# Guided Computer Engagement in Dementia: the Birdsong Initiative

*Birdsong Research Team*

*Invited Webinar Presentation*

*The Use of Technology to Engage Persons with Dementia*

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# Disclosures

- Independent Private Practice in Neuropsychology
- Community Faculty EVMS & Regent Univ.
- 30 years experience working with patients who have Dementia
- No financial interest in the technology

# Learning Objectives

1. Strengths and limitations of technology use with persons with dementia
2. Unique contribution from research demonstrating efficacy
3. Varying cost of technology and equipment
4. Future projects


Research Assistants:
Virginia Wesleyan TR undergrads & EVMS MD students

# Other acknowledgements


- Ben Unkle - CEO *WC/vision*
- Laura Mock - *WC TR coordination*
- TR Team - *daily support*
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- Jacob Philips - *psychometric training*
- Rebekah Kintzing - *psychometric training*
- Abdinur Ali - *stat review,* Norfolk State University

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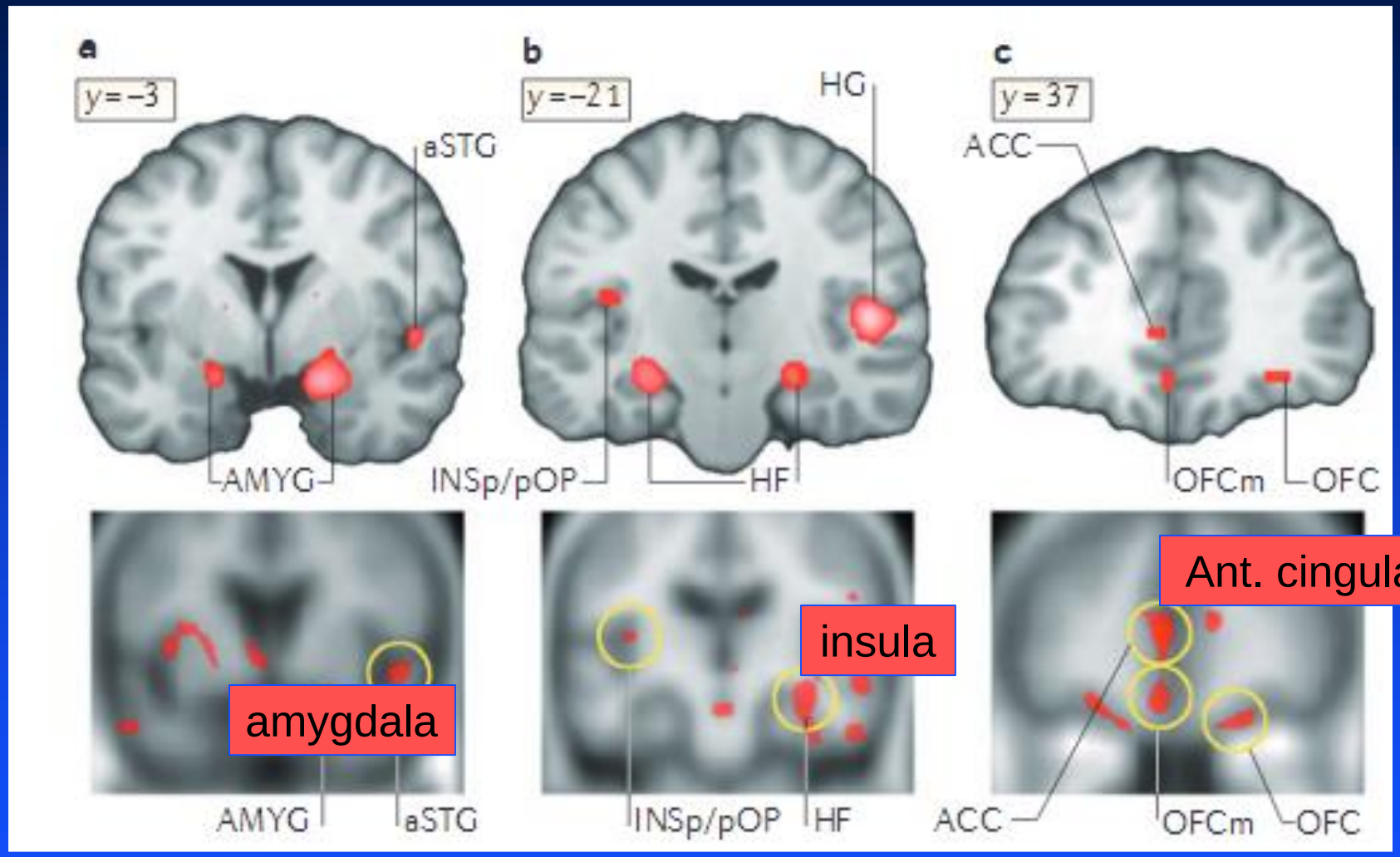
## The Birdsong Foundation, Suffolk, VA, to Westminster-Canterbury on Chesapeake

*L-R: George Birdsong; Sue Birdsong; and Ben Unkle, Pres/CEO of Westminster-Canterbury on Chesapeake Bay*

IRB approval: EVMS

# Music & Salience network: emotional (1) & memory (2) aspects of music fMRI




**Relatively spared in most dementias**


1. Fig. 3. Koelsch. Nature Reviews Neuroscience. Mar2014, Vol. 15 Issue 3, p170-180.

2. Jacobsen et al. Brain. 2015 Aug;138(Pt 8):2438-50

## National Partnership to Improve Dementia Care in Nursing Homes

*CMS et al.*

"….initial focus was on reducing the use of antipsychotic medications, the Partnership's larger mission is to enhance the use of non-pharmacologic approaches and person-centered dementia care practices."

*Quote:* https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/National-Partnership-to-Improve-Dementia-Care-in-Nursing-Homes.html

# CHALLENGING BEHAVIORS:

## Best validated non-pharmacological controls

## meta-analysis of randomized control trials

| | *Standardized Effect Size confid. intervals* |
|---|---|
| Person-centered care | 0.3-1.8 (large) |
| Communication skills training | 0.3-1.8 (large) |
| Behavioral mapping | 0.3-1.8 (large) |
| Music therapy | 0.5-0.9 (large) |
| Group activities | 0.5-0.6 (medium) |

*Effect size strength: 0.2-low; 0.5 –medium; 0.8-large*

*Livingston et al. Br J Psychiatry. 2014 Dec;205(6):436-42*

# CHALLENGING BEHAVIORS, *continued*

- CMS Innovation study; 30 nursing homes
- "Habilitation Therapy:"
  - Person-centered
  - Positive behavioral controls/relationships
  - Does not focus on loss but on what remains
  - Evaluated various quality measures
- Reliable reduction in anti-psychotic use

Does Nursing Facility Use of Habilitation Therapy Improve Performance on Quality Measures?

Fitzler S, **Raia** P, Buckley FO Jr, Wang M.

Am J Alzheimers Dis Other Demen. 2016 Dec;31(8):687-692.

http://www.alz.org/documents/maine/Habilitation_Therapy_a_New_Starscape2.edit.pdf

# Literature on computer engagement in subjects with dementia or MCI, e.g.:

- Tablets for persons w/ dementia [1]
- “ALADDIN” platform for dementia & care providers [2]
- Independent touch screen game for dementia *(Bubble Xplode)* [3]
- Virtual reality desktop computers for dementia [4]
- Preferred nature scenes/music & challenging behaviors [5]
- Tailored computer interventions for dementia [6]
- Technology-aided verbal reminiscence for dementia [7]
- Computer-based creativity promoting touch pad (ePAD) for dementia [8]
- Computer engagement in subjects with MCI [9]
- Smart phone use to capture continuous pictures during day [10]


*1 Lim et al. Gerontology. 2013;59(2):174-82.*
*2 Torkamani et al. J Alzheimers Dis. 2014;41(2):515-23*
*3 Astell et al. Int J Med Inform 2016 Jul;91:e1-8*
*4 Zucchella et al. Funct Neurol. 2014 Jul-Sep;29(3):153-8*
*5 Eggert et al. SAGE Open Med. 2015 Aug 31;3:2050312115602579*
*6 Tak et al. Gerontologist. 2015 Jun;55 Suppl 1:S40-9.*
*7 Lancioni et al. Res Dev Disabil. 2014 Nov;35(11):3026-33.*
*8 Leuty et al. Assist Technol. 2013 Summer;25(2):72-9*
*9 Gooding et al. Neuropsychol Rehabil. 2016 Oct;26(5-6):810-21*
*10 DeLeo, Brivio & Sautter Applied Neuropsych 2011, 18, 69-76*

# Disclaimer on Birdsong Initiative:

- Previously reported findings to the Virginia Geriatric Mental Health Partnership were flawed and prematurely released.
  - Study did not reliably reduce anti-psychotic use
  - Study did not reliably reduce challenging behaviors

# Purpose of this study

Effects of It's Never Too Late (IN2L)

computer platform (Denver, CO)

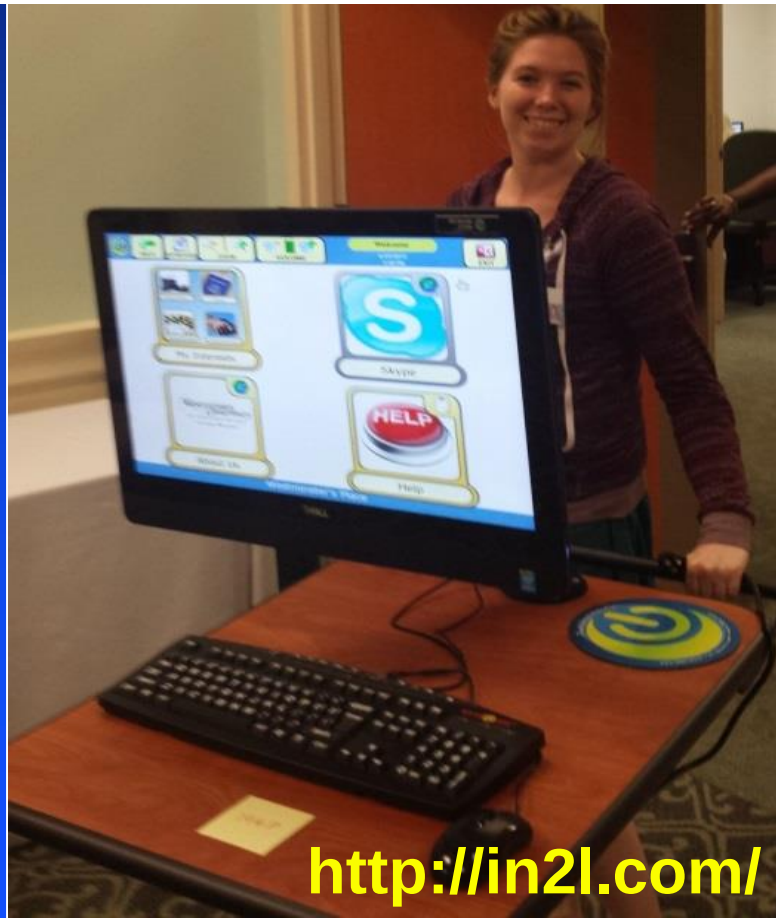
Performed in a naturalistic setting:

- Assisted living secured memory care unit
- Long term care unit

# It's Never 2 Late

dignity through technology

- Individual, customized touch screen computer
- Applications include:
  - Music
  - Games/Puzzles
  - Classic TV comedies
  - Travel
  - Skype and internet access
- And ability to monitor/quantify usage




http://in2l.com/

# METHODS

## Experimental treatment condition

- **Guided computer engagement**
  - Guided by TR/MD students (or other volunteers)
- Each session restricted to 10 apps (e.g., music, classic comedies)
- Free IN2L computer access thereafter and
- Multiple group IN2L computer activities as standard of care

## Control treatment condition

- Multiple group IN2L computer activities as standard of care

## All other standard of care provided in both conditions

## Two separate experiments:

- Exp 1)
  - Severe dementia:
    - 1 hr/d x 5d/wk x 12 weeks
- Exp 2)
  - MCI:
    - 1 hr/d x 5d/wk x 6 weeks w/6-wk prep/facilitator training

# Subject profile for each experiment

| | **Severe Dementia**<br>**N's: Exp 4, Con 6** | **MCI**<br>**N's: Exp 5, Con 5** |
|---|---|---|
| Inclusion Criteria: | Reside in Nursing Care Unit or Secured Memory Unit<br><br>Diagnosis of Dementia or Dementia related disorder | Reside in Assisted Living Unit |
| Duration of Study | 12 weeks | 6 weeks |
| Intervention time/week | 5 hrs/week | 5 hrs/week |
| Average Age: | 93 | 87 |
| Average MoCA: | 10 Severe dementia | 21 MCI |
| Gender compare: | F=83.6% | F=87.5% |
| | M=16.4% | M=12.5% |

# Statistical analyses

- A mixed-design 2 (experimental vs. control group) x 2 (pre- and post- measures) ANCOVA with Montreal Cognitive Assessment (MOCA) scores added as a covariate.

# **RESULTS**: guided computer engagement vs. control: *overview*

**For both Severe dementia study (Exp. 1) & MCI study (Exp. 2)**

- **Reliable ↑ Affect Balance Scale**
- **Overall ↓ Perceived Stress Scale for CNA caregivers**

**For MCI study (Exp. 2) only**

- **Reliable ↑ Montreal Cognitive Assessment (MoCA)**
- **Reliable ↓ Geriatric Depression Scale (GDS)**

**No reliable differences in either experiment for:**

- **Antipsychotic Medication Doses/Medication Administration Record (MAR) review**
- **Documented Behaviors (Frequency & Intensity)**
- **Systolic blood pressure**

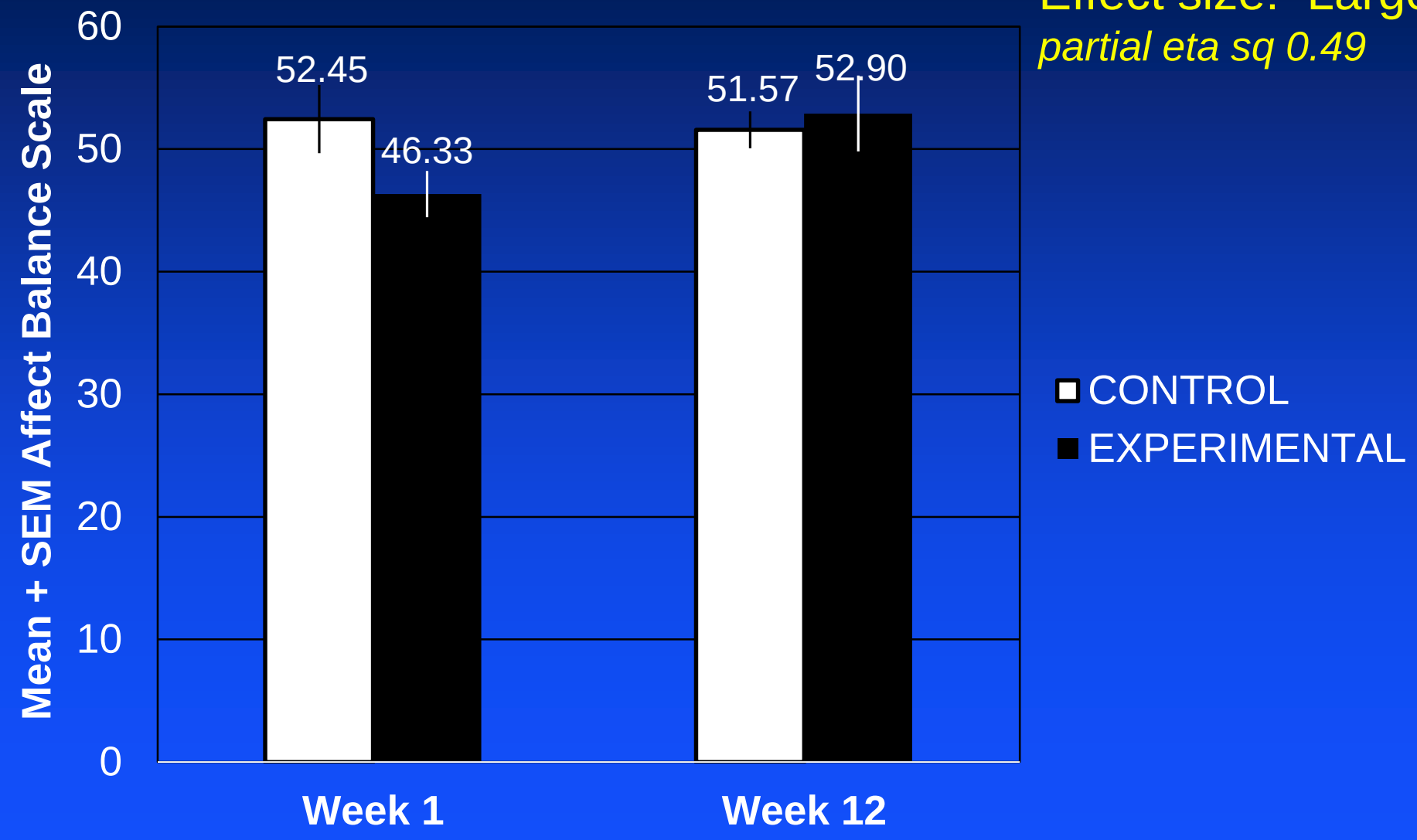
**Pending biomarkers: Salivary cortisol & alpha-amylase**

# Severe Dementia: ↑ Affect Balance Scale

**Reliable ↑ in guided computer Exp. group** ***(****Pre- vs. post: (F[1, 7] = 6.74, p = .036)* **but not Con. group**

Effect size: Large

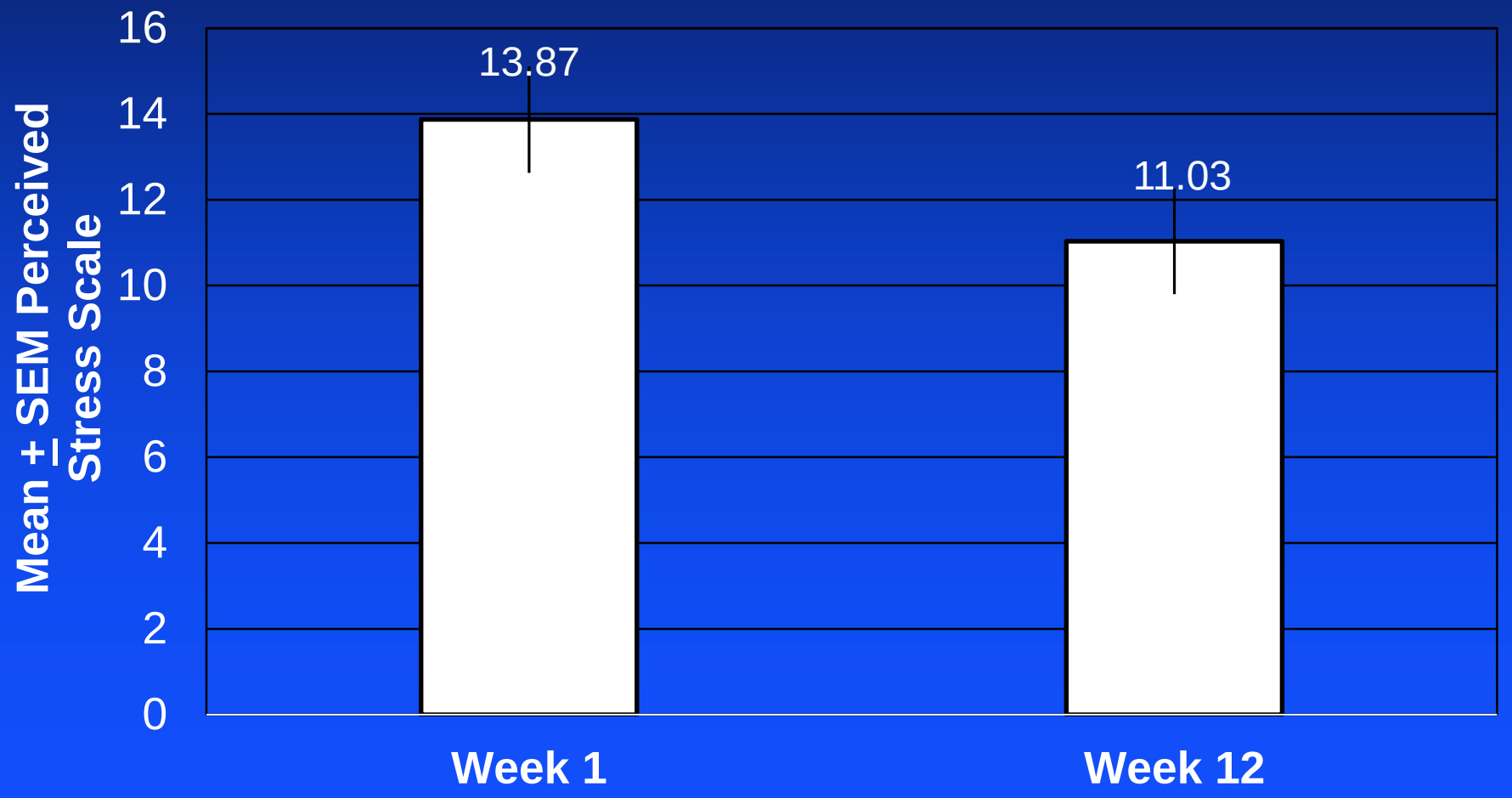
*partial eta sq 0.49*



# Severe dementia:
# Overall ↓ CNA Perceived Stress Scale

**Reliable ↓ over entire experiment collapse across treatments** *p = .02*

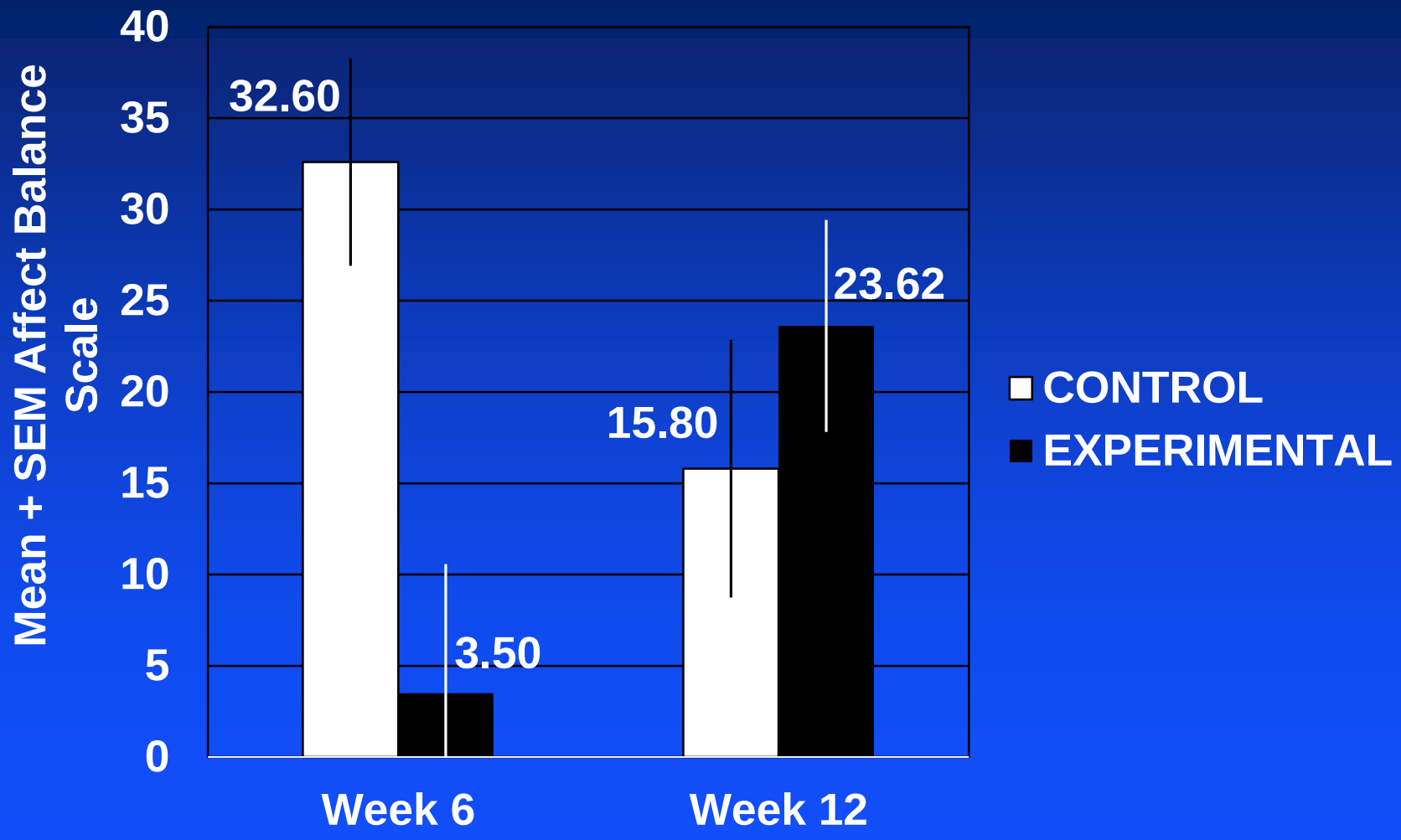
**Effect size: Large** ***partial eta sq= 0.318***



# MCI Study: ↑ Affect Balance Scale

**Reliable ↑ in guided computer Exp group *(p=0.007)* but not Con group**

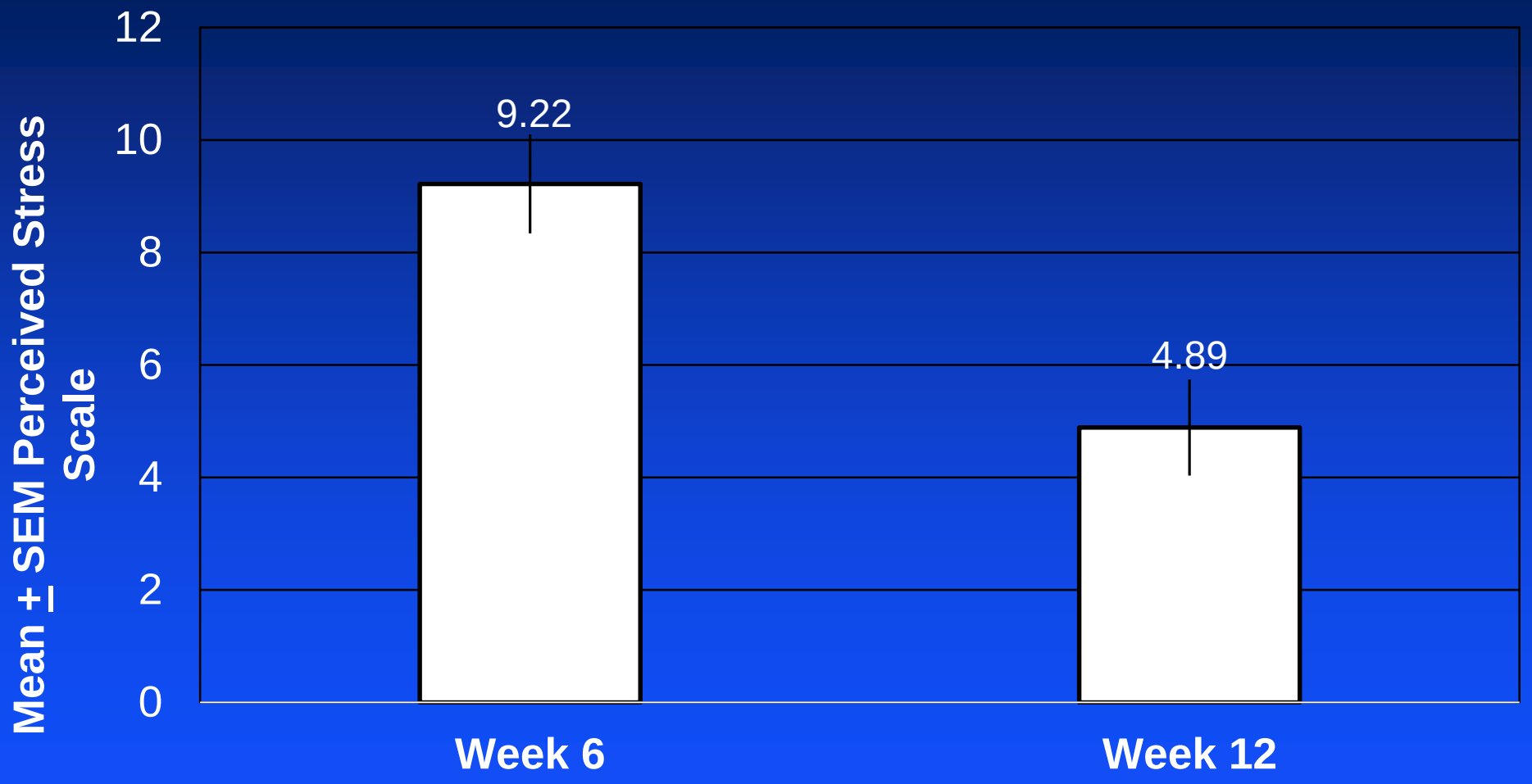
**Effect size: Large *partial eta sq = 0.369***



# MCI study: ↓ CNA Perceived Stress Scale

**Reliable ↓ over entire experiment collapsed across treatments** *(p=.024)*

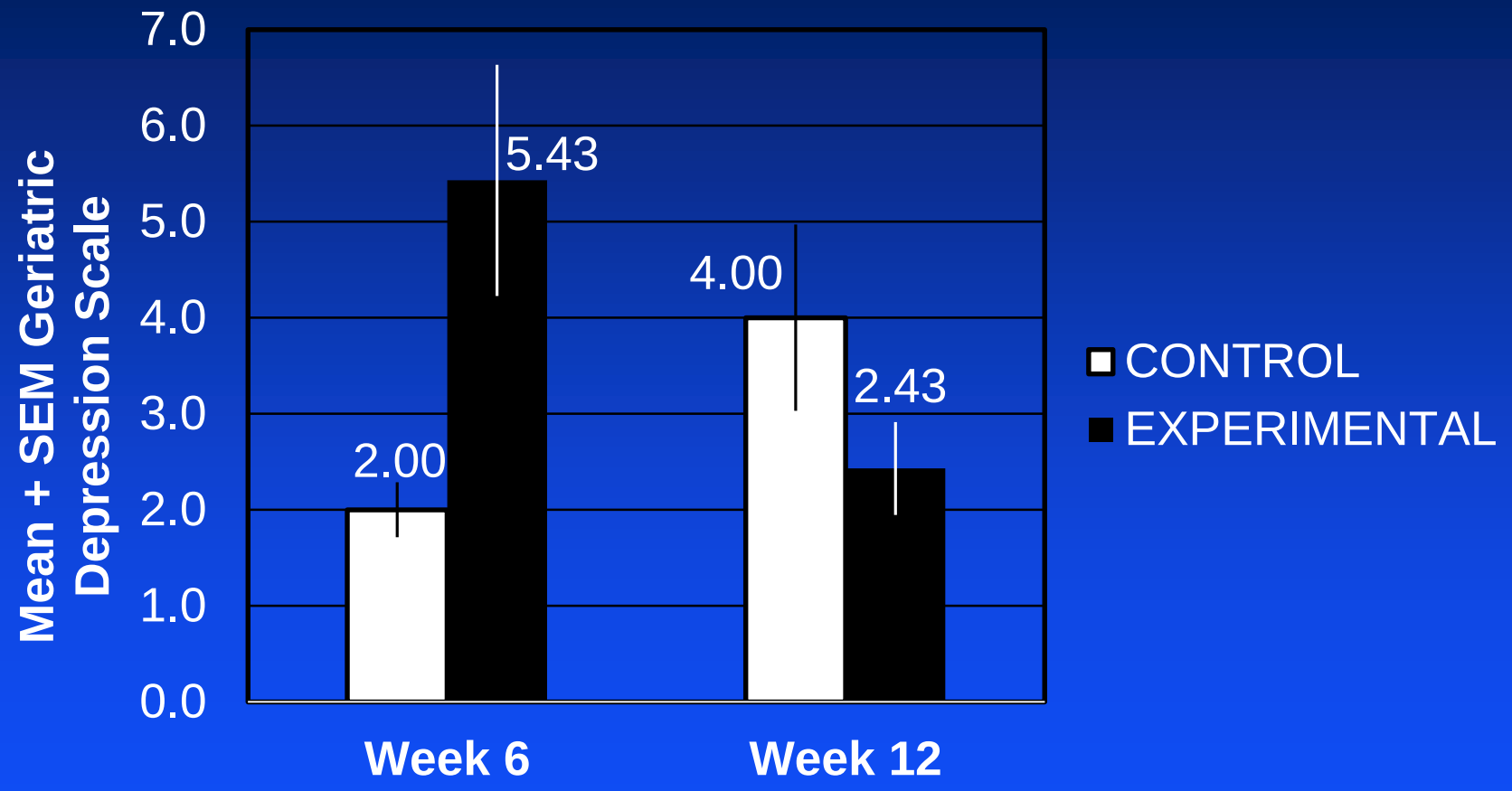
**Effect size: Large** ***partial eta squared= 0.493***



# MCI study: ↓ Geriatric Depression Scale

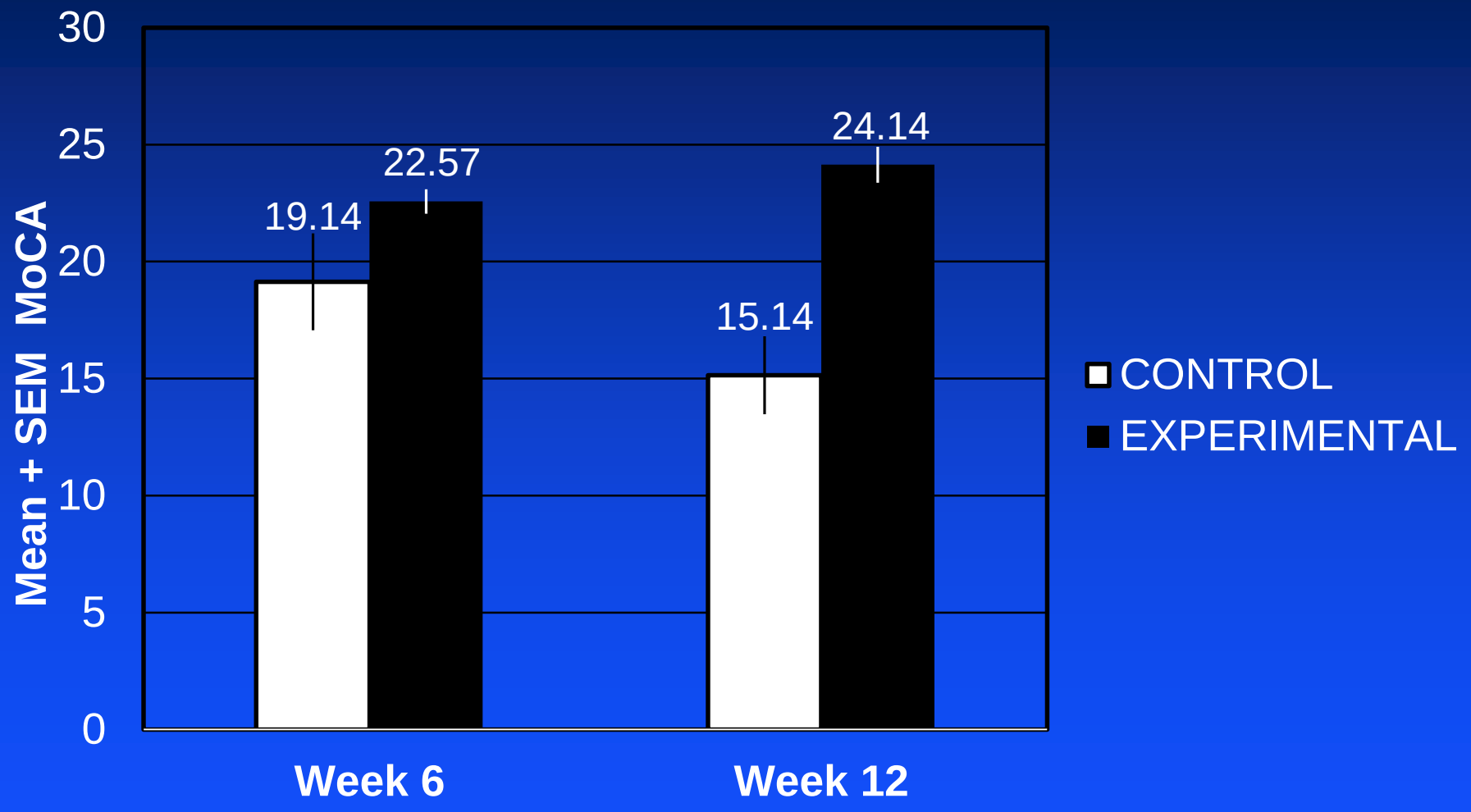
**Reliable ↓ in guided computer Exp. group *(p=0.022)* but not Con group**

**Effect size: Large *partial eta squared = 0.344***



# MCI study: ↑ MoCA

**Reliable ↑ in guided computer Exp. group *(p=0.045)* but not Con**
**Effect size: Large *partial eta squared = 0.330***



# Summary of Results:

## guided computer engagement vs. control

**For both Severe dementia study (Exp 1) & MCI study (Exp. 2)**

- **Reliable ↑ Affect Balance Scale**
- **Overall ↓ Perceived Stress Scale for CNA caregivers**

**For MCI study (Exp. 2) only**

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**No reliable differences in either experiment for:**

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- **Systolic blood pressure**

**Pending biomarkers: Salivary cortisol & alpha-amylase**

# Conclusions: Guided Computer Engagement

**Improved overall sense of wellbeing in:**

- Subjects w/ both severe dementia & subjects w/ MCI

**Improved cognition and depression:**

- But only in subjects w/ MCI
- Failure in severe dementia: severity of cognitive impairment?

**Neither study showed benefits on:**

- Challenging behaviors, Rx use, or Blood pressure
- Perhaps due to small sample of subjects on Rx's

**CNA overall participation ↓ perceived stress**

- Demonstrated in both guided engagement studies
- Shows beneficial CNA effect of cooperating w/ research
- Could help burnout/turnover/care

**This effort also shows:**

- Efficacy of research in real-world LTC/AL environments
- Productive CCRC-academic collaborative research effort
- Engagement of student learners (TR & MD students)

**Study provides further evidence for:**

- benefits of computer engagement in dementia & MCI

# Weaknesses

Small n's; need for larger studies

Exposure to computer system by both Exp & Con

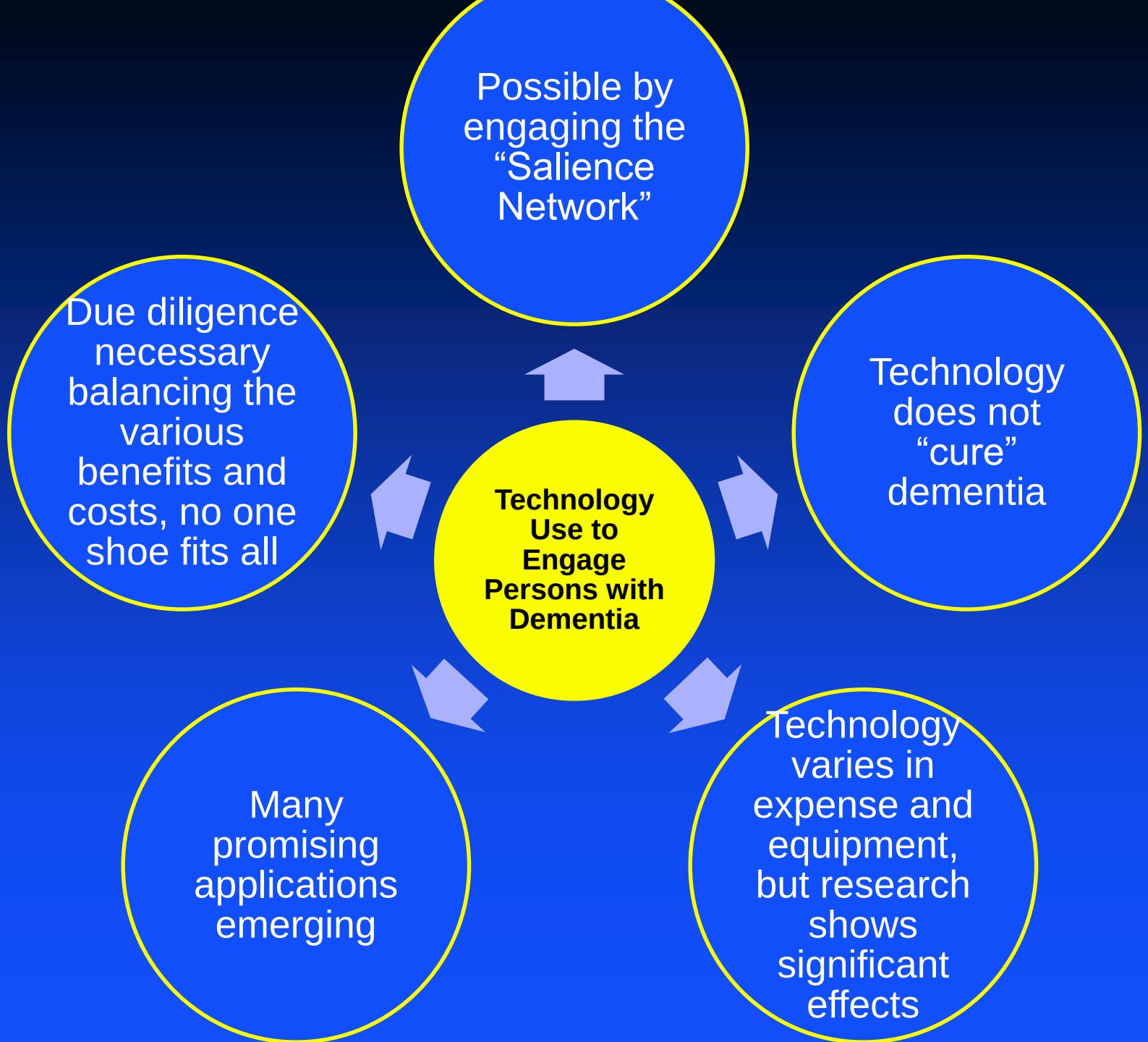
- Hence, not a true "placebo control" group
- b/c Group IN2L exposure used as standard of care by TR's
- But Exp groups had individual guided engagement plus
- Free individual access at any time, typically w/ CNA help

Not clear if beneficial effects due to:

- Guided computer engagement
- The specific computer system used
- A combination of both

# PLANNED FUTURE STUDIES

- Replicate study in 3 other long term care facilities
  - With greater power to detect Rx changes
  - Increase the sample size in rolling admission
  - Inclusive criteria: prescribed anti-psychotic medications
  - Use of Neuropsychiatric Inventory to track challenging behaviors
- Evaluate system in subjects w/ MCI/mild dementia
- Evaluate system in independent living subjects
- Extend advanced dementia studies to evaluate other interventions like recreational music making


Possible by engaging the "Salience Network"
Technology does not "cure" dementia
Technology varies in expense and equipment, but research shows significant effects
Many promising applications emerging
Due diligence necessary balancing the various benefits and costs, no one shoe fits all
Technology Use to Engage Persons with Dementia