

1. INTRODUCTION & BACKGROUND

- **Functional decline** is a major public health issue among older adults, linked to hospitalization, institutionalization, and mortality
- **Cognitive impairment** is a key contributor; up to 41% of community-dwelling older adults experience cognitive impairment
- **Social isolation** (objective lack of contact) and **loneliness** (subjective disconnection) are prevalent, especially among cognitively impaired older adults; >60% socially isolated, >1/3 lonely
- Both factors relate to declines in mobility, ADLs, and IADLs, but findings are inconsistent across populations

2. DISABLEMENT PROCESS MODEL (DPM)

- To analyze pathways, we adapted the **Disablement Process Model**, which details how health pathologies lead to impairments, functional limitations, and eventual disability.
- **Social Isolation:** Restricts support access, limits active social participation, and decreases beneficial physical movement.
- **Loneliness:** Lowers subjective self-confidence, raising vulnerability and promoting sedentary/inactive behaviors.
- **Mobility Pathway:** Acts as an early predictor underpinning subsequent self-care and household task performance.

3. STUDY AIM

- Examine longitudinal associations of social isolation and loneliness with mobility, self-care (ADLs), and household activities (IADLs), stratified by cognitive impairment

4. RESEARCH HYPOTHESES

Hypothesis 1: Social isolation and loneliness exert independent longitudinal effects on functional decline.

Hypothesis 2: Cognitive status significantly moderates the relationship between isolation, loneliness, and functional decline.

Hypothesis 3: Social isolation and loneliness act interactively to compound restrictions.

5. METHODOLOGY & STATISTICAL MODELING

Data source: NHATS 2021–2023 panel data (U.S. Medicare beneficiaries ≥65 years)

Cognitive impairment: NHATS algorithm using diagnosis, AD8, and cognitive tests; categorized as impaired vs. not impaired

Functional limitations: Late-Life Disability Scale assessing mobility, self-care, household activities (higher scores = worse function)

Social isolation: 5-item index (living alone, confidants, religious service, group activities, volunteering), score 0–5

Loneliness: Single-item frequency (0–4)

Covariates: Age, gender, race/ethnicity, education, marital status, BMI, chronic conditions, hospitalization, self-rated health, smoking, depressive symptoms

Statistical analysis:

- Generalized Estimating Equations
- Lagged predictors (t–1 → t)
- Models: isolation only, loneliness only, both, interaction
- Stratified by cognitive impairment
- Predictive margins + marginal effects to interpret interactions

Sensitivity analysis: Social isolation recoded into categorical levels

6. RESULTS– Sample characteristics

- Individuals with cognitive impairment were older, more often female, minority, less educated, widowed, underweight, with poorer health and higher depressive symptoms
- They showed higher functional limitations, more social isolation, and greater loneliness

6. RESULTS– Self-care (ADLs)

Without cognitive impairment:

- Both isolation and loneliness significant across models
- No significant interaction

With cognitive impairment:

- Neither factor significant alone
- Both significant only when interaction term included
- Interaction suggests antagonistic pattern

6. RESULTS– Household activities (IADLs)

Without cognitive impairment:

- Isolation and loneliness significant across all models
- Significant interaction (antagonistic)

With cognitive impairment:

- Loneliness significant; isolation not
- Interaction not significant
- Marginal effects inconsistent

6. RESULTS– Mobility

Without cognitive impairment:

- Both social isolation and loneliness independently predicted higher mobility limitations
- Interaction not significant
- Marginal effects: isolation effect weakens as loneliness increases

With cognitive impairment:

- Social isolation consistently significant
- Loneliness significant only in interaction model
- Significant antagonistic interaction (joint effect weaker than multiplicative expectation)
- Marginal effects: isolation significant only at low loneliness levels

6. RESULTS– Sensitivity analyses

- Mobility results robust
- Some inconsistencies in self-care and household domains, but overall patterns similar to main findings

7. CONCLUSION

- Social isolation and loneliness independently and jointly predict functional decline
- Their antagonistic interaction suggests the joint effect does not simply accumulate
- Effects differ by cognitive status and functional domain
- Screening for social disconnection should be integrated into geriatric assessments
- Early identification may help prevent mobility decline
- Combined strategies involving mobility support, caregiver involvement, and meaningful social engagement are essential