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Listening Effort, Fatigue and Social Isolation: Consequences of Aging

Barbara E. Weinstein, PhD, CCC-A, ASHA-F
Graduate Center, City University of New York
NYU Langone Medical Center
bweinstein@gc.cuny.edu

Time-Ordered Agenda

- Introductions and Learning Outcomes
- Epidemiology and Definition of Terms
- Framework
- Evidence Linking Hearing Difficulties to Listening Effort, Fatigue and Social/Emotional Loneliness
- Hearing Technologies and Social/Emotional Loneliness – The Evidence
Learning Outcomes

As a result of this course, participants will be able to:

- Distinguish between the terms loneliness and social isolation and will be able to identify consequences of each.
- Distinguish between listening effort and fatigue.
- Describe tools they can use to measure loneliness, social isolation, and fatigue.

Philosophy Underpinning My Work with Older Adults

- Lifespan approach
- Person centered
- Ability to hear and communicate are cornerstones of successful and healthy aging
- Hearing loss linked to SI via listening effort, fatigue and motivation!!
- Becoming part of the solution in health care settings
Hearing and our ability to engage with the people and environment around us, is the foundation for much of our daily experience and should be our goal as professionals working with persons with hearing loss.

ARHL has a cascading and impactful consequence on individual well-being and broader public health.

Ensuring that older adults with hearing loss, can effectively engage with the people around them is key to optimizing their health and well-being.
Demographics of Aging

Definition of Terms

Old age...when you start feeling younger than you actually are?!

Launer & Lemke, 2009
Growth of Aging Population (US Census Bureau)

Proportion of Population Over 65 and Over 85 Years (US Bureau of Census, 2016)

<table>
<thead>
<tr>
<th>Age</th>
<th>2000</th>
<th>2050</th>
<th>% Change in # of Older Adults</th>
</tr>
</thead>
<tbody>
<tr>
<td>65+</td>
<td>13%</td>
<td>20%</td>
<td>135</td>
</tr>
<tr>
<td>85+</td>
<td>1.6%</td>
<td>4.8%</td>
<td>350</td>
</tr>
</tbody>
</table>
Life Expectancy – 2016

- Life expectancy for girls born today – 82.8 years
- Life expectancy for boys born today – 79 years
- Life expectancy increases as people age
  - Average 65-year-old today can expect to live another 18.4 years
  - If you make it to 75 your life expectancy increases to 86.8!!!

- Older adults (>65 years) are predicted to live for more than half of their remaining years with at least mild levels of hearing loss, with more than half of remaining life lived with moderate hearing impairment for adults >/=75 years
  (Kiely, Mitchell, Gopinath, et al., 2016)
Percentage of Day Spent on Selected Activities (Bls-2014)

Percentage of Total Leisure Time Engaged in Selected Activities
The Secret to Living Longer (Susan Pinker)

https://www.ted.com/talks/susan_pinker_the_secret_to_living_longer_may_be_your_social_life

Public Health Risk of Our Time - SI

A Public Health Priority
Meta analysis: Comparative odds of decreased mortality
Holt-Lundstad et al 2010
GLOBAL BURDEN
(WILSON, TUCCI, MERSON, O’Donoghue, 2017)

<table>
<thead>
<tr>
<th></th>
<th>2010</th>
<th>2013</th>
<th>2015</th>
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<tbody>
<tr>
<td>11th leading cause of YLD</td>
<td>4th leading cause of YLD</td>
<td>4th leading cause of YLD</td>
<td></td>
</tr>
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</table>

The updates reflect increasing appreciation of the importance of hearing loss for gauging overall health and wellbeing.

Hearing Loss Prevalence on the Rise (70+ Years of Age and Older) (Goman, Reed & Lin, 2017)

<table>
<thead>
<tr>
<th></th>
<th>2020</th>
<th>2060</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>55.4%</td>
<td>67.4%</td>
</tr>
</tbody>
</table>

By 2060, the number of people with moderate or greater hearing loss will exceed the number of people who have a mild hearing loss today!!
Prevalence of Bilateral Hearing Loss by Severity (5, 1, 2, 4)
(Goman and Lin, 2016)*

<table>
<thead>
<tr>
<th>Age Range</th>
<th>Mild (24-40dBHL)</th>
<th>Moderate (40-60dBHL)</th>
<th>Severe (60-80dBHL)</th>
<th>Profound &gt;80dBHL</th>
</tr>
</thead>
<tbody>
<tr>
<td>40-49</td>
<td>6%</td>
<td>.48%</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>50-59</td>
<td>10%</td>
<td>2%</td>
<td>.35%</td>
<td>NA</td>
</tr>
<tr>
<td>60-69</td>
<td>20%</td>
<td>6%</td>
<td>.76%</td>
<td>.25%</td>
</tr>
<tr>
<td>70-79</td>
<td>36%</td>
<td>16%</td>
<td>3%</td>
<td>.30%</td>
</tr>
<tr>
<td>&gt;/80</td>
<td>36%</td>
<td>38%</td>
<td>7%</td>
<td>.56%</td>
</tr>
</tbody>
</table>

*National Health and Nutrition Examination Survey, United States, 2001–2010

Percentage of Population with a Disability
(CDC, Health Interview Survey)

[Graph showing prevalence of disabilities by age and gender, comparing 2010 and 2014 data]
Hidden Hearing Loss

- Audiometric thresholds DO NOT reflect the communication difficulties experienced by older adults with ARHL (Tremblay, et al., 2015)
- Many older adults experience hearing difficulty (HD) in presence of multiple talkers and competing noise despite having normal thresholds

Hearing Aid Use

- Hearing aid use and satisfaction lag behind current design improvements and technological advances
- 80% of those who could benefit, do not use hearing aids
- Majority of persons who use hearing aids are older; the majority of older adults with hearing loss do not use hearing aids
Healthy Aging

- Process of developing and maintaining functional ability that enables well being
  - A process that spans the entire life course
  - Depends on accumulation of strengths and deficits across the life course
  - Actions people can take to improve the trajectory toward healthy aging
  - Intrinsic capacity + environmental variables are determinants
Ecology Theory of Aging (ETA)
(Lawton, 1982)

- Old age is profoundly influenced by the physical environment in which people reside and how they cope with environmental challenges – poor fit leads to stress
The Person-Environment Fit Model/Theory (P-E Fit) (Harrison, 1989, 1985)

- Stress arises when there is a “misfit” between an individual and the environment
- Amount of stress depends on the degree of misfit and the person’s ability/inability to meet demands posed by environment
  - Stress is higher and well being lower when the fit between the person’s coping capacity and environmental demands is poor

Features of the Environment which Produce Stress (Pichora-Fuller, 2016)

- Novelty
- Sense of a Lack of Control
- Unpredictability
- Threat to Self

**Diagram:**

1. Novelty
2. Sense of a Lack of Control
3. Unpredictability
4. Threat to Self

**Flow:**

- Novelty → Sense of a Lack of Control → Unpredictability → Threat to Self → Novelty
Person-Environment Fit (P-E Fit) Model*

PERSON’S HEARING/COMMUNICATION ABILITY

FATIGUE & STRESS

PERCEIVED DEMANDS OF ENVIRONMENT


The Communication Challenge for Persons with Age Related Hearing Loss (Peelle, 2017)
Cognitive Demands and Expenditure of More Resources During Listening

Listening Effort and Fatigue
The Trajectory

DIFFICULTY COMMUNICATING

LISTENING EFFORT REQUIRED TO COMMUNICATE

MOTIVATION TO MAKE THE EFFORT DECLINES

FATIGUE SETS

WITHDRAWAL/DISENGAGEMENT

Listening Effort (McGarrigle, et al., 2014)

- Mental exertion required to attend to and understand an auditory message; listening may become effortful as a result of sub-optimal conditions such as:
  - (1) a degraded source signal (e.g. accented speech)
  - (2) interference during sound transmission (e.g. background noise, reverberation, hearing-aid signal processing)
    - (3) listener limitations (hearing impairment, non-native speaker)
    - (4) motivation – when listening is important
Implications of Sustained Listening Effort

- Mental Fatigue (extreme tiredness/exhaustion that results from exerting sustained listening effort)
- Communication Disengagement
- Decreased Subjective Well-Being
- Negative Effect on Q of L

Fatigue
(McGarrigle, et al., 2014; Bess & Hornsby, 2014)

- An experience of mental or physical weariness that results in reduced alertness and a range of emotions and behaviors (a symptom)
- An adaptive state, commonly reported condition associated with many chronic conditions
- Results from sustained effort in situations which are not rewarding
Did You Know?

- Adults seeking help for their hearing difficulties – more likely to report low energy (vigor deficit) and increased fatigue than older adults of comparable age in the general population
- Mental fatigue tends to be greater than physical fatigue (reduced ability or desire to perform a physical task)

Implications of Fatigue

- Depression
- Lack of desire to engage in life activities and social interaction
- When ignored it leads to decline in numerous functions and health problems
- Negative effect on Q of L
- Hearing impaired listeners report increased levels of fatigue as compared to an age matched control sample; 15% of participants with hearing loss reported severe fatigue (Alhanbali, et al., 2016; Hornsby, et al., 2016)
- CI users, SSD, HA users report comparable levels of fatigue

- Severity of hearing loss ≠ associated with feelings of fatigue
- Self perceived psychosocial hearing difficulties (HHI) associated with all fatigue domains (mostly at higher levels of HH)
- Listening effort and fatigue correlated; sustained effort a precursor to fatigue

No Correlation Between Hearing Level and Fatigue
Social Isolation & Loneliness

The Cycle

- Inability to communicate successfully
- Difficulty participating, low reward
- Withdrawal from social activities

“Neglecting our social relationships is actually shockingly dangerous to our health. Research shows that a lack of social connection carries with it a risk of premature death comparable to that of smoking, and is roughly twice as dangerous to our health as obesity.”

“The most significant thing we can do for our well-being is not to “find ourselves” or “go within.” It is to invest as much time and effort as we can into nurturing the relationships we have with the people in our lives.”

Ruth Whippman

Value of Social Integration

- People with more social ties live longer, and have better health
- Better social connectedness related to reduced risk of subsequently developing dementia
  (Fratiglioni, Wang, Ericsson, Maytan, and Winblad, 2000)
The Facts

- “Individuals lacking social connections … are at risk for premature mortality,” with risk levels comparable to those of obesity, lack of physical activity or substance abuse” (Holt-Lunstad, 2015)

What Matters Most as People Age

- Older adults value relationships with family and friends second only to health (Victor, et al., 2000)
- Social engagement – predictor of longevity and life expectancy
- The social environment matters
A poor social environment adversely affects human physiology. High levels of stress hormones (e.g. cortisol) disrupts the adrenocortical axis which can damage the hippocampus which increases risk for dementia. Individuals with richer social environments and who are more socially engaged have better cognitive health and are at less of a risk for cognitive decline.
Social Isolation: A Multivariate Sociological Phenomenon
Sociology 101

- **Loneliness** - A psychological state; a subjective discrepancy between one’s actual and preferred level of social contacts
- **Emotional loneliness** – the absence of a significant other
- **Social loneliness** – the absence of a social network
- **Social isolation** – an objective state referring to the number of social contacts or interactions, social network size
- **Social Inaction** - behavior not oriented toward others

“Greater Ph Hazard Than Obesity” (APA, 2017)
Loneliness Risk Factors (Pate, 2014)

Health Status Risks
(Physical and Mental Health Indicators)

Socio-demographic

Life Event Risks
(Bereavement)

Heylen (2010)

Higher Satisfaction with Social Relationships

Lower the Risk of Social Loneliness

Better ones Appraisal of Number of Good Friends
Theory of Socio-Emotional Selectivity

- As we Age Social Network Size Shrinks and Older Adults:
  - Shift priority to the import of close emotional bonds
  - Select contacts to optimize receipt of social support

(Pronk, et al., 2014)

- Poorer baseline hearing in noise and poorer self reported hearing associated with greater S/E loneliness at four year follow-up
  - In men
  - In non-hearing aid users
  - Those living with a partner
  - Those with MCC
  - Those with a medium or high education
South Australian Health Omnibus Survey (N=3015) (Hawthorne, 2008)

- Likelihood of self perceived social isolation increases with number of chronic conditions
- Individuals with 5+ chronic condition were 19 times more likely to feel social isolation than persons with 0-1 chronic health conditions
- Depression has the strongest association with social isolation, followed by self reported hearing difficulties

Hearing impaired older adults are at increased risk of experiencing emotional distress and restrictions in social engagement after five years (Gopinath, Hickson, Schneider, et al., 2012)

- Hearing ability in noise significantly associated with incident social and emotional loneliness (N=5-8) (Stam, et al., 2016)
- Self perceived hearing handicap and difficulty understanding distorted speech relate to loneliness and SI (Weinstein, 1983)
Emotional loneliness increases with hearing decline among persons who have recently lost a life partner. Hearing aid use has a protective effect - Only among non hearing aid users did poorer hearing lead to more loneliness.

(Pronk, et al., 2014)
Outcome on DG Loneliness Scale (Weinstein, et al., 2016)

![Graph showing outcome on DG Loneliness Scale.

Severity of Hearing Loss and Social/Emotional Loneliness

![Graph showing severity of hearing loss and social/emotional loneliness.]
Change in Social/Emotional Loneliness

Chi square = 18.54
Fisher’s exact test: df=1, p (two tailed) 0.000 → significant p<0.05

Proportion of participants experiencing reduced psychosocial difficulties after 4 to 6 weeks of hearing aid use?

62%
Proportion not lonely after 4 to 6 weeks of hearing aid use
73%

Proportion Having Residual Disability?
50%
It is possible for an individual to feel lonely even when they are socially engaged

Social Network Size

Perceived Loneliness

R= -0.111
Efficacy of Cochlear Implants
(Contrera, et al (2017))

- Reductions in scores on UCLA loneliness scale was significant from baseline to six months and from baseline to one year
- Most significant changes in loneliness was in persons with greatest baseline loneliness


- CI recipients experienced a significant reduction in social and emotional loneliness on the DeJong Gierveld Loneliness Scale from baseline to 12 months.
Clinical Implications

CLINICAL IMPLICATION # 1

Assess social network size, loneliness, listening effort and fatigue
CLINICAL IMPLICATION # 2: Reframe the Conversation

- Hearing is often referred to as the “social sense;” it plays an important role in developing and maintaining intimate relationships, social connections with family, friends, coworkers, and acquaintances.

- **Goal of hearing health care interventions should be to optimize social engagement**

- Consider range of hearing health care interventions targeting situation specific challenges.

CLINICAL IMPLICATION #3: Public Health Approach

- Emphasize optimizing audibility across social networks.

- Intervene in several different aspects of social environment:
  - Increase availability of social support within existing networks.
  - Increase social integration by creating and nurturing ties between individuals and his her community.
  - Reduce negative interactions via improved audibility.
Thank you and Reflections

- What are advantages of a life span approach to hearing health care?
- Is hearing loss a modifiable risk factor for SI/Loneliness?
- Is there a time window for successful intervention?
- Do we focus enough on communication and social integration with our patients?
- Do we focus enough on quality of relationships?
- Would you assess fatigue, LE, SI, and Loneliness routinely?