Restorative sensory care for seniors: impact on cognitive aging

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The layers of my life...

- School of Optometry, University of Montreal

- Resident Researcher, CRIR/Centre de réadaptation MAB-Mackay du CIUSSS du Centre-Ouest-de-l’Île-de-Montréal

- Resident Researcher, CRIR/Institut Nazareth et Louis-Braille du CISSS de la Montérégie-Centre

- Adjunct Professor, School of Physical and Occupational Therapy

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Our « Trinity »

“There is nothing to help my mind think”
(LeJeune, 2010, p. 151)
Definitions

- Restorative sensory care
  - pharmacological [not this presentation]
  - surgical (e.g., cochlear implant, cataract surgery)
  - rehabilitation
    - assistive devices (e.g., hearing aids, portable magnifier)
    - strategies (e.g., speech reading, lighting)

- Seniors = ? 50+? 65+? 100+?

- Cognitive/sensory Aging
  - What is normal for centenarians?
  - Ideally adjusted to measure in presence of sensory decline
Outline

● Why would sensory health influence cognition?
  ● FUEL

● Hearing Care
  ● Surgical – e.g., Cochlear Implants
  ● Rehabilitation – Devices/Strategies

● Vision Care
  ● Surgical – e.g., Cataract extraction
  ● Rehabilitation – Devices/Strategies

● The Challenge of Measurement
Framework for Understanding Effortful Listening (FUEL)

- Allocation of cognitive energy
- Listening is “tiring”
- Vision loss: effortful reading?
- Same challenge in low vision rehabilitation

Pichora-Fuller et al. 2016, Ear & Hearing
Cochlear Implants & Cognition

- **CI & aural rehabilitation:**
  - Written instructions for MMSE,
  - Scoring as normal/abnormal of standard (Mosnier 2015)

- **Evaluation of the Impact of Cochlear Implants on Cognition in Older Adults, n = 150, cognitive function before and after cochlear implantation, 2015-2019, Richard Gurgel**
  - Primary: Cognitive function
  - Secondary: Psychosocial well-being

![Figure 2. Cognitive Test Results Before and After Cochlear Implantation](https://clinicaltrials.gov/)

Individual cognitive outcomes at 12 months plotted in relation to the data obtained before cochlear implantation. Among the 91 patients who underwent the 6 cognitive tests before implantation, data were missing at 12 months after implantation for 4 individuals: 3 patients with 2 abnormal test scores, and 1 patient with 1 abnormal test score before implantation. Tan shading indicates better cognitive results after implantation; light blue, unchanged results; and light orange, poorer results.
Hearing Rehab & Cognition

- Aging and Cognitive Health Evaluation in Elders (ACHIVE),
- n = 850, Hearing rehab vs. Aging intervention,
- 2017-2022, Frank Lin & Josef Coresh

- Primary: Neurocognitive test battery
- Secondary: Dementia, MCI, cognition, social engagement, loneliness, physical function, physical ability, depression, hearing handicap, hospitalizations, QoL, feedback

https://clinicaltrials.gov/
Cataract Surgery & Cognition

- Simulated cataract = decreases reaction time and accuracy on cognitive performance (See, et al., 2010)
  - Visual testing materials (letter matching, symbol recall)
  - Used contrast sensitivity for « statistical control »

- Cataract surgery = improved cognition, maybe! (Fukuoka et al., 2016)
  - Yes (Tamura, 2004; Gray 2006; Ishii, 2008; Jefferies 2014)
  - No/Not sure (Hall, 2005; Anstey, 2006)
  - ? Publication bias ?
Vision Rehab & Cognition

- Provision of proper eye glasses already makes a difference on (cognitive?) function (Teresi, 2005)

- Challenge of providing vision rehab to clients with cognitive impairment, but possible (e.g., MORE-LVR, Whitson, et al, 2013)

- No large body of evidence that vision rehab can improve cognition

- Some hints: e.g., MoCA-B scores improve after 1 year in vision rehab & day centre, Wittich et al., 2014
  - Test-retest practice effect?
  - Scores near cut-off = 1 point makes difference
Dual Sensory Impairment & Cognition

- DSI associated with greater cognitive decline in those with low social engagement (Yamada et al., 2015)
- Cognitive impairment more prevalent in DSI (Mitoku et al., 2016) – as measured by standardized evaluation questionnaire
- No Cognition measures built for DSI [but I was asked to review a paper yesterday…]
- ALWAYS measure **vision AND hearing** in your trials!
- The Multiplicative challenge
The Future

- Knowledge Gaps & Research Opportunities:
  - Can vision rehabilitation improve
    - Performance on cognitive test?
    - And actual cognitive function?
  - Can combined vision & hearing restoration improve cognitive function?
  - The senses need to be measured in context of the bio-psycho-social situation of the person
The Future

- Knowledge Gaps & Research Opportunities:
  - Measuring Cognition – e.g., MoCA
    - When Visually Impaired
      - Blind MoCA (Wittich, 2010)
    - When Hearing Impaired
      - HI MoCA (Dupuis et al., 2016; Lin et al. 2017)
    - When BOTH Vision & Hearing are reduced/absent
      - interRAI Deafblind Supplement (Dalby, JVIB, 2009)
  - Evaluate the effectiveness/efficiency of sensory care on cognitive function
Thank you
Merci