

Restorative sensory care for seniors: impact on cognitive aging

Walter Wittich, PhD, FAAO, CLVT
Assistant Professor

School of Optometry of the Université de Montréal

Disclosures

- Current funding – peer-reviewed:



- Other funding - industry:



- Conflicts of interest: none

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
- Affiliate Assistant Professor, Department of Psychology, Concordia University



Our « Trinity »



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

Definitions

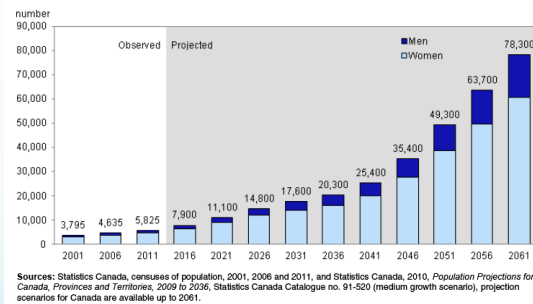
- Restorative sensory care
 - pharmacological [not this presentation]
 - surgical (e.g., cochlear implant, cataract surgery)
 - rehabilitation
 - assistive devices (e.g., hearing aids, portable magnifier)
 - strategies (e.g., speech reading, lighting)

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

- Cognitive/sensory Aging

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

Figure 1 Number of centenarians by sex, Canada, 2001 to 2061

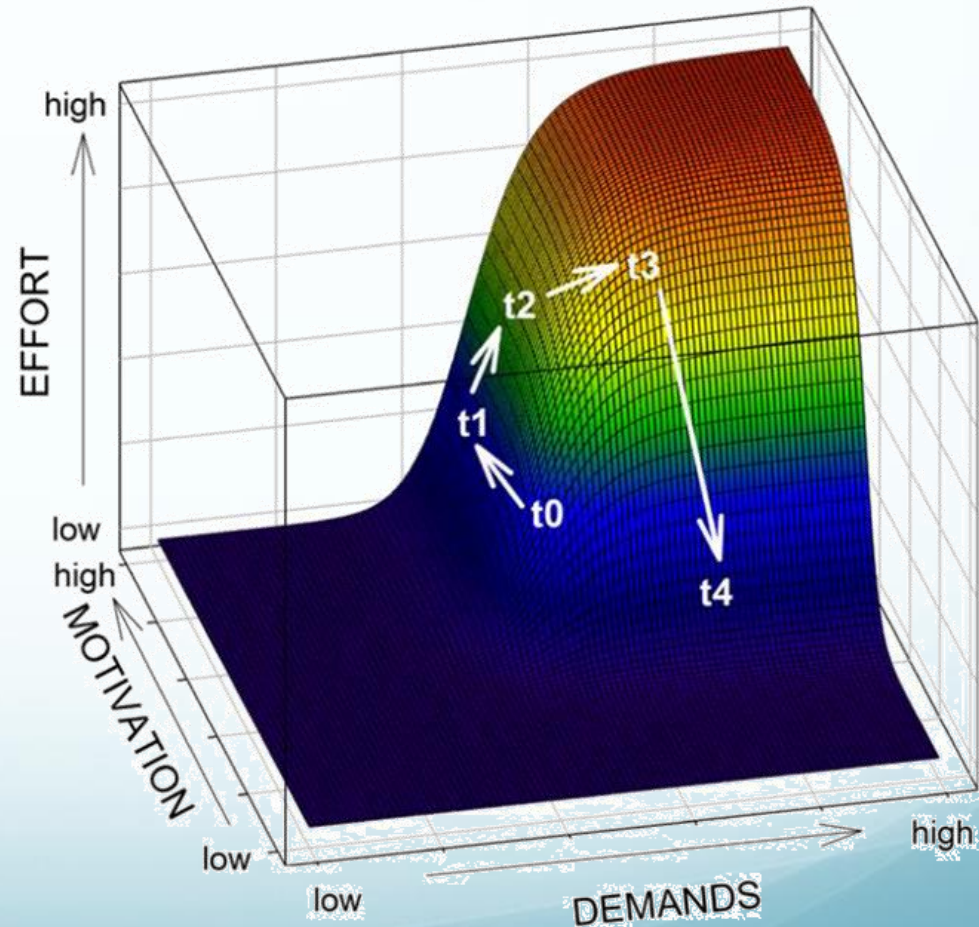


Outline

- 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



Cochlear Implants & Cognition

- CI & aural rehabilitation:
 - Written instructions for MMSE,
 - Scoring as normal/abnormal of standard (Mosnier 2015)
 - Cosetti 2016, Harada 2013, Herzog 2003, Lenarz 2012, Lin 2012, Miller 2015, Oghalai 2012, Schwab 2015, Waltzman 1993, Yang 2016, Chatelin 2004, ...
- 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

No. of abnormal test results 12 mo after implantation	No. of abnormal test results before implantation				Total
	0	1	2	3	
0	17	9	8	1	35
1	6	12	6	5	29
2	0	4	5	10	19
3	0	2	0	2	4
Total	23	27	19	18	87

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

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

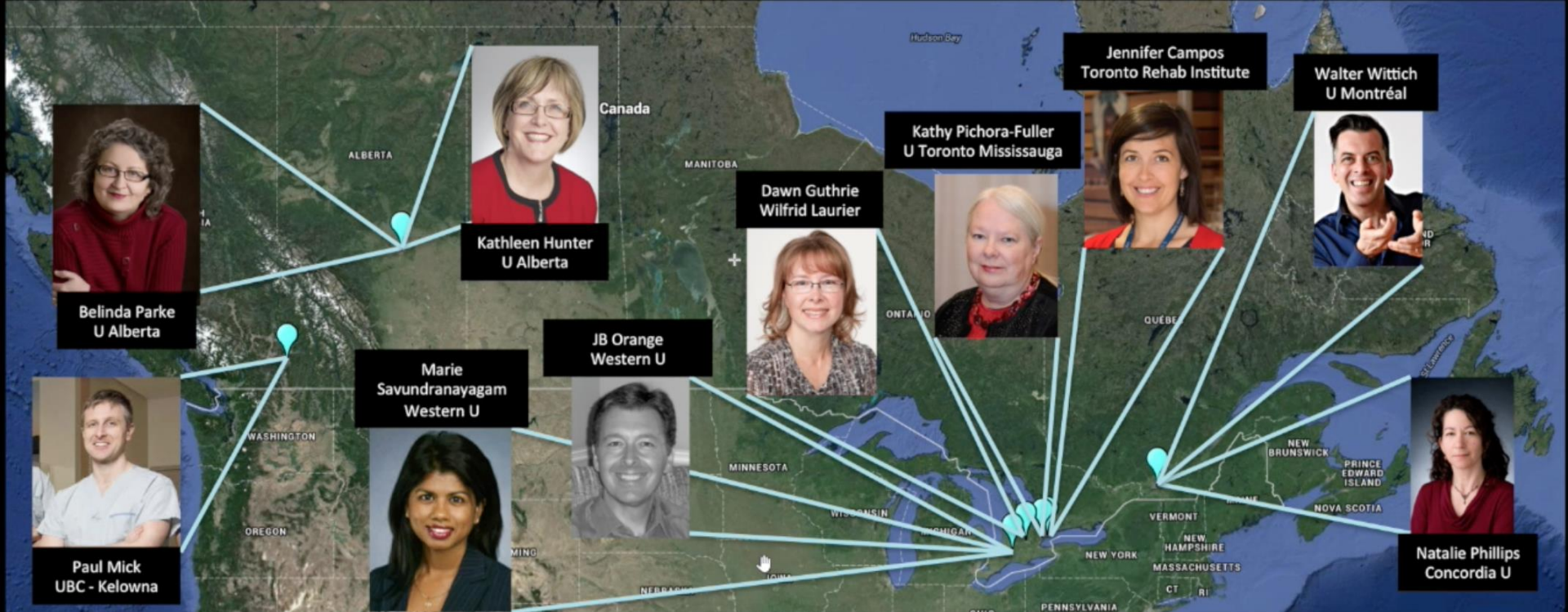
- DSI associated with greater cognitive decline in those with low social engagement (Yamada et al., 2015)
- Cognitive impairment more prevalent in DSI (Mitoku et al., 2016) – as measured by standardized evaluation questionnaire
- No Cognition measures built for DSI [but I was asked to review a paper 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



TEAM 17:
Interventions at the sensor
cognitive interface



ÉQUIPE 17 :
Les interventions dans les
interactions sensorielles et
cognitives



Paul Mick
UBC - Kelowna

CCNA 17 - CCNV 17
@ccna17_ccnv17

Dementia & the senses: Tweets on behalf
of Team 17- Not reflecting @ccna_ccnv
Démence & les sens: Tweets au nom de
l'équipe 17- Non reflétant @ccna_ccnv

📍 Canada

🌐 ccna-ccnv.ca/en/

Thank you Merci



Walter Wittich
@WalterWittich

Researcher focusing on the
[#rehabilitation](#) of individuals with sensory
impairment, and on the use and usability
of [#assistivetechology](#)

📍 Montréal, Québec