status, and diagnoses of heart disease, hypertension, diabetes, and stroke. Education, rather than income, was included as an indicator of socioeconomic status (Darin-Mattsson et al., 2017) because of its association with cognitive function (Heyl & Wahl, 2014).

Statistical Analysis

Descriptive statistics, bivariate correlations, and mean difference tests were estimated to provide initial information about the sample. Structural equation modeling, using *Mplus* (Muthén & Muthén, 2017), was used to test study hypotheses. As seen in Figure 1, we examined associations of sensory difficulty in Round 5 with social isolation in Rounds 5 and 6 and cognitive function in Rounds 5, 6, and 7. We simultaneously modeled direct (not attributable to social isolation) and indirect (attributable to social isolation) associations cross-sectionally and across 1- and 2-year periods (see Hayes, 2018). Models were adjusted for all covariates and prior-wave measures of outcomes. VD and HD were estimated together in the same models, allowing for direct comparisons between the two. Models including DSD were estimated separately due to its correlation with VD (r = .52) and HD (r = .47). Estimates were calculated using full-information maximum likelihood, an estimation approach that uses all available data to address missing data. Bootstrapping with 5,000 draws was used to adjust the standard errors associated with indirect effects (Hayes & Preacher, 2010).

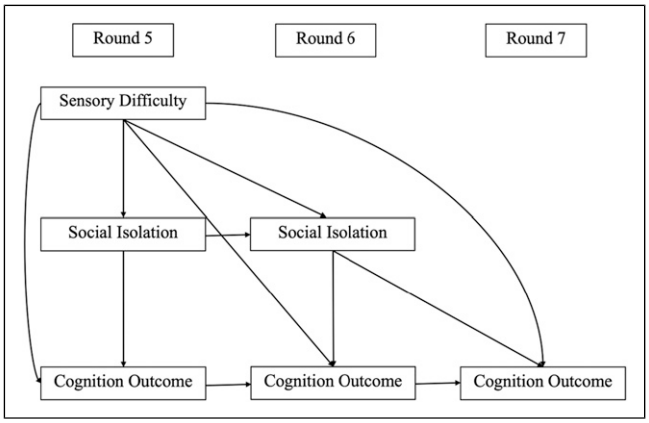

Figure 1. Diagram of the guiding conceptual and analytic model.

Results

Characteristics of the Study Sample

Table 1 summarizes the baseline characteristics of the 6,338 participants in this study. Participants ranged in age from 65 to 89 years, with the largest proportion in the 70–74 age range (26%). The majority were female (57%) and married (50%). Those with DSD were older and reported higher social-isolation scores than those with no or only one sensory difficulty. Participants without sensory difficulties had higher cognitive performance scores than those with HD, VD, or DSD, and those with DSD had significantly lower cognitive functioning scores than those with HD alone.

Associations of Self-Reported Sensory Difficulty, Social Isolation, and Cognitive Function

As seen in Models 1–3 of Table 2, VD in Round 5 was significantly associated with learning/memory scores 1 year later ($\beta = -.03$, $p < .01$), concurrent orientation ($\beta = -.06$, $p < .001$), and all three waves of executive function (Round 5: $\beta = -.09$, $p < .001$; Round 6: $\beta = -.07$, $p < .001$; Round 7: $\beta = -.05$, $p < .01$). In all three models, VD in Round 5 was associated with greater social isolation concurrently (β's = .03 to .04, $p < .01$) and 1 year later (β's = .03, $p < .01$). HD in Round 5 was significantly associated with concurrent, but not future, learning/memory ($\beta = -.04$, $p < .01$), and orientation

Table 1. Descriptive Statistics from Round 5 of NHATS and ANOVA Analyses of Main Study Variables (N (%) or M (SD)).

Variable	NHATS Total Study Sample	No Sensory Difficulty (n = 4511)	Hearing Difficulty (n = 578)	Visual Difficulty (n = 343)	Dual Sensory Difficulty (n = 140)	Mean Difference p-values
Age groups		a	b	c	d	$p < .001$
65–69	1013 (15.98%)	829 (18.38%)	68 (11.76%)	50 (14.58%)	18 (12.86%)	
70–74	1651 (26.05%)	1310 (29.04%)	109 (18.86%)	78 (22.74%)	17 (12.14%)	
75–79	1428 (22.53%)	1053 (23.34%)	111 (19.20%)	86 (25.07%)	22 (15.71%)	
80–84	1126 (17.77%)	753 (16.69%)	125 (21.63%)	55 (16.03%)	23 (16.43%)	
85–89	728 (11.49%)	410 (9.09%)	88 (15.22%)	52 (15.16%)	29 (20.71%)	
≥ 90	392 (6.18%)	156 (3.46%)	77 (13.32%)	22 (6.41%)	31 (22.14%)	
Sex		a	b	c	a	$p < .001$
Male	2726 (43.01%)	1823 (40.41%)	299 (51.73%)	112 (32.65%)	52 (37.14%)	
Female	3612 (56.99%)	2688 (59.59%)	279 (48.27%)	231 (67.35%)	88 (62.86%)	
Education level		a	b	c	c	$p < .001$
No Degree	1211 (19.11%)	803 (17.80%)	144 (24.91%)	112 (32.65%)	61 (43.57%)	
High School	3119 (26.38%)	1164 (25.80%)	170 (29.41%)	102 (29.74%)	38 (27.14%)	
Some college	2355 (26.87%)	1257 (27.87%)	139 (24.05%)	76 (22.16%)	19 (13.57%)	
College degree	2986 (25.59%)	1192 (36.42%)	115 (19.90%)	46 (13.41%)	19 (13.57%)	
Marital status		a	a	b	b	$p < .001$
Married	1760 (50.42%)	1305 (50.72%)	159 (51.79%)	69 (37.70%)	27 (34.62%)	
Not married	1731 (49.58%)	1268 (49.28%)	148 (48.21%)	114 (62.30%)	51 (65.38%)	
Smokes now		a	a	a	a	$p = .073$
No	5863 (92.51%)	4140 (91.80%)	540 (93.43%)	305 (88.92%)	132 (94.29%)	
Yes	474 (7.15%)	370 (8.20%)	38 (6.57%)	38 (11.02%)	8 (5.71%)	
Race/Ethnicity		a	b	c	c	$p < .001$
White, non-Hispanic	4391 (69.28%)	3031 (68.89%)	434 (76.14%)	180 (53.89%)	79 (58.09%)	
Non-White	1799 (28.38%)	1369 (31.11%)	136 (23.86%)	154 (46.11%)	57 (41.91%)	
Social isolation	2.46 (1.27)	2.42[a]	2.72[b]	2.74[b]	3.12[c]	$p < .001$
Clock-drawing	3.77 (1.07)	3.83[a]	3.69[b]	3.39[c]	3.16[c]	$p < .001$
Delayed word recall	3.61 (2.01)	3.71[a]	3.16[b]	3.20[b]	2.47[c]	$p < .001$
Orientation	6.69 (1.44)	6.79[a]	6.32[b]	6.17[b]	5.58[c]	$p < .001$

Notes. Differences in superscripts a, b, c, and d represent significant mean group differences.

(β = −.06, $p < .001$), and with social isolation (β's = .05 to .06, $p < .001$). As seen in Models 1-3 of Table 3, DSD in Round 5 was significantly associated with concurrent, but not future, learning/memory (β = −.03, $p < .05$), orientation (β = −.07, $p < .001$), and executive function (β = −.05, $p < .01$). In Tables 2 and 3, greater social isolation at Round 5 was significantly associated with lower scores on nearly all cognitive indicators in all rounds. Predictors account for between 30% and 47% of the variance in cognitive-functioning scores at Round 7, suggesting that the models provide a robust view of cognitive functioning in the context of important related factors.

Mediation Analyses

Results of mediation analyses indicated significant associations between sensory difficulty and cognitive outcomes mediated by social isolation (shown as percentage of total effect mediated) and are presented in Supplemental Table 1 and in Figures 2 and 3. Baseline VD was significantly associated with all three concurrent (Round 5) cognitive-functioning measures through social isolation (learning/memory: 25% of total effect, $p < .01$; orientation: 5% of total effect, $p < .05$; executive function: 2% of total effect, $p < .05$). Longitudinally, baseline VD was associated with learning/memory (9% of total effect, $p < .01$) 1 year later through Round 6 social isolation, and with learning/memory (9% of total effect, $p < .01$) and orientation (5% of total effect, $p < .01$) 2 years later through Round 6 social isolation.

Baseline HD was associated with all three concurrent (Round 5) cognitive-functioning measures through social isolation (learning/memory: 11% of total effect, $p < .01$; orientation: 6% of total effect, $p < .01$; executive function: 50% of total effect, $p < .01$), though HD was not associated with cognitive function longitudinally. Baseline DSD was associated with all three concurrent cognitive measures through social isolation (learning/memory: 11% of total effect, $p < .01$; orientation: 6% of total effect, $p < .01$; executive function: 6% of total effect, $p < .01$) and was significantly associated longitudinally with learning/memory (10% of total effect, $p < .05$) 1 year later through Round 6 social isolation.

Table 2. Standardized Regression Coefficients From Structural Equation Model of Self-Reported Vision and Hearing Difficulty Predicting Cognitive Functioning Indirectly Through Social Isolation.

Predictor Variable	Model 1 Learning/Memory ß (*SE*)	Model 2 Orientation ß (*SE*)	Model 3 Executive Function ß (*SE*)
VD →R5 CI	−.012 (.01)	−.061*** (.01)	−.087*** (.01)
VD →R6 CI	−.032** (.01)	−.010 (.01)	−.066*** (.01)
VD →R7 CI	.012 (.01)	−.018 (.01)	−.048** (.02)
HD →R5 CI	−.039** (.01)	−.062*** (.01)	−.003 (.01)
HD →R6 CI	−.006 (.01)	−.011 (.01)	.008 (.01)
HD →R7 CI	−.015 (.01)	.004 (.01)	.011 (.02)
Social isolation →R5 CI	−.093*** (.01)	−.074*** (.01)	−.056*** (.01)
Social isolation →R6 CI	−.081*** (.01)	−.029* (.01)	−.033* (.01)
Social isolation →R7 CI	−.030** (.01)	−.036** (.01)	−.024± (.01)
VD →R5 social isolation	.043*** (.01)	.034** (.01)	.033** (.01)
VD →R6 social isolation	.031** (.01)	.029** (.01)	.029** (.01)
HD →R5 social isolation	.050*** (.01)	.051*** (.01)	.058*** (.01)
HD →R6 social isolation	−.001 (.01)	.000 (.01)	.002 (.01)
VD →R5 social isolation →R5 CI	−.004** (.00)	−.003* (.00)	−.002* (.00)
VD →R6 social isolation →R6 CI	−.003** (.00)	−.001± (.00)	−.001± (.00)
VD →R6 social isolation →R7 CI	−.001* (.00)	−.001* (.00)	−.001 (.00)
HD →R5 social isolation →R5 CI	−.005** (.00)	−.004** (.00)	−.003** (.00)
HD →R6 social isolation →R6 CI	.000 (.00)	.000 (.00)	.000 (.00)
HD →R6 social isolation →R7 CI	.000 (.00)	.000 (.00)	.000 (.00)
Chi-square model fit	12,247.93***	12,572.22***	8740.76***
RMSEA	.02	.02	.02
CFI	1.00	1.00	1.00
R^2 of R7 CI	.47***	.47***	.30***

Note. N = 6,338. VD = vision difficulty; HD = hearing difficulty; R = Round; CI = cognitive impairment; RMSEA = root mean squared error of approximation; CFI = Comparative Fit Index. R5 was in 2015, R6 was in 2016, and R7 was in 2017. Arrows denote a directional regression; multiple arrows denote an indirect relationship. Covariates were age, gender, marital status, race, education, smoking status, and chronic health conditions (heart disease, hypertension, diabetes, and stroke). ±p < .10, *p < .05, **p < .01, ***p < .001.

Table 3. Standardized Regression Coefficients from Structural Equation Models of Self-Reported Dual Sensory Difficulty Predicting Cognitive Functioning Indirectly Through Social Isolation.

Predictor Variable	Model 1 Learning/Memory ß (*SE*)	Model 2 Orientation ß (*SE*)	Model 3 Executive Function ß (*SE*)
DSD →R5 CF	−.031** (.01)	−.065*** (.02)	−.051** (.02)
DSD →R6 CF	−.018 (.01)	−.015 (.01)	−.011 (.02)
DSD →R7 CF	.002 (.01)	−.001 (.02)	−.019 (.02)
Social isolation →R5 CF	−.084*** (.01)	−.077*** (.01)	−.064*** (.01)
Social isolation →R6 CF	−.086*** (.01)	−.029* (.01)	−.041** (.01)
Social isolation →R7 CF	−.032** (.01)	−.037** (.01)	−.031* (.01)
DSD →R5 social isolation	.048*** (.01)	.049*** (.01)	.049*** (.01)
DSD →R6 social isolation	.022* (.01)	.023* (.01)	.023* (.01)
DSD →R5 social isolation →R5 CF	−.004** (.00)	−.004** (.00)	−.003** (.00)
DSD →R6 social isolation →R6 CF	−.002* (.00)	−.001 (.00)	−.001± (.00)
DSD →R6 social isolation →R7 CF	−.001 (.00)	−.001± (.00)	−.001 (.00)
Chi-square	12,468.68***	12,516.34***	9053.17***
RMSEA	.02	.02	.03
CFI	1.00	1.00	1.00
R^2 of R7 CF	.47***	.47***	.30***

Note. N = 6,338. DSD = dual sensory difficulty, CF = cognitive function; RMSEA = root mean squared error of approximation, CFI = Comparative Fit Index; R = Round. R5 was in 2015, R6 was in 2016, and R7 was in 2017. Arrows denote a directional regression; multiple arrows denote an indirect relationship. Covariates were age, gender, marital status, race, education, smoking status, and chronic health conditions (heart disease, hypertension, diabetes, and stroke). ±p < .10, *p < .05, **p < .01, ***p < .001.

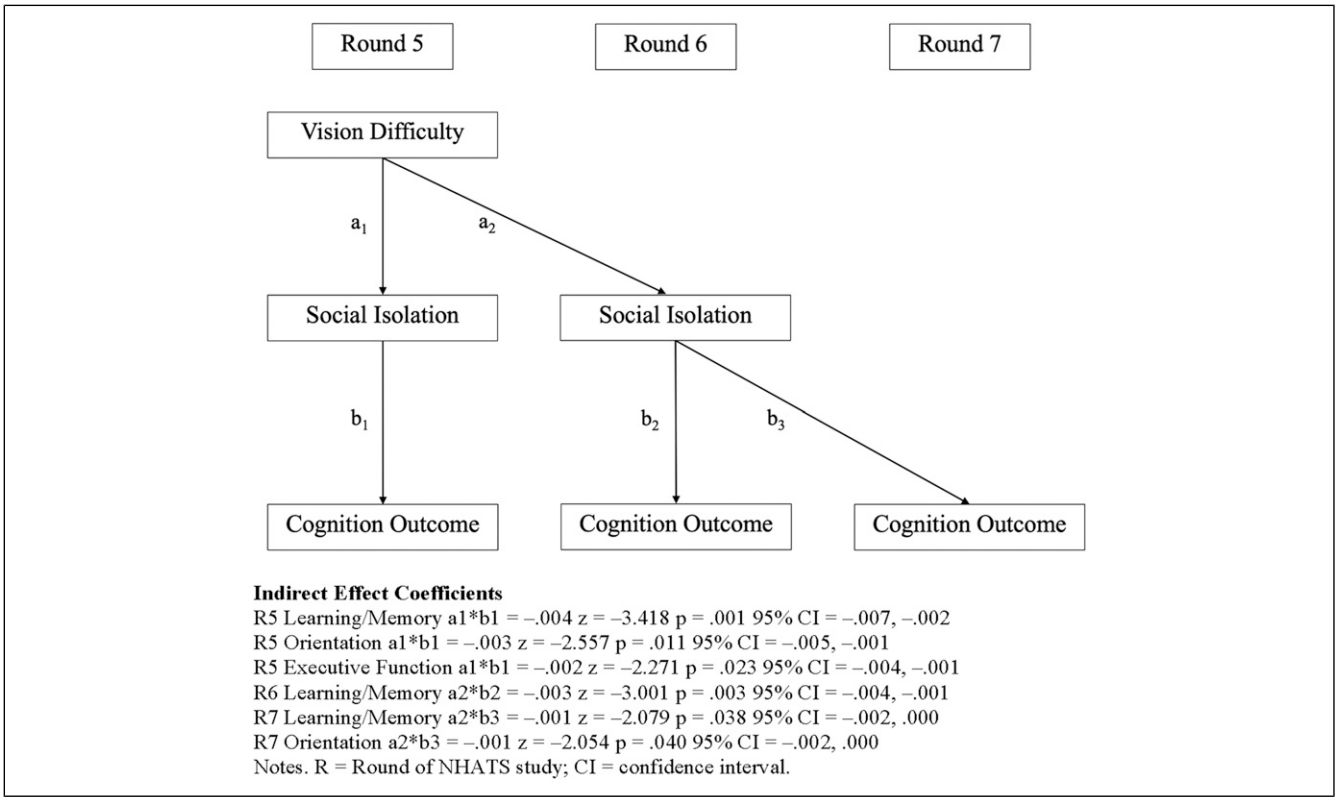

Figure 2. Results from tests of indirect effects of vision difficulty on cognitive outcomes through social isolation, indirect effect coefficients.

Indirect association effect sizes were generally small (Kenny, 2021).

Discussion

Using data from the nationally representative NHATS, we tested longitudinal associations between self-reported sensory difficulty and multiple measures of cognitive function, as well as whether this association was mediated by social isolation. Findings indicated that all cross-sectional associations between VD, HD, and DSD and cognitive function operated through social isolation. However, longitudinally, only the associations of VD and DSD with cognitive function appeared to be significantly mediated by social isolation. The proportion of indirect to total effects suggests that social isolation accounts for around or less than 10% in most cases, although in one case it accounted for 50% of the total effect of sensory difficulty on cognitive functioning. Taken together, results indicated that social isolation likely plays a small yet consistent role in the sensory–cognitive association.

Visual Difficulty

The finding of a longitudinal association between VD and cognitive function is in agreement with prior studies based on both self-reported VD (Davies-Kershaw et al., 2018; Maharani et al., 2018) and objectively measured visual function (Lee et al., 2020; Naël et al., 2019; Zheng et al., 2018). In fact, a recently published meta-analysis of longitudinal studies found that the odds of impaired cognitive function were significantly higher among adults with VD than among adults with normal vision (OR = 1.7; Vu et al., 2020). The current study builds on this literature, providing evidence of the association of VD with domain-specific cognitive function in a U.S. population-based sample. Notwithstanding the robust and consistent association of poor vision with cognitive function, vision has not yet been widely recognized in summaries of population attributable risk factors for dementia (Livingston et al., 2020).

In our study, VD was longitudinally associated with cognitive functioning 2 years later through social isolation. Few other studies have sought to test hypothesized mediators that might account for the association between visual and cognitive function. A cross-sectional study in Canada showed only weak mediating effects by social isolation between objectively measured sensory and cognitive difficulties (Hämäläinen et al., 2019). The researchers in that study reported that social factors were most important for cognitive abilities for females and older individuals, the latter of which was not surprising, as the sample ranged in age from 45 to 85 years. The current study extends those findings and provides

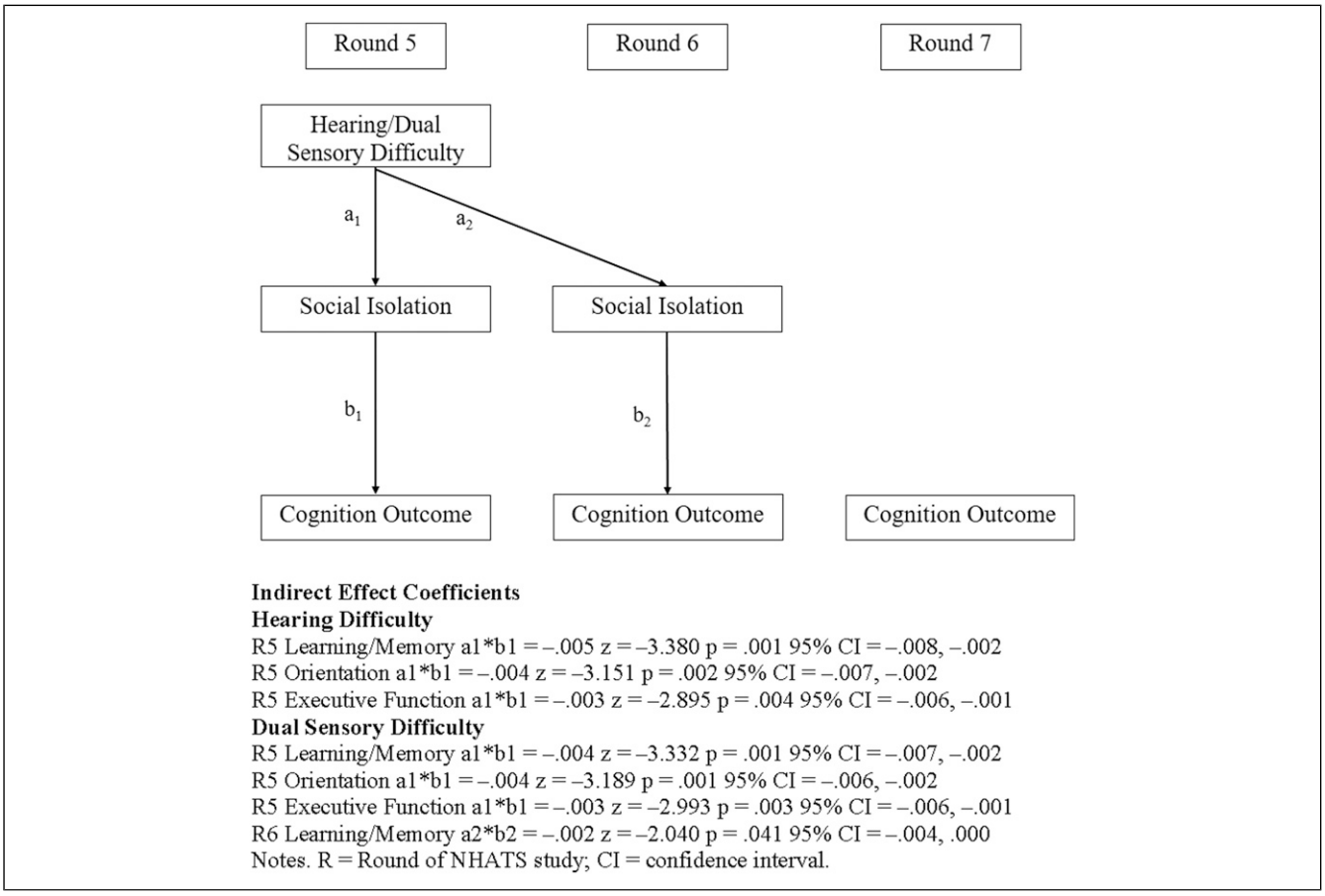

Figure 3. Results from tests of indirect effects of hearing difficulty and dual sensory difficulty on cognitive outcomes through social isolation.

longitudinal evidence supporting these associations. Although we accounted for age, gender, and other covariates, we did not explore how these characteristics might moderate direct and indirect associations between sensory difficulty and cognitive functioning. Future research is needed to better understand the specific groups for whom these associations may be most important. For instance, associations between sensory difficulties and cognition are found to be stronger when individuals have higher neuroticism scores (Gaynes et al., 2013; Wettstein et al., 2016). Additionally, social isolation accounted for only a fraction of the total association between vision and cognition, suggesting a need to investigate additional contributory mechanisms, including other mediators, such as genetics, cognitive reserve, sensory deprivation, and physiological as well as lifestyle factors.

Hearing Difficulty

As hypothesized and supported by prior research (Shukla et al., 2020), HD was associated with higher concurrent levels of impaired cognitive functioning and a significant fraction of this association was attributable to social isolation. Like VD, HD may impede social interactions, and prior research has suggested that this can lead to decreased cognitive functioning (Zheng et al., 2018). However, in the current study, HD was not significantly associated with a longitudinal decline in cognitive function. One possibility is that HD may have been underreported in the current sample. Some prior investigations have found that older adults tend to overestimate their hearing ability (Bainbridge & Wallhagen, 2014).

Dual Sensory Difficulty

Like VD and HD, DSD was associated with impaired cognitive functioning through social isolation cross-sectionally. DSD was also associated with learning/memory across 1 year through social isolation. Because VD and HD were independently associated with impaired cognitive functioning, it was not surprising that DSD was also associated with impaired cognitive functioning. In support of prior research, DSD may be a risk factor for cognitive decline and dementia in later life (Brenowitz et al., 2019).

Based on our findings, it appears likely that sensory difficulties have a considerable impact on concurrent and

sometimes longitudinal social interactions and cognitive performance. Prior research has suggested that individuals with DSD may be at greater risk for adverse cognitive outcomes (Brenowitz et al., 2019). At the same time, it is possible that some older adults with sensory difficulties make adaptations to overcome social isolation, which may explain why some effects of sensory difficulties relating to cognitive functioning did not persist over time. Further research examining the nuances of how social networks, social connectedness, and loneliness are impacted by different sensory difficulties over long periods of time is needed to better understand the potential mediating role of these psychosocial constructs on cognitive outcomes.

Strengths and Limitations

Although prior studies have reported an association between sensory difficulties and impaired cognitive functioning, the pathways that account for this association have not been rigorously tested in longitudinal studies. A key strength of the current study is that it investigated the associations between sensory difficulties and cognitive function, as well as the mediating role of social isolation in a single longitudinal model. Additionally, the NHATS data used in this study are generalizable to the Medicare-eligible U.S. population age 65 years and older, which represents a population at high risk for sensory, cognitive, and social dysfunction. There were also several limitations to this study. Data on sensory difficulty and social isolation were based on self-reports, which may be subject to recall and social-desirability biases. Self-reported measures of sensory difficulty may in fact represent distinct latent constructs from objective measures of sensory status (e.g., visual acuity, pure-tone audiometry). However, both types of measures may be important in assessing functional status and outcomes related to sensory health (Gaynes et al., 2013), and there is substantial overlap between self-reported and objectively measured sensory function (Ng & Loke, 2015). Future work could compare associations between cognitive function and these two types of sensory measures. Data may also have been subject to survival bias, wherein the least healthy participants were less likely to continue study participation and contribute complete data. A follow-up analysis suggested that cognitive scores predicted attrition in the current sample. This could have led to an underestimation of the true rates of cognitive decline, biasing results toward the null hypothesis, as both sensory and cognitive challenges are negatively associated with survival (Ehrlich et al., 2021; Smith & Ismail, 2021).

Conclusion

Sensory difficulties impact not only the sight and hearing of older adults, but may also have a profound effect on other aspects of their lives, including social, cognitive, economic, and physical well-being (Burton et al., 2020). Consequently, there has been increasing interest in the association of sensory difficulty with cognition and dementia because vision and hearing may represent readily modifiable risk factors that could possibly be leveraged to decrease cognitive decline and prevent dementia. This study provides novel evidence on the mediating role of social isolation in the association between sensory difficulty and cognitive function in a nationally-representative sample of older U.S. adults. In fact, social isolation may represent another viable intervention target to promote cognitive health among older adults with sensory difficulty—a group that is at high risk for cognitive decline. Furthermore, interventions which focus on reducing social isolation would be protective of multiple other negative health outcomes (National Academies of Sciences, Engineering, and Medicine, 2020). Research is needed to test additional hypothesized mediating pathways between sensory difficulty and cognitive functioning, strategies to reduce social isolation in older adults with sensory difficulty, particularly vision loss, and, ultimately, to conduct trials to determine whether cognitive decline may be mitigated through interventions to optimize sensory and social function.

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References

Bainbridge, K. E., & Wallhagen, M. I. (2014). Hearing loss in an aging American population: Extent, impact, and management. *Annual Review of Public Health*, *35*(1), 139–152. https://doi.org/10.1146/annurev-publhealth-032013-182510

Baltes, P. B., & Lindenberger, U. (1997). Emergence of a powerful connection between sensory and cognitive functions across the adult life span: A new window to the study of cognitive aging? *Psychology and Aging*, *12*(1), 12–21. https://doi,org-erl.lib.byu.edu/10.1037/0882-7974.12.1.12

Brenowitz, W. D., Kaup, A. R., Lin, F. R., & Yaffe, K. (2019). Multiple sensory impairment is associated with increased risk of dementia among Black and White older adults. *The Journals of*

Gerontology: Series A, *74*(6), 890–896. https://doi.org/10.1093/gerona/gly264

Burton, M. J., Ramke, J., Marques, A. P., Bourne, R. R. A., Congdon, N., Jones, I., Ah Tong, B. A. M., Arunga, S., Bachani, D., Bascaran, C., Bastawrous, A., Blanchet, K., Braithwaite, T., Buchan, J. C., Cairns, J., Cama, A., Chagunda, M., Chuluunkhuu, C., Cooper, A., & Faal, H. B. (2020). The lancet global health commission on global eye health: Vision beyond 2020. *Lancet Global Health*, *9*(4), E489–E551. https://doi.org/10.1016/S2214-109X(20)30488-5

Cudjoe, T. K., Roth, D. L., Szanton, S. L., Wolff, J. L., Boyd, C. M., & Thorpe, R. J. Jr. (2020). The epidemiology of social isolation: National health and aging trends study. *The Journals of Gerontology: Series B*, *75*(1), 107–113. https://doi.org/10.1093/geronb/gby037

Darin-Mattsson, A., Fors, S., & Karcholt, I. (2017). Different indicators of socioeconomic status and their relative importance as determinants of health in older age. *International Journal for Equity in Health*, *16*, 173. https://doi.org/10.1186/s12939-017-0670-3

Davies-Kershaw, H. R., Hackett, R. A., Cadar, D., Herbert, A., Orrell, M., & Steptoe, A. (2018). Vision impairment and risk of dementia: Findings from the English longitudinal study of ageing. *Journal of the American Geriatrics Society*, *66*(9), 1823–1829. https://doi.org/10.1111/jgs.15456

Dawes, P., Emsley, R., Cruickshanks, K.J., Moore, D.R., Fortnum, H., Edmondson-Jones, M., McCormack, A., & Munro, K.J. (2015). Hearing loss and cognition: The role of hearing aids, social isolation and depression. *Plos One*, *10*(3), 1–10. https://doi.org/10.1371/journal.pone.0119616

Dichgans, M., & Leys, D. (2017). Vascular cognitive impairment. *Circulation Research*, *120*(3), 573–591. https://doi.org/10.1161/circresaha.116.308426

Ehrlich, J. R., Hassan, S. E., & Stagg, B. C. (2019). Prevalence of falls and fall-related outcomes in older adults with self-reported vision impairment. *Journal of the American Geriatrics Society*, *67*(2), 239–245. https://doi-org.erl.lib.byu.edu/10.1111/jgs.15628

Ehrlich, J.R., Ramke, J., Macleod, D., Burn, H., Lee, C. N., Zhang, J. H., Waldock, W., Swenor, B. K., Gordon, I., Congdon, N., Burton, M., & Evans, J. R. (2021). Association between vision impairment and mortality: A systematic review and meta-analysis. *The Lancet Global Health*, *9*(4), e418–e430. https://doi.org/10.1016/S2214-109X(20)30549-0

Frank, C.R., Xiang, X., Stagg, B.C., & Ehrlich, J.R. (2019). Longitudinal associations of self-reported vision impairment with symptoms of anxiety and depression among older adults in the United States. *JAMA Ophthalmology*, *137*(7), 793–800. https://doi.org/10.1001/jamaophthalmol.2019.1085

Gaynes, B. I., Shah, R., Leurgans, S., & Bennett, D. (2013). Neuroticism modifies the association of vision impairment and cognition among community-dwelling older adults. *Neuroepidemiology*, *40*(2), 142–146. https://doi.org/10.1159/000342762

Goman, A. M., & Lin, F. R. (2016). Prevalence of hearing loss by severity in the United States. *American Journal of Public Health*, *106*(10), 1820–1822. https://doi.org/10.2105/AJPH.2016.303299

Hämäläinen, A., Phillips, N., Wittich, W., Pichora-Fuller, M. K., & Mick, P. (2019). Sensory-cognitive associations are only weakly mediated or moderated by social factors in the Canadian longitudinal study on aging. *Scientific Reports*, *9*(1), 1–8. https://doi.org/10.1038/s41598-019-55696-5

Hayes, A.F. (2018). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach* (2nd ed.). Guilford Press.

Hayes, A. F., & Preacher, K. J. (2010). Quantifying and testing indirect effects in simple mediation models when the constituent paths are nonlinear. *Multivariate Behavioral Research*, *45*(4), 627–660. https://doi.org/10.1080/00273171.2010.498290

Heyl, V., & Wahl, H.-W. (2014). Experiencing age-related vision and hearing impairment: The psychosocial dimension. *Journal of Clinical Outcomes Management*, *21*(7), 323–335.

Heyl, V., Wahl, H.-W., & Mollenkopf, H. (2005). Visual capacity, out-of-home activities and emotional well-being in old age: Basic relations and contextual variation. *Social Indicators Research*, *74*(1), 159–189. https://doi.org/10.1007/s11205-005-6522-3

Kasper, J. D., Freedman, V. A., & Spillman, B. C. (2013). *Classification of persons by dementia status in the National Health and Aging Trends Study*. Technical Paper #5.

Kenny, D. A. (2021). *Mediation*. http://davidakenny.net/cm/mediate.htm

Lee, A. T., Richards, M., Chan, W. C., Chiu, H. F., Lee, R. S., & Lam, L. C. (2020). Higher dementia incidence in older adults with poor visual acuity. *The Journals of Gerontology: Series A*, *75*(11), 2162–2168. https://doi.org/10.1093/gerona/glaa036

Lin, F. R., & Albert, M. (2014). Hearing loss and dementia—Who is listening? *Aging and Mental Health*, *18*(6), 671–673. https://doi.org/10.1080/13607863.2014.915924

Livingston, G., Huntley, J., Sommerlad, A., Ames, D., Ballard, C., Banerjee, S., Brayne, C, Burns, A, Cohen-Mansfield, J., Cooper, C., Costofreda, S.G., Dias, A., Fox, N., Gitlin, L.N., Howard, R., Kales, H.C., Kivimäk, M., Larsen, E.B., Ogunniyi, A., & Mukadam, N. (2020). Dementia prevention, intervention, and care: 2020 report of the lancet commission. *Lancet*. Advance online publication. https://doi.org/10.1016/S0140-6736(20)30367-6

Lövdén, M., Ghisletta, P., & Lindenberger, U. (2005). Social participation attenuates decline in perceptual speed in old and very old age. *Psychology and Aging*, *20*(3), 423–434. https://doi.org/10.1037/0882-7974.20.3.423

Maharani, A., Dawes, P., Nazroo, J., Tampubolon, G., Pendleton, N., & Sense-Cog WP1 Group. (2018). Visual and hearing impairments are associated with cognitive decline in older people. *Age and Ageing*, *47*(4), 575–581. https://doi.org/10.1093/ageing/afy061

McEwen, B. S. (2000). Effects of adverse experiences for brain structure and function. *Biological Psychiatry*, *48*(8), 721–731. https://doi.org/10.1016/s0006-3223(00)00964-1

Muthén, L. K., & Muthén, B. O. (2017). *Mplus: Statistical analysis with latent variables: User's guide* (Version 8). Muthén & Muthén.

Naël, V., Peres, K., Dartigues, J. F., Letenneur, L., Amieva, H., Arlco, A., Scherlen, A. C., Tzourio, C., Berr, C., Carriere, I., Delcourt, C., Helmer, C., Bertelsen, G., Cosh, S., Cougnard-Gregoire, A., Dawes, P., Delcourt, C., Constantinidou, F., Helmer, C., & von Hanno, T. (2019) Vision loss and 12-year risk of dementia in older adults: The 3C cohort study. *European Journal of Epidemiology*, *34*(2), 141–152. https://doi.org/10.1007/s10654-018-00478-y

National Academies of Sciences, Engineering, and Medicine; Division of Behavioral and Social Sciences and Education; Health and Medicine Division; Board on Behavioral, Cognitive, and

Sensory Sciences; Board on Health Sciences Policy; & Committee on the Health and Medical Dimensions of Social Isolation and Loneliness in Older Adults. (2020). *Social isolation and loneliness in older adults: Opportunities for the health care system*. National Academies Press.

Ng, J. H.-Y., & Loke, A. Y. (2015). Determinants of hearing-aid adoption and use among the elderly: A systematic review. *International Journal of Audiology*, *54*(5), 291–300. https://doi.org/10.3109/14992027.2014.966922

Patel, N., Stagg, B. C., Swenor, B. K., Zhou, Y., Talwar, N., & Ehrlich, J. R., (2020). Association of co-occurring dementia and self-reported visual impairment with activity limitations in older adults. *JAMA Ophthalmology*, *138*(7), 756–763. https://doi.org/10.1001/jamaophthalmol.2020.1562

Pigeon, C., Li, T., Moreau, F., Pradel, G., & Marin-Lamellet, C. (2019). Cognitive load of walking in people who are blind: Subjective and objective measures for assessment. *Gait & Posture*, *67*, 43–49. https://doi.org/10.1016/j.gaitpost.2018.09.018

Shah, K., Frank, C. R., & Ehrlich, J. R. (2020). The association between vision impairment and social participation in community-dwelling adults: A systematic review. *Eye*, *34*(2), 290–298. https://doi-org.erl.lib.byu.edu/10.1038/s41433-019-0712-8

Shukla, A., Harper, M., Pedersen, E., Goman, A., Suen, J. J., Price, C., Applebaum, J., Hoyer, M., Lin, F. R., & Reed, N. S. (2020). Hearing loss, loneliness, and social isolation: A systematic review. *Otolaryngology-Head & Neck Surgery*, *162*, 622–633. https://doi-org.erl.lib.byu.edu/10.1177/0194599820910377

Smith, E. E., & Ismail, Z. (2021). Mortality risk models for persons with dementia: A systematic review. *Journal of Alzheimer's Disease*, *80*(1), 103–111. https://doi.org/10.3233/JAD-201364

Swenor, B. K., Lee, M. J., Varadaraj, V., Whitson, H. E., & Ramulu, P. Y. (2020). Aging with vision loss: A framework for assessing the impact of visual impairment on older adults. *The Gerontologist*, *60*(6), 989–995. https://doi.org/10.1093/geront/gnz117

Swenor, B. K., Ramulu, P. Y., Willis, J. R., Friedman, D., & Lin, F. R. (2013). Research letters: The prevalence of concurrent hearing and vision impairment in the United States. *JAMA Internal Medicine*, *173*(4), 312–313. https://doi.org/10.1001/jamainternmed.2013.1880

Tamura, H., Tsukamoto, H., Mukai, S., Kato, T., Minamoto, A., Ohno, Y., Yamashita, H., & Mishima, H. K. (2004). Improvement in cognitive impairment after cataract surgery in elderly patients. *Journal of Cataract & Refractive Surgery*, *30*(3), 598–602. https://doi.org/10.1016/j.jcrs.2003.10.019

Varadaraj, V., Munoz, B., Simonsick, E. M., & Swenor, B. K. (2020). Vision impairment and participation in cognitively stimulating activities: The Health ABC Study. *Journals of Gerontology: Series A*, *76*(5), 835–841. https://doi.org/10.1093/gerona/glaa184

Vu, T. A., Fenwick, E. K., Gan, A. T. L., Man, R. E. K., Tan, B. K. J., Gupta, P., Ho, K. C., Reyes-Ortiz, C. A., Trompet, S., Gussekloo, J., O'Brien, J. M., Mueller-Schotte, S., Wong, T. Y., Tham, Y. C., Cheng, C.-Y., Lee, A. T. C., Rait, G., Swenor, B. K., Varadaraj, V., & Lamoureux, E. L. (2020). The bidirectional relationship between vision and cognition: A systematic review and meta-analysis. *Ophthalmology*, *128*(7), 981–992. https://doi.org/10.1016/j.ophtha.2020.12.010

Wettstein, M., Kuźma, E., Wahl, H.-W., & Heyl, V. (2016). Cross-sectional and longitudinal relationship between neuroticism and cognitive ability in advanced old age: The moderating role of severe sensory impairment. *Aging & Mental Health*, *20*(9), 918–929. https://doi.org/10.1080/13607863.2015.1049119

Whitson, H. E., Cronin-Golomb, A., Cruickshanks, K. J., Gilmore, G. C., Owsley, C., Peelle, J. E., Recanzone, G., Sharma, A., Swenor, B., Yaffe, K., & Lin, F. R. (2018). American geriatrics society and National Institute on aging bench-to-bedside conference: Sensory impairment and cognitive decline in older adults. *Journal of the American Geriatrics Society*, *66*(11), 2052–2058. https://doi.org/10.1111/jgs.15506

Xiang, X., Freedman, V. A., Shah, K., Hu, R. X., Stagg, B. C., & Ehrlich, J. R. (2020). Self-reported vision impairment and subjective well-being in older adults: A longitudinal mediation analysis. *The Journals of Gerontology: Series A*, *75*(3), 589–595. https://doi-org.erl.lib.byu.edu/10.1093/gerona/glz148

Zheng, D. D., Swenor, B. K., Christ, S. L., West, S. K., Lam, B. L., & Lee, D. J. (2018). Longitudinal associations between visual impairment and cognitive functioning: The salisbury eye evaluation study. *JAMA Ophthalmology*, *136*(9), 989–995. https://doi-org.erl.lib.byu.edu/10.1001/jamaophthalmol.2018.2493

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Special Issue: Psychological and Social Dynamics of the Aging Experience Among Racial/Ethnic Minorities

Sensory Disabilities and Social Isolation Among Hispanic Older Adults: Toward Culturally Sensitive Measurement of Social Isolation

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Abstract

Objectives: Sensory disabilities, including vision disability and hearing disability, increase risk for social isolation, which is associated with multiple negative health outcomes. Existing literature suggests that the cultural value of familism may provide a buffer against social isolation. We examined the longitudinal trajectory of social isolation among Hispanic older adults with self-reported vision disability (SRVD) and self-reported hearing disability and tested a modified measure of social isolation incorporating familism.

Methods: We compared 8-year trajectories of social isolation among Hispanics (n = 445) and non-Hispanic Whites (n = 4,861) from the National Health and Aging Trends Study. We used structural equation modeling to explore the longitudinal relationships between sensory disability and social isolation while comparing 2 measures of social isolation.

Results: Social isolation increased longitudinally for both groups, with SRVD significantly associated with higher initial levels. Social isolation started and remained higher across time among Hispanics. Using an adjusted measure of social isolation (added familial support), neither initial levels nor trajectories of social isolation differed between Hispanic and non-Hispanic White participants.

Discussion: Initially, Hispanics appeared more socially isolated, reporting less social support from outside the home. Yet, we found that they were more likely to report family social connections. Traditional measures of social isolation focusing on social support outside of the home (neglecting support by family) may lack content validity among Hispanic groups. Culturally sensitive measures of social isolation will be increasingly consequential for future research and health policy to meet the needs of a diverse older population.

Keywords: Culture, Familism, Hispanic, Sensory disability, Social isolation

Cultural diversity in the United States is enhanced by its largest ethnic group, Hispanics, who comprise 18% of the population. The term *Hispanic* describes a heterogeneous group of people who trace their heritage to Latin America or Spain. Individuals who identify as Hispanic may be of any race. In 2019, the Hispanic population in the United States was 60.6 million, a 20% increase from 2010 (U.S. Census Report, 2020). Contributing to a trend of increasing ethnic diversity in the United States, this number is projected to increase to 118 million by the year 2060 when Hispanics will comprise approximately 28% of the U.S. population. Consistent with the aging of the U.S. population, the median age of Hispanics in the country is also increasing (Noe-Bustamante et al., 2020).

Despite great diversity among Hispanics, this group may share common cultural values, which some have suggested contribute to a sociocultural health advantage, referred to as the *Hispanic Paradox*. Although they may, on average, experience higher poverty rates and less access to education, health care, and other resources, Hispanics have a higher life expectancy and better health outcomes in several domains compared with non-Hispanic Whites or Blacks (Markides & Eschbach, 2005). This is especially true among immigrants, although the health advantage seems to equalize in older age (Angel, 2009; Markides & Rote, 2019).

Family-centered values, or *familism*, foster strong social cohesion and sturdy social networks (Gallo et al., 2009; Ruiz et al., 2016). Familism is described as "a cultural frame of reference about the centrality of the family that is enacted in attitudes and behaviors" (Hernandez & Bamaca-Colbert, 2016, p. 464) and explains how Hispanics are likely to refer to the family for support, comfort, and services (Behnke et al., 2008). Related constructs noted in Hispanic culture include filial piety and *respeto*, which involve honoring family, including caring for aging parents. These communalistic values prioritize social relationships with extended family networks over individual achievement and create social support via a tight social network that buffers stress (Corona et al., 2017) and promotes resilience (Ruiz et al., 2016). Benefits of strong family social connections may partly explain the longevity and resilience described by the Hispanic Paradox (Markides et al., 2013). Familism seems to be a feature Hispanic ethnicity, regardless of country of origin (Campos et al., 2014).

An important health-related outcome associated with sensory impairments is social isolation. Older adults who experience vision impairment or hearing loss are at significantly increased risk of becoming socially isolated (Shah et al., 2020; Shukla et al., 2020). Social isolation has been linked to a host of negative outcomes, including higher likelihood of anxiety and depression (Domènech-Abella et al., 2019; Santini et al., 2020), worse cognitive functioning (Evans et al., 2019; Read et al., 2020), decreased physical and mental health (Hawton et al., 2011), and mortality (Holt-Lunstad et al., 2015). Vision loss and hearing loss are prevalent among older adults and are increasing across all demographics as the U.S. population ages (Swenor et al., 2013).

Vision loss affects 9% of older adults in the United States (Patel et al., 2020), yet risk may be higher for Hispanics. Vision loss among Hispanics is driven by health disparities that influence incidence and access to treatment of diabetic eye disease and cataracts (Herren & Kohanim, 2016; Varma et al., 2004). The unmet need for refractive correction (regular eyeglasses) can cause or compound vision impairment. While up to 64% of Hispanics over age 40 have a need for refractive correction, 20% of those lack access, especially those with lower rates of acculturation, lower education level, and those without insurance (Uribe et al., 2011). Though Hispanics are at an increased risk for vision loss, they are less likely to receive screening. Sixty-three percent of the participants in the Los Angeles Latino Eye Study who had vision disabilities had never been diagnosed or sought treatment prior to the study (Varma et al., 2004).

Among those of older age, rates of hearing loss are similar between Hispanic older adults and non-Hispanic White older adults (Cruickshanks et al., 2015) and affect 31% of those aged 60–69 and 63.1% of those aged 70 and older (Goman & Lin, 2016). However, individuals of Hispanic ethnicity can expect to live a greater proportion of their lives hearing impaired than non-Hispanics (West & Scott, 2021). Previous research has identified underuse of hearing aids among Hispanic older adults compared with non-Hispanic Whites, largely due to lack of health insurance access (Arnold et al., 2019). This suggests a higher impact of hearing loss among Hispanics.

Together, these patterns suggest a strong impact of sensory disabilities for Hispanic older adults, who have less access to resources that mitigate the challenges created by sensory loss, including early diagnosis and treatment and access to adaptive or corrective equipment. Yet, little is known about the possible buffering effect of family-centered values on the myriad adverse health outcomes associated with sensory disability.

Although some research has examined how social isolation differs among older adults based on ethnic origins (Locher et al., 2005), little is known about the direct influence of culture. There is evidence that Hispanic older adults prefer to receive social support primarily from family systems rather than from the community at large (Min & Barrio, 2009). This may be due in part to the cultural value of familism. While established measures of social isolation (Lubben, 1988; Zimet et al., 1988) include measures of family support, researchers who use large, population-based data sets, such as the National Health and Aging Trends Study (NHATS), must create measures from existing data and are somewhat limited. Though care may be taken in selecting items to include, they may not be appropriate for individuals of diverse backgrounds. For example, using the NHATS, the study by Cudjoe et al.

(2020) uses a composite measure of social isolation that may underestimate the scope of social support experienced by Hispanic older adults. The typology of this scale relies on social supports that are external to the family, including volunteering in the community and participating in clubs or classes. Other studies utilizing this typology like those by Suntai and White (2021) and Falvey et al. (2021) may be overestimating social isolation among Hispanics as they are not measuring support form family.

Marín and Marín (1991) cautioned that measures may represent the world view of those doing the research and may therefore be culturally biased. Items included may be selected based on the researcher's perceptions, norms, and values and may lack the ability to reflect the cultural assumptions underlying the respondents' views.

As the United States is becoming more ethnically diverse, understanding the impact of sensory disabilities and social isolation among Hispanic people will be increasingly consequential to future research and policy as we work to understand the intersection of "ethnicity, aging and health" (Howard, 2019, p. 3). Thus, the purpose of this research was to explore the longitudinal trajectory of social isolation among Hispanic older adults with self-reported sensory disabilities, including self-reported vision disability (SRVD) and self-reported hearing disability (SRHD). A comparison with non-Hispanic Whites provided a reference point for understanding features of social isolation that may be unique to the Hispanic population. In this process, we explored elements of a more culturally sensitive measure of social isolation in this group, including items addressing familism.

The following questions guided the research:

1. Do trajectories of social isolation differ between Hispanic and non-Hispanic White respondents?
2. Do trajectories of social isolation differ for Hispanic and non-Hispanic White respondents when a more culturally sensitive measure of social isolation is used?
3. Do sensory disabilities relate to trajectories of social isolation differently for Hispanic and non-Hispanic White respondents?

Method

Sample and Procedures

This study used data from the NHATS, a nationally representative longitudinal study of Medicare beneficiaries aged 65 and older. Annual data collection began in 2011, and the current analysis used data from the 2011 cohort followed through 2018 (Rounds 1 through 8). At Round 1, there were initially a total of 8,245 participants in the sample. However, 2,939 participants were dropped for either (a) not living in a community setting or (b) not belonging to the ethnic or racial groups of Hispanic or White non-Hispanic, or missing on either of those characteristics. The resulting analytic sample included 5,306 participants, among whom 4,861 were non-Hispanic White and 445 were Hispanic. The sample did experience attrition over the 8 years of the study. Attrition was consistently around 15% between each wave of the study, with the sample dropping to 32% of the original sample at Round 8.

As seen in Table 1, descriptive statistics indicated an even distribution of participants across age, sex, education, and income. Across the total sample, participants ranged in age from 65 to ≥95, with approximately 20% of the sample falling in each age category (65–69, 70–74, 75–79, 80–84, 85+). Approximately 56% of participants were female, and nearly half (48%) had at least some education post-high school. The average income in the sample was as would be anticipated, yet had considerable variability (mean = $56,000/year, *SD* = $199,383).

Measures

Self-reported vision disability

SRVD was measured using three items. Participants were considered to have a vision disability if they reported being blind or if they responded "No" to questions asking if they could see well enough to recognize someone across the street and to read newspaper print while wearing glasses or contact lenses, if applicable. This method has been used in previous studies with NHATS data (Ehrlich et al., 2019; Frank et al., 2019; Xiang et al., 2020).

Self-reported hearing disability

SRHD was measured using four items. Participants were coded as having a hearing disability if they reported being deaf or if they responded "No" to questions asking if they could hear well enough to use the telephone, carry on a conversation in a room with the TV or radio playing, and carry on a conversation in a quiet room. This method has been used in previous studies with NHATS data (Kuo et al., 2021). Individuals who self-reported vision disability or hearing disability at baseline were followed longitudinally to better understand trajectories of social isolation.

Social isolation

Preliminary measurement of social isolation was conducted using a five-item composite variable (Cudjoe et al., 2020). Participants received one point for each of the following, for a maximum of five points: if they (a) lived alone, (b) talked to one person or fewer about "important matters" in the past year, (c) did not attend religious services in the past month, (d) did not attend clubs/classes/organized activities in the past month, and (e) did not participate in volunteer work in the past month. Points were summed, with higher scores indicating higher levels of social isolation.

An adjusted measure of social isolation was also constructed, with the goal of identifying elements of familial support which might be more relevant to Hispanic individuals. This adjusted measure did not include the items about participating in volunteer work or attending clubs, etc., but

Table 1. Round 1 of NHATS: Main Study Variables and Demographics

Variable	NHATS total study sample	Non-Hispanic Whites (n = 4,861)	Hispanics (n = 445)
Age groups, n (%)			
65–69	1,006 (18.96%)	919 (18.91%)	87 (19.55%)
70–74	1,084 (20.43%)	989 (20.35%)	95 (21.35%)
75–79	1,081 (20.37%)	991 (20.39%)	90 (20.22%)
80–84	1,056 (19.90%)	972 (20.00%)	84 (18.88%)
85–89	666 (12.55%)	609 (12.53%)	57 (12.81%)
≥90	413 (7.78%)	381 (7.84%)	32 (7.19%)
Sex, n (%)			
Male	2,303 (43.40%)	2,110 (43.41%)	193 (43.37%)
Female	3,003 (56.60%)	2,751 (56.59%)	252 (56.63%)
Education level, n (%)			
Less than diploma	1,205 (22.71%)	932 (19.17%)	273 (61.35%)
High school	1,525 (28.74%)	1,455 (29.93%)	70 (15.73%)
Trade/some college	1,123 (21.16%)	1,071 (22.03%)	50 (11.69%)
College degree	1,443 (27.20%)	1,395 (28.70%)	48 (10.79%)
Cudjoe social isolation measure,[a] M (SD)	2.57 (1.26)	2.55 (1.28)	2.78 (1.06)
Adjusted social isolation measure, M (SD)	2.13 (1.12)	2.19 (1.07)	1.95 (1.19)
SRHD, n (%)	1,231 (9.91%)	913 (16.15%)	104 (22.03%)
SRVD, n (%)	840 (6.76%)	491 (8.68%)	90 (19.07%)

Notes: NHATS = National Health and Aging Trends Study; SRHD = self-reported hearing disability; SRVD = self-reported vision disability. Values for the Cudjoe social isolation measure and the adjusted social isolation measure ranged from 0 to 5.
[a]Cudjoe et al. 2020.

did include items about (a) whether the participant visited with friends/family in the participant's home or in the home of the friend/family member, and (b) whether they lived in an intergenerational household. Each of these items was included based on familistic values, and because they were theoretically relevant to social connections among Hispanic older adults. The resulting adjusted measure had a maximum of six points, with more points indicating greater social isolation. The original and adjusted measures of social isolation did have considerable overlap, yet also some uniqueness (r = 0.76).

Covariates

Covariates included age, gender, and education. Age and education categories were endorsed by participants and were included in analyses as ordered categorical variables (see Table 1). Participants also reported their gender (0 = male; 1 = female).

Analytic Approach

We first conducted descriptive analyses of the baseline study sample characteristics (see Table 1). To explore our first research question, unconditional latent growth models were estimated in *Mplus* (Muthén & Muthén, 1998–2017) across two groups (Hispanics and non-Hispanic Whites) using the original measure of social isolation that Cudjoe et al. (2020) described. Group differences in intercept and slope growth curve parameters were tested using the Model Test command in *Mplus*. To address our second research question, steps were taken to explore a more culturally appropriate measurement of social isolation among Hispanic participants. The proportion of each response to binary social isolation items from the original measure described by Cudjoe et al. (2020), as well as some new proposed items, was compared across groups using z-tests of proportion (see Table 2). Using the adjusted, more culturally sensitive measure of social isolation that we hypothesized would be more relevant to Hispanic respondents, we estimated multigroup latent growth models of social isolation across time for Hispanic and non-Hispanic White respondents. Group differences in growth curve parameters (i.e., intercepts and slopes) were tested using the Model Test command in *Mplus*. To address the third research question, an additional model included SRVD and SRHD as predictors, along with covariates. Both SRVD and SRHD were examined in relation to the initial levels and slopes of social isolation across time. Education, age, and gender were included as covariates. Finally, sensitivity analyses were conducted to identify possible differences between Hispanic subgroups according to country of origin. Some participants (6% of non-Hispanic White; 8.7% Hispanic) were missing on the social isolation measure at Round 1. The full information maximum likelihood approach was used in estimated models so that all data present from the full sample (N = 5,306) could inform estimates.

Results

Preliminary Analyses

Responses to individual items in the social isolation measure were analyzed using z-tests of proportion to compare differences between Hispanics and non-Hispanic Whites (see Table 2). Results suggested that Hispanic participants were more likely to live with others and were less likely to visit clubs and participate in formal volunteer opportunities. No

Table 2. Comparison of Frequencies, Percentages, and *Z*-Tests of Proportions of Social Isolation Responses Between Non-Hispanic White and Hispanic Respondents

Item	Non-Hispanic Whites frequency (%)	Hispanics frequency (%)	*Z*-score
1. Participant lives alone.	1469 (30.34%)	96 (21.67%)	3.83***
2. Participant has one or fewer people who he/she talked to in the last year about important things.	2160 (46.89%)	179 (45.78%)	0.42
3. In the last month, participant never attended religious services.	2186 (44.98%)	192 (43.15%)	0.74
4. In the last month, (besides religious services,) participant never participated in clubs, classes, or other organized activities.[a]	3021 (62.15%)	361 (81.12%)	−7.97***
5. In the last month, participant never did volunteer work.[a]	3609 (74.26%)	408 (91.69%)	−8.21***
6. In the last month, participant did not visit in person with friends or family not living with him/her, either at his/her home or theirs.[b]	569 (11.71%)	107 (24.04%)	−7.47***
7. Participant does not live in an intergenerational household.[b]	913 (81.21%)	192 (56.85%)	12.11***

Notes:
[a]Included in the Cudjoe et al. (2020) measure of social isolation; not included in the adjusted Cudjoe et al. (2020) measure.
[b]Included in the adjusted Cudjoe et al. (2020) measure of social isolation; not included in the Cudjoe et al. (2020) measure.
***$p < .001$.

group differences were found in talking with others about important things or participating in religious services.

A comparison of responses to the new, culturally adjusted survey questions was also made between Hispanic and non-Hispanic White respondents using *z*-tests of proportion (see Table 2). Results suggested that Hispanic participants were less likely than non-Hispanic Whites to visit with friends or family in their home or the homes of others yet were more likely to live in an intergenerational household.

Social Isolation Trajectories With Traditional Social Isolation Measure (Model 1)

An unconditional growth curve model was estimated to examine the intercepts and slopes of social isolation for non-Hispanic Whites and Hispanics. The growth curve model provided adequate fit to the data (comparative fit index [CFI] = 0.988; root mean square error of approximation [RMSEA] = 0.036, 90% confidence interval, or CI = [0.032, 0.041]). Initial levels of social isolation differed significantly across groups (non-Hispanic White $M_{intercept}$ = 2.556, $p < .001$; Hispanic $M_{intercept}$ = 2.822, $p < .001$; Wald value = 28.190 (df = 1), $p < .001$). Slopes of social isolation increased significantly across time among both groups (non-Hispanic White M_{slope} = 0.019, $p < .001$; Hispanic M_{slope} = 0.024, $p < .05$), but did not significantly differ (Wald value = 0.206 (df = 1), $p = .65$). Panel A of Figure 1 shows a visual representation of social isolation trajectories with the traditional social isolation measure.

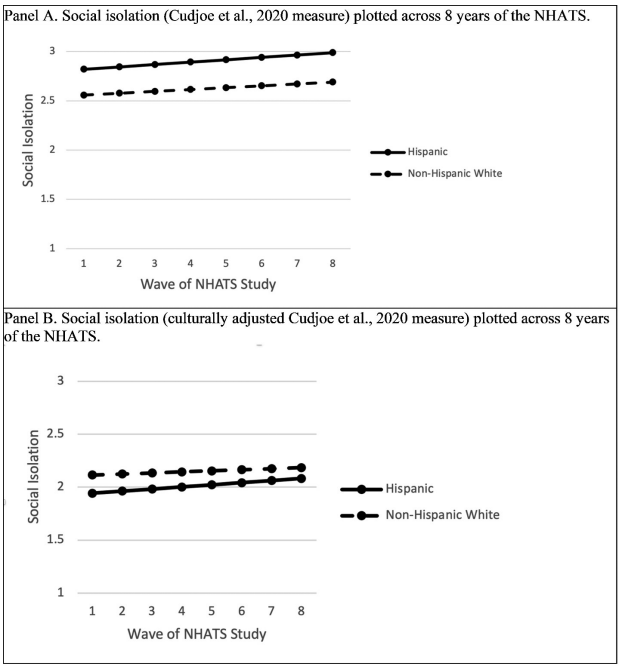

Figure 1. Plots comparing Hispanic respondents with non-Hispanic White respondents in levels of social isolation as measured with the Cudjoe et al. (2020) measure (Panel A) and the culturally adjusted Cudjoe et al. (2020) measure (Panel B). *Notes*: NHATS = National Health and Aging Trends Study. Adjusted Cudjoe et al. (2020) measure of social isolation did not include information about attending clubs/classes/organized activities or formal volunteer work but did include a measure of family and friend personal visits and whether a household was intergenerational.

Sensory Disability and Social Isolation Trajectories (Model 2)

SRVD and SRHD were added as predictors of initial levels and slopes of social isolation trajectories for non-Hispanic White and Hispanic participants using the traditional measure of social isolation (Cudjoe et al., 2020) while controlling for all other covariates. Model 2 adequately fit the data (CFI = 0.988; RMSEA = 0.026, 90% CI = [0.022, 0.029]). SRVD was associated with higher initial levels of social isolation for non-Hispanic White participants (β

[*SE*] = 0.24 [0.069], p = .01). No other sensory disability predictors were associated with initial levels or slopes of social isolation.

Social Isolation Trajectories With Adjusted Social Isolation Measure (Model 3)

Using the novel measure of social isolation, a growth curve of social isolation was estimated to assess the intercepts and slopes for the Hispanic and non-Hispanic White participants (see Table 3). The model provided adequate fit to the data (CFI = 0.993; RMSEA = 0.028, 90% CI = [0.023, 0.032]). Non-Hispanic Whites ($M_{intercept}$ = 3.017, p < .001) and Hispanics ($M_{intercept}$ = 2.852, p < .001) significantly differed in their initial levels of social isolation (Wald value = 7.925 (df = 1), p < .01). Mean slope values suggested significant increases in social isolation across time for both Hispanic (M_{slope} = 0.025, p < .05) and non-Hispanic White (M_{slope} = 0.015, p < .001) respondents. Panel B of Figure 1 shows a visual representation of social isolation trajectories with the adjusted social isolation measure.

Sensory Disability and Social Isolation Trajectories With Adjusted Social Isolation Measure (Model 4)

Using the novel social isolation measure, SRVD and SRHD were used as predictors of intercepts and slopes of social isolation trajectories for non-Hispanic White and Hispanic participants while controlling for all other covariates. Model 4 provided adequate fit (CFI = 0.994; RMSEA = 0.018, 90% CI = [0.014, 0.022]). Neither SRVD nor SRHD was significantly related to the intercept or slope of social isolation for Hispanic or non-Hispanic White participants.

Sensitivity Analyses

Sensitivity analyses were performed to examine country of origin as a possible contextual variable that might shape findings regarding SRVD and SRHD as predictors of intercepts and slopes of social isolation trajectories. Six models were assessed (see Supplementary Table 1), including some with the original social isolation measure and some with the adjusted measure. Results from those analyses suggest some differences between Hispanics of various national origins (Mexican, Puerto Rican, and Other) and non-Hispanic Whites in their social isolation trajectories as well as how SRVD and SRHD relate. Among other findings, SRVD is associated with an increased slope of social isolation across time among the Mexican group when the original measure of social isolation was used, but this association was no longer present when the adjusted measure of social isolation was used. This pattern was not observed in groups of Hispanic participants from other national origins.

Discussion

Given the association between sensory loss and social isolation, as well as evidence of health disparities related to sensory loss between Hispanic and non-Hispanic White older adults (Arnold et al., 2019; Uribe et al., 2011; Varma et al., 2004; West & Scott, 2021), the purpose of this study was to explore the impact of self-reported sensory disability on social isolation among those of Hispanic ethnicity. We hypothesized that, despite disparities in access to screening and treatment for sensory loss, Hispanic older adults may be less socially isolated than their non-Hispanic White counterparts, due to the influence of the cultural values that promote a reliance on family ties, or familism.

Initial analyses revealed that levels of social isolation were unexpectedly higher among Hispanic than non-Hispanic White participants. This was unanticipated, as past research has described how the family-centered culture among Hispanic individuals serves as a major buffer against stress, social isolation, and other negative health outcomes (Corona et al., 2017; Markides et al., 2019). Analyzing individual items in the composite measure of social isolation proposed by Cudjoe et al. (2020) revealed that, though Hispanic participants initially appeared more socially isolated, they reported that they were less likely to live alone than their non-Hispanic White counterparts. Further analyses revealed that Hispanic respondents were less likely to report participation in community activities outside of the home, including doing volunteer work or attending clubs or classes. This led us to hypothesize that perhaps the existing composite measure did not include features of social support that are important to Hispanic individuals, including family connections. Thus, we created a new, modified indicator of social isolation that included culturally relevant items for Hispanic older adults which emphasized familial support.

When we applied the original Cudjoe et al. (2020) measure of social isolation, Hispanic older adults with sensory disabilities appeared to be significantly more socially isolated than their non-Hispanic White counterparts. Using the new measure of social isolation, which included measures of family support, it appeared that the Hispanic sample was significantly less socially isolated than they originally appeared. The Hispanic respondents in the study were more likely than non-Hispanic Whites to live in intergenerational households and were less likely to live alone. This trend is reflected in other national data. As of 2016, 20% of Americans live in multigenerational households (up from 17% in 2009) and this trend is increasing. Racial and ethnic minorities are more likely to live in multigenerational households (% in 2016 from % in 2009, respectively): Hispanic 27% from 23%; Asian 29% from 26%; Black 26% from 24%; non-Hispanic Whites 16% from 13% (Cohn & Passel, 2018). In the current study, 42% of Hispanic participants reported living in an intergenerational household, which

Table 3. Social Isolation Growth Parameters and Predictors of Those Parameters for Non-Hispanic Whites and Hispanics, Using Two Measures of Social Isolation

	Non-Hispanic Whites		Hispanics	
	Intercept	Slope	Intercept	Slope
Model 1: traditional measure				
Mean	2.556***[a]	0.019***	2.822***[a]	0.024*
Variance	1.222***	0.012***	0.602***	0.008**
n	4,707		418	
CFI/RMSEA	0.988/0.036			
Model 2: traditional measure, W/Pred				
Mean	3.057***	–0.011	3.243***	0.010
Variance	1.059***	0.011***	0.487***	0.007**
SRHD	0.036	0.014	0.005	–0.005
SRVD	0.243***	0.013	0.017	0.036
Education	–0.147***	0.001	–0.104***	–0.004
Age	0.108***	0.013***	0.039	0.001
Gender	–0.202***	0.006	–0.444***	0.038†
R-squared	0.132***	0.044**	0.165***	0.088
n	4,861		445	
CFI/RMSEA	0.988/0.026			
Model 3: adjusted measure				
Mean	2.144***[a]	0.010***	1.942***[a]	0.020†
Variance	0.814***	0.007***	1.027***	0.010***
n	4,706		418	
CFI/RMSEA	0.992/0.028			
Model 4: adjusted measure, W/Pred				
Mean	2.230***	-0.007	2.218***	0.010
Variance	0.778***	0.007***	0.974***	0.010***
SRHD	–0.006	0.010	0.008	0.023
SRVD	0.057	0.019†	0.167	–0.012
Education	–0.040***	–0.001	–0.018	–0.008
Age	0.088***	0.008***	–0.018	0.011
Gender	–0.177***	0.011*	–0.416***	0.016
R-squared	0.042***	0.040**	0.048*	0.080
n	4,861		445	
CFI/RMSEA	0.992/0.020			

Notes: Traditional measure of social isolation is defined by Cudjoe et al. (2020); the adjusted measure of social isolation does not include: club/class/organized activity attendance, volunteering; and the following were added: visiting with friends or family, and living in intergenerational household. CFI = comparative fit index; RMSEA = root mean square error of approximation; SRHD = self-reported hearing disability; SRVD = self-reported vision disability; W/Pred = conditional model with predictors.

[a]Indicates parameters differ per a Wald test of parameter differences ($df = 1$). Model 1 = 28.190, $p < .001$; Model 3 = 12.574, $p < .001$. No other group mean differences existed in either intercepts or slopes.

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

may be evidence of familism at play, as family members may be providing social connection and other support for older parents and grandparents who, in this sample, are living with sensory disabilities. Despite this, Hispanic respondents reported they were less likely to have visitors or to visit others. This could be evidence of perceived social isolation driven by unfulfilled, culturally driven social expectations due to acculturation of younger generations (Markides et al., 2013).

We explored the impact of self-reported sensory disabilities on social isolation and discovered that, when using the traditional measure (Cudjoe et al., 2020), vision disability (SRVD) was significantly associated with higher levels of social isolation for non-Hispanic Whites, but not for Hispanic participants. This is further evidence that cultural factors may be at play and may buffer the impact of sensory disability, even before the new adjusted measure of social isolation is used. Hearing disability (SRHD) was not associated with initial levels or longitudinal increases in social isolation for either group and there were no differences between groups when using the new adjusted measure of social isolation. This could be because these measures are not capturing the types of social isolation someone with a hearing disability may experience, including subjective

feelings of disconnection, even while they are participating in events in the community or with family.

Strengths and Limitations

Approximately 1.2% of undocumented residents of the United States are age 65+ (Pew Research Center's Hispanic Trends Project, 2020). The NHATS data are derived from Medicare beneficiaries and thus may not be representative of individuals not eligible for Medicare. When designing the new, culturally sensitive measure of social isolation, we were limited by the constraints of the data. We could select only the items that were included in the NHATS survey. There are items or measures not included in NHATS that may have been appropriate to assess social activities that are more common among Hispanic individuals such as "attending a dance" or "picnicking on the weekend." Still, our study represents an important starting point, utilizing a nationally representative sample to generate early evidence that cultural values may be at play, not only in the way research participants describe their level of social isolation, but also in how families respond to their older family members who are living with disabilities, such as sensory disability. Shedding light on these patterns allows us to better understand how to support older adults and their family units as they navigate life with sensory loss.

Future Directions

Future research, including mixed methods work, is needed to create culturally sensitive measures of social isolation and measures of other important culturally mediated health outcomes. Such measures could involve greater nuance in response options, and therefore could be subjected to psychometric testing and development. Additionally, future investigations could explore familial and other social dynamics among older adults of Hispanic origin with sensory disabilities. Hispanics are a heterogeneous group comprised of individuals from various countries, historical and political backgrounds, and races. Although familism is a shared value among Hispanics, there are likely differences between subgroups due to their heterogeneity, as our preliminary sensitivity analyses suggest (Supplementary Table 1). Attention should be given to understanding differences between Hispanic subgroups (e.g., those born in the United States, those from various countries, or those dealing with challenges related to immigration status in which family structures may be disrupted). This may be facilitated by upcoming NHATS rounds that will include larger, more diverse samples due to planned oversampling of Hispanic participants. In addition, the current NHATS measures of sensory disability represent subjective assessments. In future rounds of NHATS data, where objective measures of vision and hearing impairment are included, research could explore nuances of how degree of vision or hearing disability relates differently to social isolation.

Conclusion

This investigation suggests that measures of social isolation that focus on social support outside of the home may not be valid among Hispanic older adults. Culturally sensitive measures of social isolation will be increasingly consequential for future research and health policy to meet the needs of a diverse older population.

Supplementary Material

Supplementary data are available at *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences* online.

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Conflict of Interest

None declared.

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Data, analytic methods, and study materials will be made available upon request.

Author Contributions

C. Trujillo Tanner planned the study, wrote the paper, and led the collaboration of coauthors; J. B. Yorgason planned the study, supervised, and performed statistical analysis, and wrote the paper. S. Richardson planned the study, performed statistical analysis, and contributed to writing the paper; A. H. Redelfs contributed to writing the paper; M. M. Y. Serrao Hill contributed to writing the paper and to the statistical analysis; A. White contributed to planning the study and writing the paper and to the statistical analysis; K. S. Markides contributed to planning the study and writing the paper; B. Stagg contributed to planning the study; J. R. Ehrlich contributed to planning the study, assisting with the statistical analysis, and writing the paper.

References

Angel, R. J. (2009). Structural and cultural factors in successful aging among older Hispanics. *Family & Community Health*, **32**(1), S46–S57. doi:10.1097/01.FCH.0000342839.05607.2a

Arnold, M. L., Hyer, K., Small, B. J., Chisolm, T., Saunders, G. H., McEvoy, C. L., Lee, D. J., Dhar, S., & Bainbridge, K. E. (2019). Hearing aid prevalence and factors related to use among older adults from the Hispanic Community Health Study/Study of Latinos. *JAMA Otolaryngology—Head and Neck Surgery*, **145**, 501–508. doi:10.1001/jamaoto.2019.0433

Behnke, A. O., MacDermid, S. M., Coltrane, S. L., Parke, R. D., Duffy, S., & Widaman, K. F. (2008). Family cohesion in the lives of Mexican American and European American parents. *Journal of Marriage and Family*, **70**(4), 1045–1059. doi:10.1111/j.1741-3737.2008.00545.x

Campos, B., Ullman, J. B., Aguilera, A., & Dunkel Shetter, C. (2014). Familism and psychological health: The intervening role of closeness and social support. *Cultural Diversity & Ethnic Minority Psychology*, **20**(2), 191–201. doi:10.1037/a0034094

Cohn, D., & Passel, J. S. (2018). *A record 64 million Americans live in multigenerational households*. https://www.pewresearch.org/fact-tank/2018/04/05/a-record-64-million-americans-live-in-multigenerational-households/

Corona, K., Campos, B., & Chen, C. (2017). Familism is associated with psychological well-being and physical health. *Hispanic Journal of Behavioral Sciences*, **39**(1), 46–65. doi:10.1177/0739986316671297

Cruickshanks, K. J., Dhar, S., Dinces, E., Fifer, R. C., Gonzalez, F., Heiss, G., Hoffman, H. J., Lee, D. J., Newhoff, M., Tocci, L., Torre, P., & Tweed, T. S. (2015). Hearing impairment prevalence and associated risk factors in the Hispanic Community Health Study/Study of Latinos. *JAMA Otolaryngology—Head and Neck Surgery*, **141**, 641–648. doi:10.1001/jamaoto.2015.0889

Cudjoe, T. K., Roth, D. L., Szanton, S. L., Wolff, J. L., Boyd, C. M., & Thorpe, R. J., Jr. (2020). The epidemiology of social isolation: National Health and Aging Trends Study. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **75**(1), 107–113. doi:10.1093/geronb/gby037

Domènech-Abella, J., Mundó, J., Haro, J. M., & Rubio-Valera, M. (2019). Anxiety, depression, loneliness and social network in the elderly: Longitudinal associations from The Irish Longitudinal Study on Ageing (TILDA). *Journal of Affective Disorders*, **246**, 82–88. doi:10.1016/j.jad.2018.12.043

Ehrlich, J. R., Hassan, S. E., & Stagg, B. C. (2019). Prevalence of falls and fall-related outcomes in older adults with self-reported vision impairment. *Journal of the American Geriatrics Society*, **67**(2), 239–245. doi:10.1111/jgs.15628

Evans, I. E., Martyr, A., Collins, R., Brayne, C., & Clare, L. (2019). Social isolation and cognitive function in later life: A systematic review and meta-analysis. *Journal of Alzheimer's Disease*, **70**(Suppl. 1), S119–S144. doi:10.3233/JAD-180501

Falvey, J. R., Cohen, A. B., O'Leary, J. R., Leo-Summers, L., Murphy, T. E., Ferrante, L. E. (2021). Association of social isolation with disability burden and 1-year mortality among older adults with critical illness. *JAMA Internal Medicine*, **181**(11), 1433. doi:10.1001/jamainternmed.2021.5022

Frank, C. R., Xiang, X., Stagg, B. C., & Ehrlich, J. R. (2019). Longitudinal associations of self-reported vision impairment with symptoms of anxiety and depression among older adults in the United States. *JAMA Ophthalmology*, **137**, 793–800. doi:10.1001/jamaophthalmol.2019.1085

Gallo, L. C., Penedo, F. J., Espinosa de los Monteros, K., & Arguelles, W. (2009). Resiliency in the face of disadvantage: Do Hispanic cultural characteristics protect health outcomes? *Journal of Personality*, **77**, 1707–1746. doi:10.1111/j.1467-6494.2009.00598.x

Goman, A. M., & Lin, F. R. (2016). Prevalence of hearing loss by severity in the United States. *American Journal of Public Health*, **106**, 1820–1822. doi:10.2105/AJPH.2016.303299

Hawton, A., Green, C., Dickens, A. P., Richards, S. H., Taylor, R. S., Edwards, R., Greaves, C. J., & Campbell, J. L. (2011). The impact of social isolation on the health status and health-related quality of life of older people. *Quality of Life Research*, **20**(1), 57–67. doi:10.1007/s11136-010-9717-2

Hernandez, M. M., & Bamaca-Colbert, M. Y. (2016). A behavioral process model of familism. *The Journal of Family Theory and Review*, **8**(4), 463–483. doi:10.1111/jftr.12166

Herren, D. J., & Kohanim, S. (2016). Disparities in vision loss due to cataracts in Hispanic women in the United States. *Seminars in Ophthalmology*, **31**(4), 353–357. doi:10.3109/08820538.2016.1154166

Holt-Lunstad, J., Smith, T. B., Baker, M., Harris, T., & Stephenson, D. (2015). Loneliness and social isolation as risk factors for mortality: A meta-analytic review. *Perspectives on Psychological Science*, **10**, 227–237. doi:10.1177/1745691614568352

Howard, A. L.-M. (2019). *Exploring disability outcomes among aging Latinos in the United States: A mixed methods approach (Doctoral dissertation)*. The University of Chicago.

Kuo, P. L., Huang, A. R., Ehrlich, J. R., Kasper, J., Lin, F. R., McKee, M. M., Reed, N. S., Swenor, B. K., & Deal, J. A. (2021). Prevalence of concurrent functional vision and hearing impairment and association with dementia in community-dwelling Medicare beneficiaries. *JAMA Network Open*, **4**(3), 1–12. doi:10.1001/jamanetworkopen.2021.1558

Locher, J. L., Ritchie, C. S., Roth, D. L., Baker, P. S., Bodner, E. V., & Allman, R. M. (2005). Social isolation, support, and capital and nutritional risk in an older sample: Ethnic and gender differences. *Social Science & Medicine*, **60**, 747–761. doi:10.1016/j.socscimed.2004.06.023

Lubben, J. E. (1988). Assessing social networks among elderly populations. *Family & Community Health: The Journal of Health Promotion & Maintenance*, **11**(3), 42–52. doi:10.1097/00003727-198811000-00008

Marín, G., & Marín, B. V. (1991). *Research with Hispanic populations*. Sage. doi:10.4135/9781412985734

Markides, K. S., Angel, R. J., & Peek, K. M. (2013). Aging, health and families in the Hispanic population: Evolution of a paradigm. In M. Silverstein & R. Giarrusso (Eds.), *Kinship and cohort in an aging society: From generation to generation* (pp. 314–332). John Hopkins University Press.

Markides, K. S., & Eschbach, K. (2005). Aging, migration, and mortality: Current status of research on the Hispanic Paradox. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **60**(2), S68–S75. doi:10.1093/geronb/60.Special_Issue_2.S68

Markides, K. S., & Rote, S. (2019). The healthy immigrant effect and aging in the United States and other Western countries. *The Gerontologist*, **59**(2), 205–214. doi:10.1093/geront/gny136

Min, J. W., & Barrio, C. (2009). Cultural values and caregiver preference for Mexican-American and non-Latino White elders. *Journal of Cross-Cultural Gerontology*, **24**, 225–239. doi:10.1007/s10823-008-9088-0

Muthén, L. K., & Muthén, B. O. (1998–2017). *Mplus user's guide* (8th ed.). Muthén & Muthén. https://www.statmodel.com/HTML_UG/introV8.htm

Noe-Bustamante, L., Lopez, M. H., & Krogstad, J. M. (2020, July 7). *U.S. Hispanic population surpassed 60 million in 2019, but growth has slowed*. Pew Research Center. https://www.pewresearch.org/fact-tank/2020/07/07/u-s-hispanic-population-surpassed-60-million-in-2019-but-growth-has-slowed/

Patel, N., Stagg, B. C., Swenor, B. K., Zhou, Y., Talwar, N., & Ehrlich, J. R., (2020). Association of co-occurring dementia and self-reported visual impairment with activity limitations in older adults. *JAMA Ophthalmology*, **138**, 756–763. doi:10.1001/jamaophthalmol.2020.1562

Pew Research Center's Hispanic Trends Project. (2020). *A portrait of unauthorized immigrants in the United States*. Pew Research Center. https://www.pewresearch.org/hispanic/2009/04/14/a-portrait-of-unauthorized-immigrants-in-the-united-states/

Read, S., Comas-Herrera, A., & Grundy, E. (2020). Social isolation and memory decline in later-life. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **75**(2), 367–376. doi:10.1093/geronb/gbz152

Ruiz, J. M., Campos, B., & Garcia, J. J. (2016). Disparities, paradoxes, and future directions. *Journal of Latina/o Psychology*, **4**(2), 61–66. doi:10.1037/lat0000065

Santini, Z. I., Jose, P. E., Cornwell, E. Y., Koyanagi, A., Nielsen, L., Hinrichsen, C., Meilstrup, C., Madsen, K. R., & Koushede, V. (2020). Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): A longitudinal mediation analysis. *The Lancet Public Health*, **5**(1), e62–e70. doi:10.1016/S2468-2667(19)30230-0

Shah, K., Frank C. R., & Ehrlich, J. R. (2020). The association between vision impairment and social participation in community-dwelling adults: A systematic review. *Eye*, **34**(2), 290–298. doi:10.1038/s41433-019-0712-8

Shukla, A., Harper, M., Pedersen, E., Goman, A., Suen, J. J., Price, C., Applebaum, J., Hoyer, M., Lin, F. R., & Reed, N. S. (2020). Hearing loss, loneliness, and social isolation: A systematic review. *Otolaryngology—Head and Neck Surgery*, **162**, 622–633. doi:10.1177/0194599820910377

Suntai, Z., & White, B. (2021). Social isolation among older veterans: Findings from the National Health and Aging Trends Study. *Aging and Mental Health*. doi:10.1080/13607863.2021.1942434

Swenor, B. K., Ramulu, P. Y., Willis, J. R., Friedman, D., & Lin, F. R. (2013). Research letters: The prevalence of concurrent hearing and vision impairment in the United States. *JAMA Internal Medicine*, **173**(4), 312–313. doi:10.1001/jamainternmed.2013.1880

United States Census Bureau. (2020, June 25). *65 and older population grows rapidly as Baby Boomers age*. https://www.census.gov/newsroom/press-releases/2020/65-older-population-grows.html

Uribe, J. A., Swenor, B. K., Muñoz, B. E., & West, S. K. (2011). Uncorrected refractive error in a Latino population: Proyecto VER. *Ophthalmology*, **118**(5), 805–811. doi:10.1016/j.ophtha.2010.09.015

Varma, R., Paz, S. H., Azen, S. P., Klein, R., Globe, D., Torres, M., Shufelt, C., Preston-Martin, S., & Los Angeles Latino Eye Study Group. (2004). The Los Angeles Latino Eye Study: Design, methods, and baseline data. *Ophthalmology*, **111**, 1121–1131. doi:10.1016/j.ophtha.2004.02.001

West, J., & Scott, M. (2021). Demographic and socioeconomic disparities in life expectancy with hearing impairment in the United States. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*, **76**, 944–955. doi:10.1093/geronb/gbaa166

Xiang, X., Freedman, V. A., Shah, K., Hu, R. X., Stagg, B. C., & Ehrlich, J. R. (2020). Self-reported vision impairment and subjective well-being in older adults: A longitudinal mediation analysis. *The Journals of Gerontology, Series A: Biological Sciences and Medical Sciences*, **75**, 589–595. doi:10.1093/gerona/glz148

Zimet, G. D., Dahlem, N. W., Zimet, S. G., & Farley, G. K. (1988). The multidimensional scale of perceived social support. *Journal of Personality Assessment*, **52**(1), 30–41. doi:10.1207/s15327752jpa5201_2