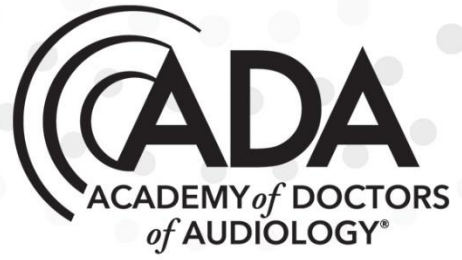


AUDACITY

Bolder than Ever



Depression & Hearing Loss

Victor Bray, MSC, PhD, FNAP

What are Problems Associated with Untreated HL?

Impact on Others, Quality of Life, and Cognitive Function

- Uncorrected hearing loss auditory disability
- Affects both the HI person and significant others
- The HI person not aware of all consequences
- Uncorrected hearing loss poorer quality of life
- Correlation between uncorrected HL and cognition
- No proof that HL is the cause of reduced cognitive function

Negative consequences of uncorrected hearing loss—a review

Stig Arlinger



<https://www.asthmaptkids.com/quality-of-life>

What are Problems Associated with Untreated HL?

Communications, Emotional Health & Physical Health

Sequence of Events

Hearing Impairment

Ability to Communicate

Affect Interpersonal Relationships

Multiple Negative Outcomes

Depression

Loneliness

Altered Self-Esteem

Diminished Functional Status

Adjusted Odds Ratio for Impact of Moderate or More Hearing Loss

(n = 2,461 Alameda County)

(self-report, 2-year longitudinal)

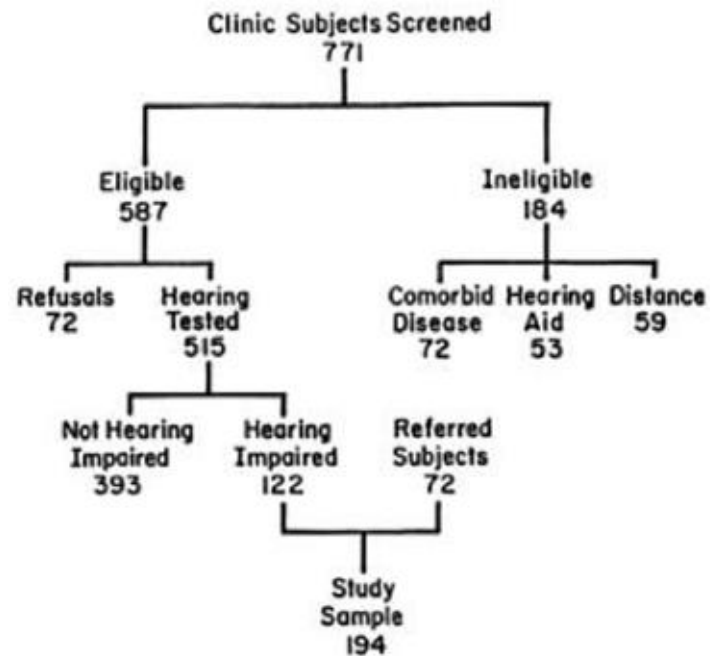
Fair or poor physical health	OR:1.39*
ADL disability	OR:1.85***
IADL disability	OR:1.32*
Physical performance disability	OR:1.98***
Fair or poor mental health	OR:1.90***
Depression	OR:2.05***

Negative Consequences of Hearing Impairment in Old Age: A Longitudinal Analysis

William J. Strawbridge, PhD,¹ Margaret I. Wallhagen, PhD,² Sarah J. Shema, MS,³ and George A. Kaplan, PhD⁴

What are Improvements with Treatment?

Communication, Mental Health, Quality of Life



“Hearing loss is associated with important adverse effects on the quality of life of elderly persons, effects of which are reversible with hearing aids.”

Average Difference between Groups: QoL

Scale	Change	p Value
HHIE	34.0	< 0.0001
QDS	24.2	< 0.0001
SPMSQ	0.28	= 0.0008
GDS	0.80	= 0.03
SELF	1.9	= 0.27

Quality-of-Life Changes and Hearing Impairment

A Randomized Trial

Cynthia D. Mulrow, MD, MSc; Christine Aguilar, MD; James E. Endicott, PhD; Michael R. Tuley, PhD; Ramon Velez, MD, MSc; Walter S. Charlip, PhD; Mary C. Rhodes, MPH; Judith A. Hill, MD; and Louis A. DeNino, PhD

Sustained benefits of hearing aids.

Mulrow CD¹, Tuley MR, Aguilar C.

What is Depression?

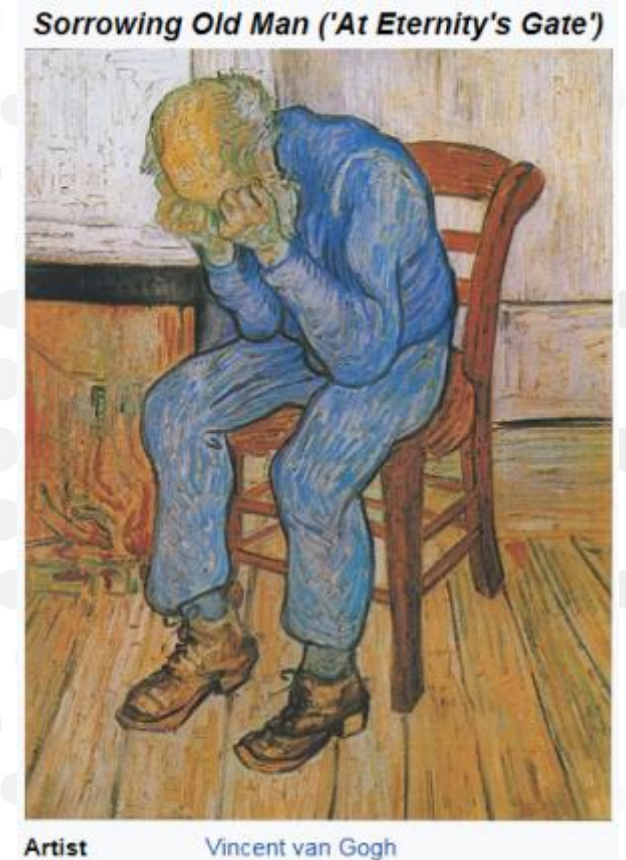
Biological, Environmental, Genetic Psychosocial Factors

- **Depression** (MDD) common, serious medical illness, negatively affects feelings, thoughts, actions
- **Depression** causes sadness, loss of interest in activities
- **Depression** can lead to:
 - emotional and physical problems
 - decrease person's ability to function at work, at home
- A chronic disease to be monitored
- Pathophysiological cause unknown
- No laboratory tests
- No clinically useful biological markers
- Genetics, biology, psychology, environment



What are Risk Factors for Depression?

- Alcohol dependence
- Anxiety
- Chronic pain
- **Comorbid chronic medical conditions**
- Female sex
- Hypomania or Mania
- Nonresponsive to effective treatments for medical conditions
- Obstetric patients
- Psychosis
- Personal or family history of depression
- Recent childbirth
- **Recent stressful events**
- Substance misuse
- Unexplained somatic symptoms



What are Psychosocial Correlates of HRQoL?

Aspects of Discussion and Working Definitions

PSYCHOLOGICAL

- **Anxiety**
- Cognitive Disorder
- Dementia
- **Depression**
- **Loss of Self Esteem**
- **Stress**
- **Worry**

SOCIAL

- Activity Limitation
- Participation Restriction
- **Loneliness**
- **Social Isolation**
- **Social Withdrawal**

Depression is characterized by chronic feelings of sadness or worthlessness, irritability, physical lethargy, insomnia and sometimes thoughts of suicide.

What are Chronic Conditions Associated with Depression in the Elderly?

- “Chronic diseases and risk of **depression** in old age (meta-analysis)
 - 24 cross-sectional and 7 prospective longitudinal studies
- Conclusions:
 - **Definite risk factors** for increased **depression** in old age, chronic diseases of stroke (OR: 1.87), **hearing loss** (OR: 1.71), **vision loss** (OR: 1.94), cardiac disease (OR: 1.67), chronic lung disease (OR: 2.13)
 - **Probable risk factors** for increased **depression** in old age chronic diseases of arthritis, hypertension, and diabetes
 - **Risk factor not found** for gastrointestinal disease

Chronic diseases and risk for **depression** in old age: A meta-analysis of published literature

Huang Chang-Quan, Dong Bi-Rong*, Lu Zhen-Chan, Yue Ji-Rong, Liu Qing-Xiu

Comorbidities and Untreated Hearing Loss?

*Comorbidities of **SNHL** also Associated with **Depression***

- Comorbidities of **SNHL** included cirrhosis, hypertension, hyperlipidemia, diabetes mellitus, asthma, chronic kidney disease, ***chronic artery disease, alcohol-related illness, anxiety, COPD, stroke***, and steroids. *[Are these in your case history? –VB]*
- **SNHL and comorbidities** in ***bold italics*** (above) associated w/ **depression**.
- Comparing SHNL to NH, **depression** incidence (aHR:1.73) increased with age and with women more than men.

“Depression is a common mental disorder, which affect 350 million people in the world. Unipolar depressive disorders and adult-onset hearing loss, the most common neuropsychiatric conditions, and sense organ disorder, are the first and second leading nonfatal causes of year loss due to disability in high-income countries.”

Increased risk of depression in patients with acquired sensory hearing loss

A 12-year follow-up study

Wei-Ting Hsu, MD^a, Chih-Chao Hsu, MD^b, Ming-Hsun Wen, MD^c, Hong-Ching Lin, MD^{a,d}, Hsun-Tien Tsai, MD, PhD^a, Peijen Su, MD, PhD^{d,e}, Chi-Te Sun, MSc^f, Cheng-Li Lin, MSc^g, Chung-Yi Hsu, MD, PhD^h, Kuang-Hsi Chang, PhDⁱ, Yi-Chao Hsu, PhD^j

What are Depression & Chronic Illness Impact on HRQoL?

Depression Interaction with Medical Conditions for HRQoL

- “**Depression** and Health-Related Quality of Life.”
- Evaluated HRQoL, **Depression**, Arthritis, Diabetes and Hypertension
 - 9,898 subjects using NHEFS
- Conclusions:
 - **Depression** associated w/ decrements in quality of life (QoL)
 - **Depression** effect comparable to arthritis, diabetes and hypertension
 - **Depression** interaction w/ medical conditions to further decrease QoL
 - Results underscore need for clinical attention by general medical providers to **depression** for persons with chronic conditions

Depression and Health-Related Quality of Life

BRADLEY N. GAYNES, M.D., M.P.H.,¹ BARBARA J. BURNS, Ph.D.,² DAN L. TWEED, Ph.D.,³ and PENNIFER ERICKSON, Ph.D.⁴

What is Impact of Dual Sensory Loss?

Vision & Hearing Loss Association with Mental Health

➤ Armstrong ... (2016)

- Individual sensory loss, higher rate of **depression**.
- Dual loss @ 31% > **Vision Loss** @ 25% > **HL** @ 17% > No Loss @ 12%

➤ Turunen-Taheri ... (2017)

- Increased **depression** for Dual Loss vs. **HL** with adjusted OR:2.38
- Increased **anxiety** for Dual Loss vs. **HL** with adjusted OR:1.87

➤ Cosh ... (2017)

- HL group shows **depression** and **anxiety** effects at baseline.
- VL and Dual loss groups show **depression** effects over time (six years).
- Different sensory loss groups have different mental health profiles.

Armstrong, Surya, Burdine, Elliot and Brossart (2016)
Turunen-Taheri, Skagerstannd, Hellström and Carlsson (2017)
Cosh, Von Hanno, Helmer, Bertelson, et al. (2017)

Depression and Untreated Hearing Loss?

Depression Associated with Degree of Hearing Loss

Prevalence of moderate to severe **depression** in the population varies with degree of **hearing loss**.

- 5% Excellent hearing
- 7% Good hearing
- 11% Trouble hearing

After accounting for other factors, hearing impairment was significantly associated with depression, particularly in women.

Multivariate odds ratios for **depression** varied with degree of **hearing loss**.

- OR:1.4 Good hearing
- OR:1.7 A little trouble
- **OR:2.4 Moderate trouble**
- OR:1.5 A lot of trouble
- OR:0.6 Deaf

Hearing Impairment Associated With Depression in US Adults, National Health and Nutrition Examination Survey 2005-2010

Chuan-Ming Li, MD, PhD; Xinzhi Zhang, MD, PhD; Howard J. Hoffman, MA; Mary Frances Cotch, PhD; Christa L. Themann, MA, CCC-A; M. Roy Wilson, MD

Depression and Treated Hearing Loss?

Hearing Aid Usage Associated with Lowered Depression

Baseline data

- 59% had **hearing loss**.
- 4% met criteria for **MDD**
- 7% met criteria for **depressive disorder**.
- Greater **hearing loss** was not associated with greater odds of **depression**.
- **Hearing aid** use was associated with reduced odds of **depression**.
 - OR: 0.3 / 0.5

• Discussion

- The direction of any association between **hearing loss** or **hearing aid** use and **depression** not determined.
- **Hearing loss treatment** may promote social engagement and reduce **depressive symptoms**, OR
- Individuals without **depression** more likely to obtain **hearing aids**.

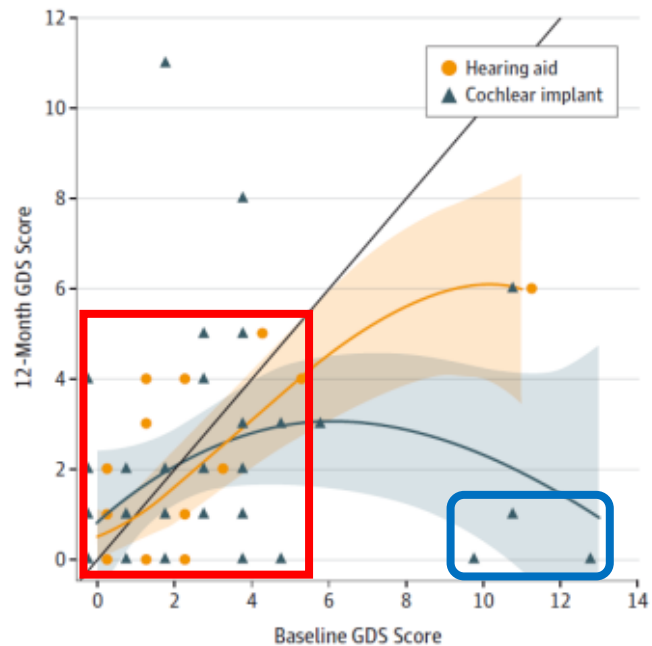
Hearing Loss and Depression in Older Adults

David J. Mener, M.D. M.P.H.¹, Joshua Betz, M.S.^{2,3}, Dane J. Genter, M.D.¹, David Chen, B.S.¹, and Frank R. Lin, M.D. Ph.D.^{1,3}

Depression and Treated Hearing Loss?

*Largest Treatment Effect Associated with Greater **Depression***

Figure 1. Geriatric Depression Scale (GDS) Scores at 12 Months vs Baseline With Loess Fit



The black line is a reference line representing no change in depressive symptoms at 12 months of follow-up vs baseline. The shaded areas represent 95% CI bands.

Procedures:

- Adults (≥ 50) with **hearing loss**
- Treatment with HA or CI

Findings:

- Baseline GDS higher for CI than HA
- 6 months, \uparrow GDS for CI & HA groups
- 12 months, \uparrow GDS for CI, but not HA

Comments:

- The most improvements were patients with higher GDS scores.
- The statistical effect of the study may not be clinically significant.

Association of Using Hearing Aids or Cochlear Implants With Changes in Depressive Symptoms in Older Adults

Janet S. Choi, MPH; Joshua Betz, MS; Lingsheng Li, MHS; Caitlin R. Blake, MSPH; Yoon K. Sung, MHS; Kevin J. Contrera, MPH; Frank R. Lin, MD, PhD

Anxiety and Untreated Hearing Loss?

Anxiety & Depression Associated with Hearing Loss

Procedures:

- Adults, mean age 60
- Moderate to profound HL

Findings:

- **Anxiety** associated with the severity of the hearing loss.
- ↑ **anxiety** & **depression** associated with ↑ rumination & catastrophizing behaviors.
- **Rumination** is focused attention of symptoms over solutions.
- **Catastrophizing** is imagined worst-case scenarios as fact.

Cognitive coping and goal adjustment are associated with symptoms of depression and anxiety in people with acquired hearing loss

Nadia Garnefski & Vivian Kraaij

Procedures:

- Adults, age 76 – 85
- Normal, Mild, and ≥ Moderate HL

Findings:

- ↑ **anxiety** with ↑ **hearing loss**
- Mild HL OR:1.32
- Mod+ HL OR:1.59

Comments:

- **Hearing impairment** is associated with greater odds of **anxiety**.
- Cannot establish the temporal link between **HL** and **anxiety**.

Loneliness and Untreated Hearing Loss?

Loneliness & Depression Associated with Hearing Loss

Association of Hearing Loss and Loneliness in Older Adults

Yoon-kyu Sung, MHS¹, Lingsheng Li, MHS²,
Caitlin Blake, MSPH¹, Josh Betz, MS¹,
and Frank R. Lin, MD, PhD¹

Procedures:

- Adults w/ problems hearing.

Baseline Findings:

- **Depression, social loneliness & emotional loneliness** associated with **poorer hearing** (self report)

4 Year Findings:

- **Social Loneliness** in non-users of hearing aids (self report).
- **Emotional Loneliness** in men (self report and speech in noise screening).

Prospective effects of hearing status on loneliness and depression in older persons: Identification of subgroups Marieke Pronk, Dorly J.H. Deeg, Cas Smits, Theo G. van Tilburg, Dirk J. Kuik, Joost M. Festen & Sophia E. Kramer

Procedures:

- Adult HA and CI candidates
- SMART study

Findings:

- **Loneliness** significantly associated with Age and **Hearing Loss**.

Comments:

- Increased **loneliness** independently associated with greater **hearing loss** and younger age.
- Need to address **hearing loss** as a potentially modifiable factor for **loneliness** and healthy aging.

Loneliness and Treated Hearing Loss?

HA Usage Associated with Reduced Emotional & Social Loneliness

Procedures:

- 40 adults, ages 62 – 92
- Mild to moderately-severe **HL**

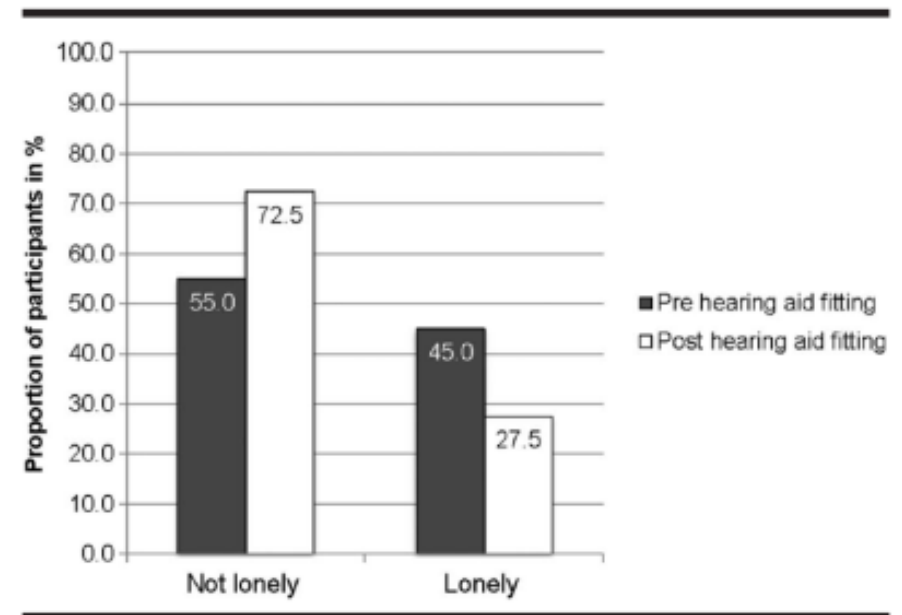
Findings:

- Significant change for **overall loneliness** and perceived **emotional loneliness**.
- Mod/Sev **HL** associated with more reduction in perceived **loneliness**.

Comments:

- Hearing aid use (4 – 6 weeks) a buffer against **social** and **emotional loneliness**, especially with significant HL.

Figure 3. Proportion of participants experiencing significant loneliness prior to and following hearing aid use.



Relating Hearing Aid Use to Social and Emotional Loneliness in Older Adults

Barbara E. Weinstein,^a Lynn W. Sirow,^b and Sarah Moser^c

Treatment of Depressive Disorders?

Bimodality in Treatment Options: Therapy and/or Medications

➤ Mild-to-Moderate **Depression**

- Psychotherapy or Medication

➤ Severe **Major Depressive Disorder**

- Medication (alone)
- Psychotherapy with Medication

➤ Psychotherapy Modalities

- Cognitive Behavioral Therapy
- Interpersonal Psychotherapy

Psychotherapy
Alone

Medications
Alone

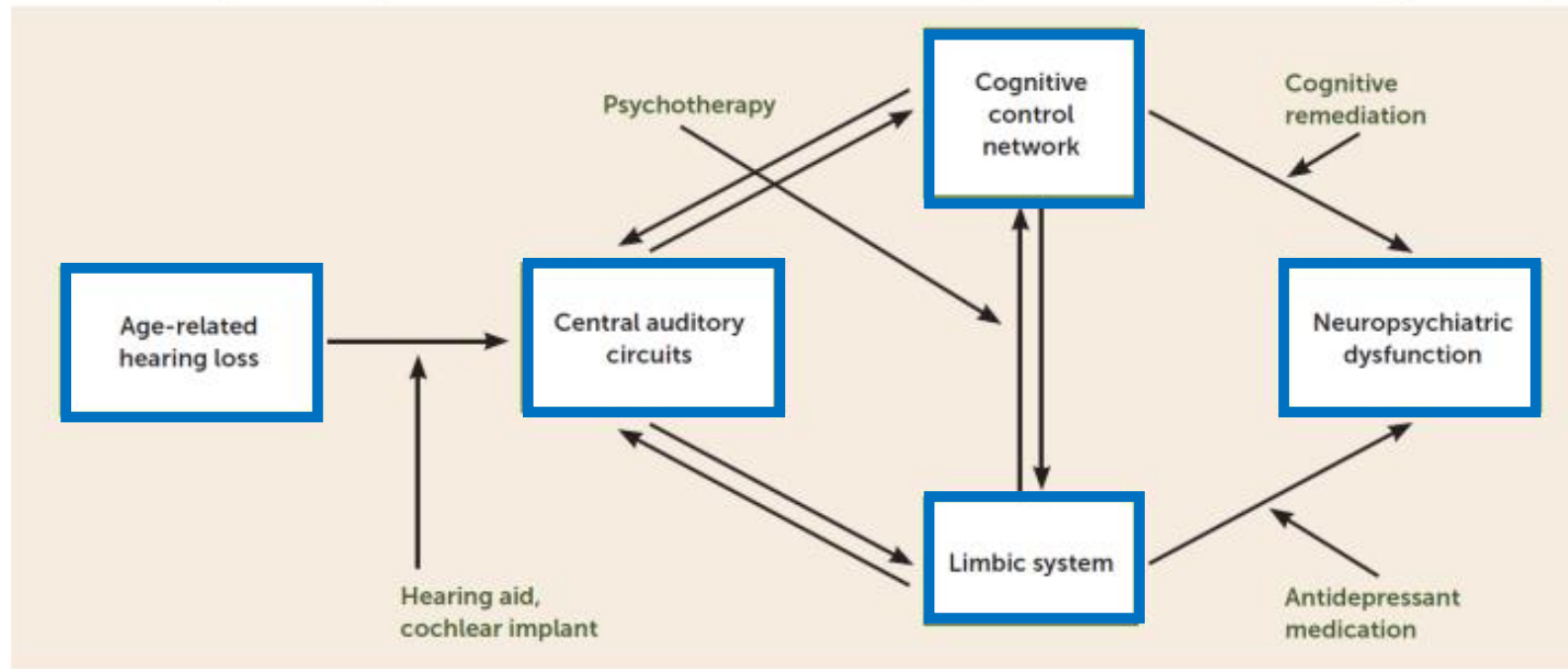
Psychotherapy &
Medications

Model for ARHL Treatment?

Biological, Environmental, Genetic Psychosocial Factors

RUTHERFORD ET AL.

FIGURE 3. Possible Targets of Therapeutic Intervention for Patients With Hearing Loss Who Are at Risk of Neuropsychiatric Dysfunction



Cognitive Control Network: Mental skills that help you get things done.

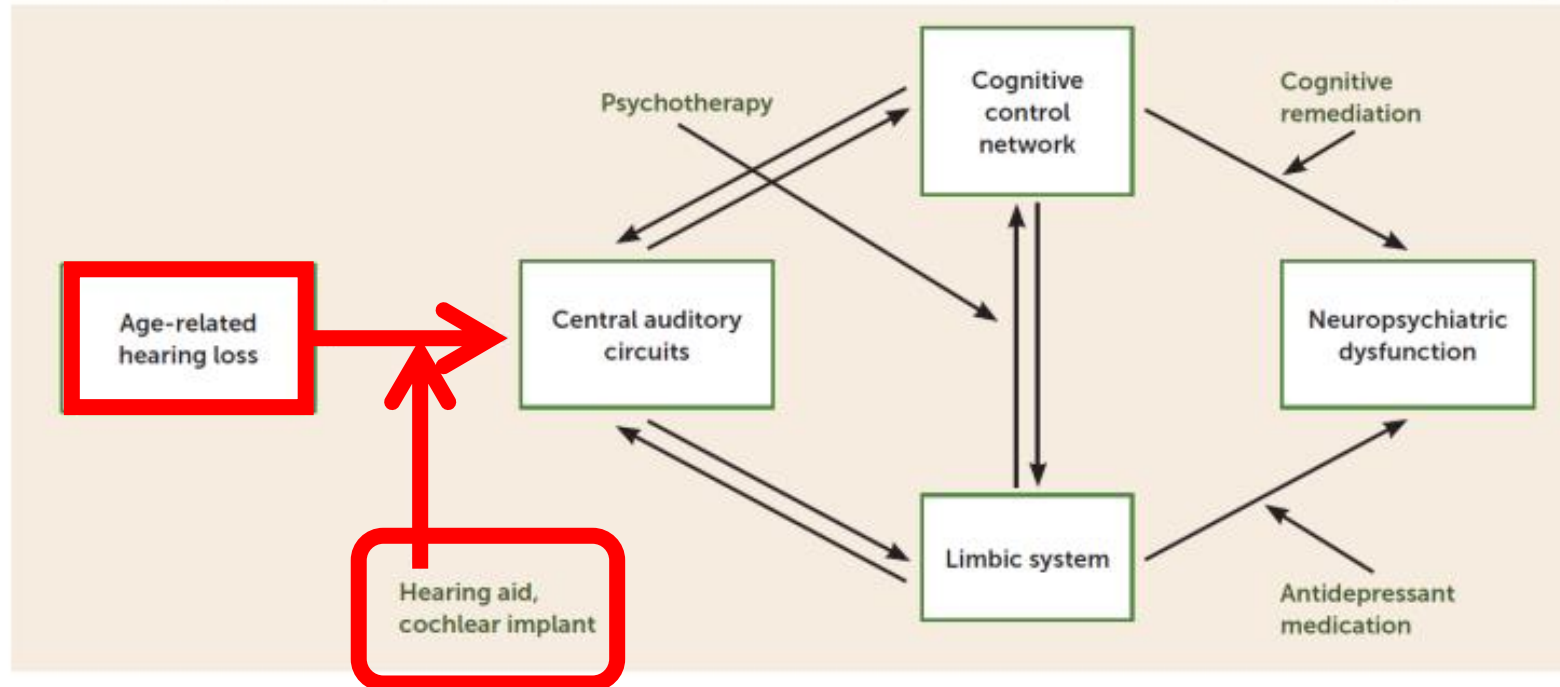
Limbic System: Emotional center, new memories, past experiences.

Model for ARHL Treatment?

Biological, Environmental, Genetic Psychosocial Factors

RUTHERFORD ET AL

FIGURE 3. Possible Targets of Therapeutic Intervention for Patients With Hearing Loss Who Are at Risk of Neuropsychiatric Dysfunction

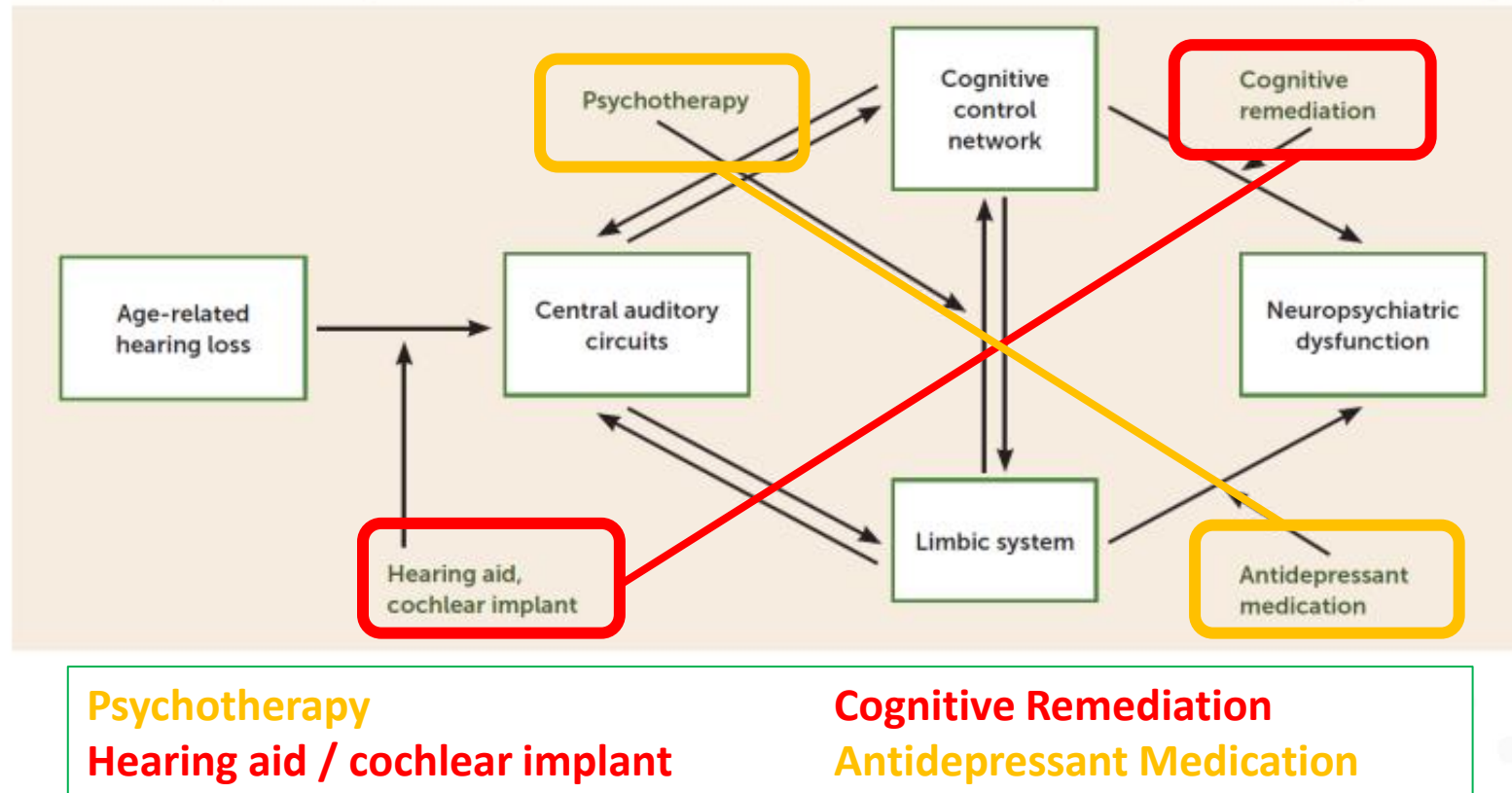


Model for ARHL Treatment?

Biological, Environmental, Genetic Psychosocial Factors

RUTHERFORD ET AL.

FIGURE 3. Possible Targets of Therapeutic Intervention for Patients With Hearing Loss Who Are at Risk of Neuropsychiatric Dysfunction



Screening for Depression?

- **Clinicians should consider screening patients with identified risk factors** or who present with unexplained somatic symptoms, chronic pain, anxiety, substance abuse, or nonresponsive to effective treatments for medical conditions.

Annals of Internal Medicine[®]

In the Clinic[®]

Depression

McCarron, Vanderlip
and Rado (2016).

- **Patient Health Questionnaire (PHQ)** self-administered screening tool for presence of **depressive symptoms**.
- **PHQ-2 & PHQ-9**
- Over the past 2 weeks have you
 - felt down, depressed, hopeless?”
 - felt little interest or pleasure in doing things?”
- Positive response or responses are a failure of the screening.

<https://www.aafp.org/afp/2012/0115/p139.html>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2906530/>

Depression, Hearing Loss & The Big Picture

Overview of Hearing Loss

- Hearing loss can be mild or severe, present since birth or begin later in life, occur gradually or suddenly, result from a health condition or accompany aging; one or both ears can be affected. Most hearing loss in adults is permanent or slowly progressive.
- Hearing loss has been associated with serious health comorbidities such as depression, anxiety, low self-esteem and insecurity, social isolation, stress, mental fatigue, cognitive decline and dementia, reduced mobility, and falls. Both the severity of hearing loss and the impact hearing loss has on individuals' lives vary. More research is needed to better understand the impacts.
- It has been estimated that **30 million people (12.7 percent of Americans ages 12 years or older) in the U.S. have hearing loss.**
- **The unmet need for hearing health care is high.** Estimates of hearing aid use are that 67 to 86 percent of adults (50 years and older) who might benefit from hearing aids do not use them.

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Why Focus on Hearing Health Care Now?

- *Changing Demographics: Intersection of Hearing Loss and Aging*
- *Recognizing Hearing Loss as a Public Health Priority and a Societal Responsibility*
- *Rapidly Changing Technologies*
- *Changes in Health Care Paradigms*

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Hearing Loss & Depression

Victor Bray, MSC, PhD, FNAP
ADA 2018 Symposium