Online Cognitive Stimulation Intervention (CSI) For Healthy Older Adults

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Cognitive Training (CT)

- A method for improving a broad range of psychological issues;
- Has been successfully utilized in the aging literature;
- Problem:
  - lab-based
  - unclear transfer gains

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Age-related decline
CSI
Real-life CT
New norm
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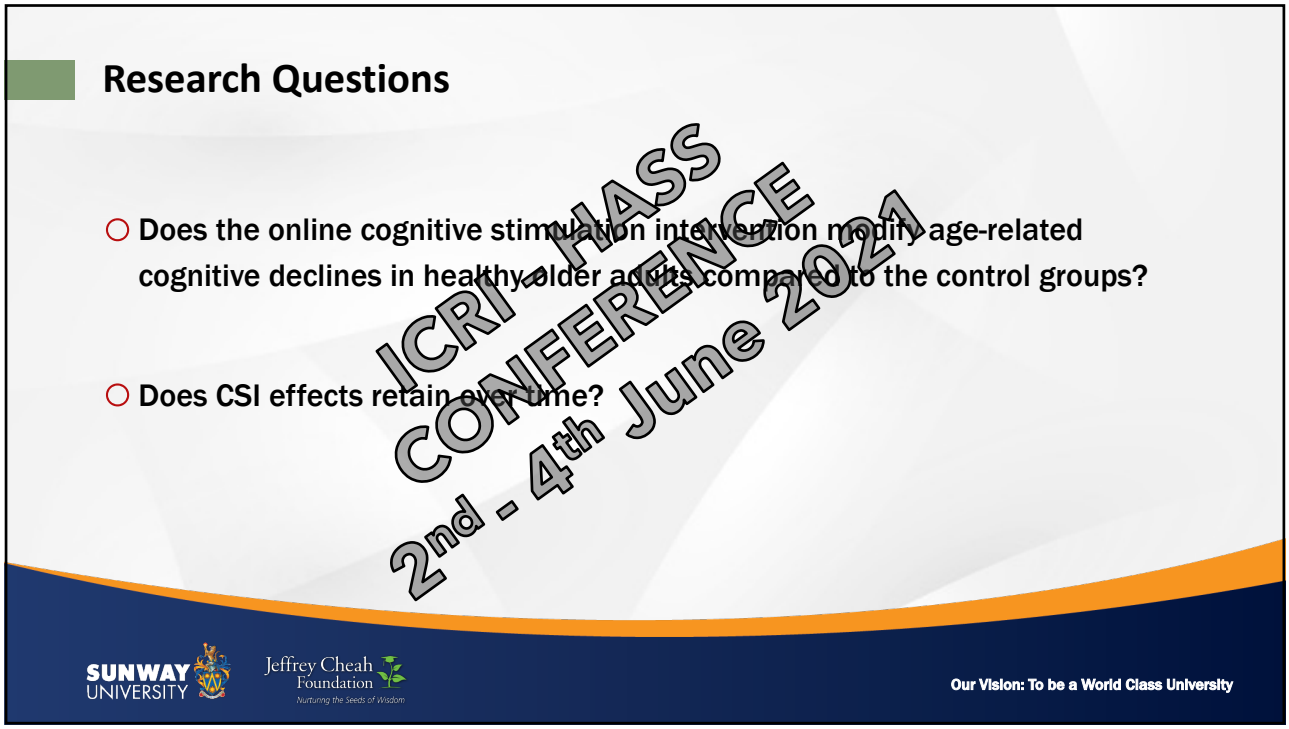
Research Questions
Does the online cognitive stimulation intervention modify age-related cognitive declines in healthy older adults compared to the control groups?
Does CSI effects retain over time?
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Hypotheses

- The CSI group will have a reduced cognitive decline (inhibition and WM) compared to control groups;
- The CSI group gains will transfer to untrained cognitive domains;
- The training gains will remain 1 month after the training is over.

Participants	• 180 healthy older adults • Cohen's d = .2, Power= .80, Alpha= .05 • 57 older adults recruited
Inclusion criteria	• Age: above 60 • Adequate level of literacy • Having smartphone and accessing the Internet • a score of 21 or above in the MoCA • English
Exclusion criteria	• Severe health-related conditions; • Psychiatric or neurological disorders; • Neurodegenerative disorder; • Uncorrected verbal, auditory or visual impairments

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Groups

Random assignment

- CSI
- Active control group (ACG)
- Passive control group (PCG)

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Stages of The Study

Baseline → Pre-training (introductory sessions) → Training → Post-training → Follow-up

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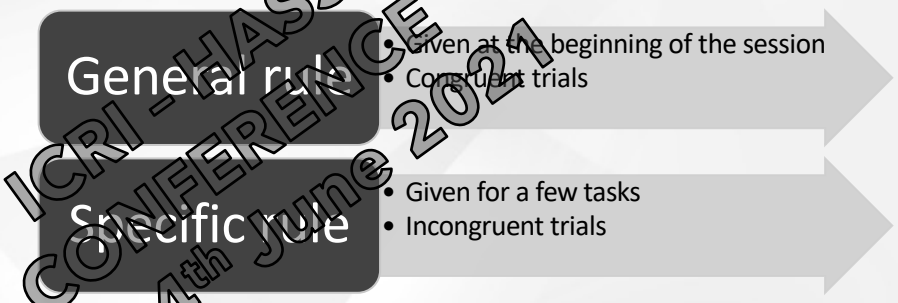
Online CSI

- **Adaptive** in nature;
- Targeting **inhibition** and **WM-updating (independent variables)**;
- **Three different levels of complexity** as easy, medium, and difficult;
- **3 shopping applications.**

CSI Procedure

Inhibition

- Based on go/ no- go principles;
- Number of congruent trials are always more than incongruent trials.



Examples of Easy and Difficult Inhibition Tasks

Easy/ Happy Fresh App

- **General rule: ONLY** obtain information about the items WITH a promotion unless otherwise mentioned.
  - Take a screenshot of **any brand of fruit yogurt (congruent).**
  - Take a screenshot of **any brand of UHT milk** (only consider items **without a promotion**) **(incongruent).**

Difficult/ Happy Fresh App

General Rule: ONLY obtain information about the items **WITH odd last decimal** in their price unless otherwise mentioned.

- Take screenshots of **any brand of LOW-FAT fruit yogurt** and **any brand of FULL CREAM milk (congruent).**
- Take screenshots of TWO products WITH a PROMO and **without an odd last decimal in their prices (incongruent).**

Incongruent/ overall tasks ratio

Level	Number of incongruent trials/ overall trials	Percentages of incongruent trials
A (Easy)	2/10	20%
B (Medium)	3/14	21% (rounded)
C (Difficult)	4/16	25%

This ratio has been proposed according to Carter et al. (2000)

Working Memory-updating

- Based on the n-back principle

No question/ included in the task

Recall the most recent item

Recall the item 2 screenshots ago

Recall the item 3 screenshots ago

Examples of WM-updating Tasks

- Take screenshots of any canned product and tell Samira the price of it (0-back).
- Take a screenshot of any dairy product you prefer (3-back).
- Add any two brands of low-fat milk to your cart and take a screenshot of your cart (2-back).
- Take a screenshot of any product by the "farm fresh" brand (1-back).
  - Tell Samira how much was the price of the latest product you took screenshot from.
  - Tell Samira the brand names of the milk you took screenshot from previously.
  - Tell Samira the brand name of the dairy product you took screenshot from before.

Scoring Manual

Equal/ higher= proceed
Lower= regress

Inhibition levels	Score range	Cut off point	WM updating levels	Score range	Cut off point
Level A (easy)	0-10	5/10	Level A (easy)	0-10	5/10
Level B (medium)	0-23	12/23	Level B (medium)	0-24	12/24
Level C (difficult)	0-25	13/25	Level C (difficult)	0-27	15/27

Preliminary Analysis and Results

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Sample Characteristics

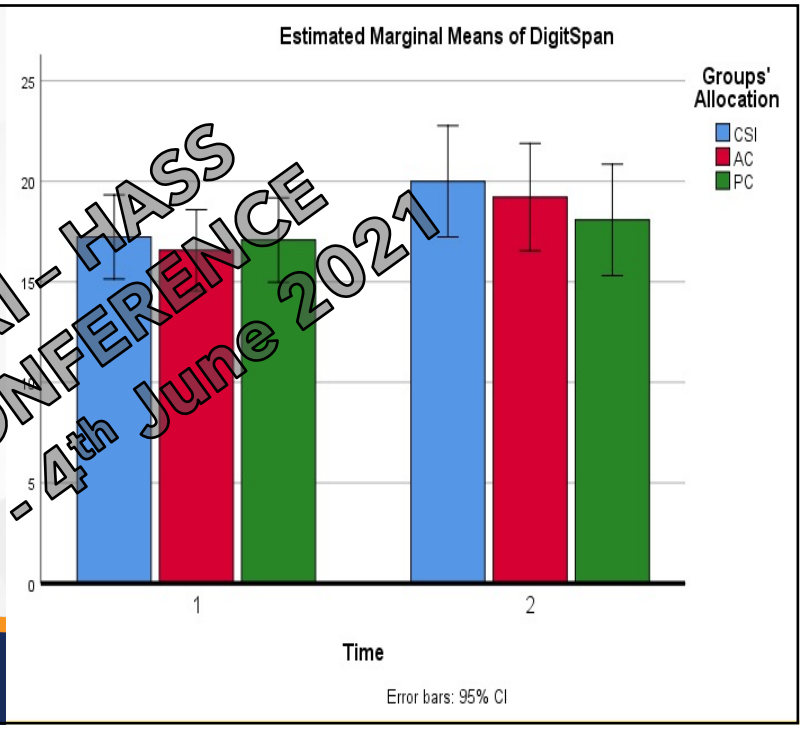
	Percentage	N	Mean (SD)
Female	78.57%	44	-
Age (range: 60-89)	-	56	67.30 (5.55)
SES-Malaysia (subjective scale)	37.50% (6th rung)	55	6.27 (.97)
SES-Community (subjective scale)	28.57% (5th rung)	55	6.18 (1.27)

Preliminary Analysis

Variable	N	Mean (SD)	
		Pre-test	Post-test
Working Memory (Max score: 30)	40	16.95 (3.64)	19.10 (4.86)
Inhibition (Max score: 72)	40	66.45 (5.36)	67.32 (4.95)
Episodic Memory (Max score: 16)	40	11 (4.59)	13.90 (5.03)
Processing Speed (Max score:60)	40	48.77 (10.09)	49.23 (8.87)

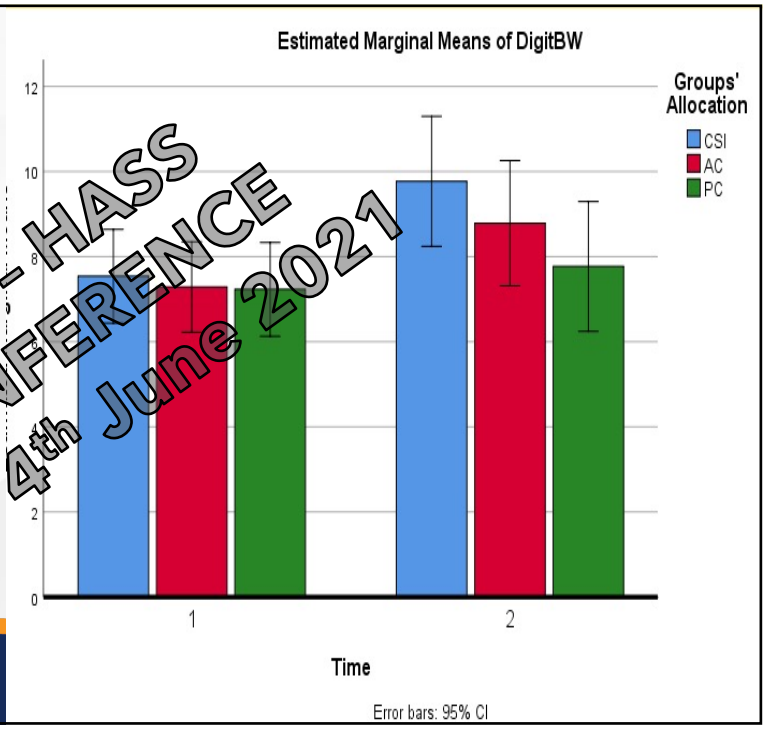
Working Memory

Working memory (F= 7.80, p= .008, η^2= .17)



Backward Digits

Backward digits (subtest of WM) (F= 11.73, *p*= .002, η^2= .24),



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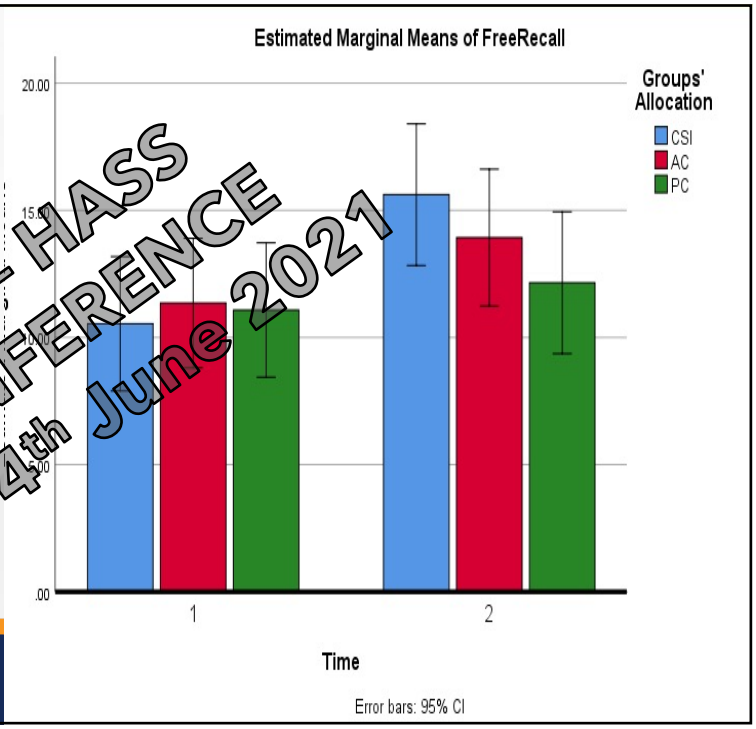
Episodic Memory

Episodic memory (F= 20.19, *p*= .000, η^2= .35)

A marginal significant between-groups result (F= 3.17, *p*= .053, η^2=.14)



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Implication

- A novel CT protocol combining technology and daily life tasks;
- To understand how older adults respond to tech-based technique;
- Easy to administer.

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