MOTIVATION AND DECISION MAKING IN AGING

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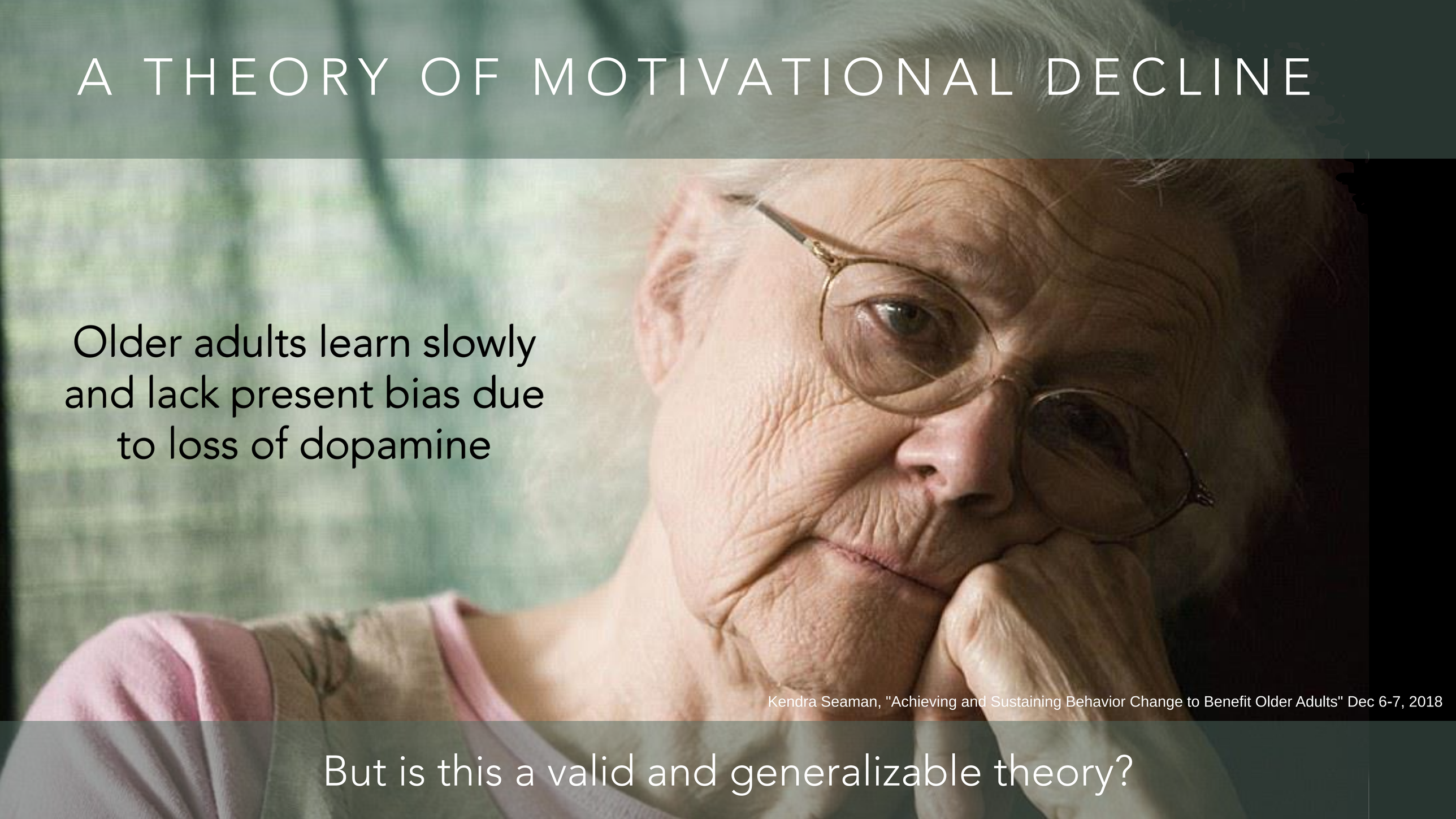
MOTIVATED COGNITION & AGING BRAIN LAB

A THEORY OF MOTIVATIONAL DECLINE



Older adults learn slowly and lack present bias due to loss of dopamine

Kendra Seaman, "Achieving and Sustaining Behavior Change to Benefit Older Adults" Dec 6-7, 2018

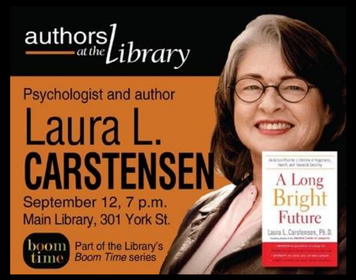
But is this a valid and generalizable theory?

GOALS SHIFT WITH AGE

Time horizons influence goals

- Goals change motivation

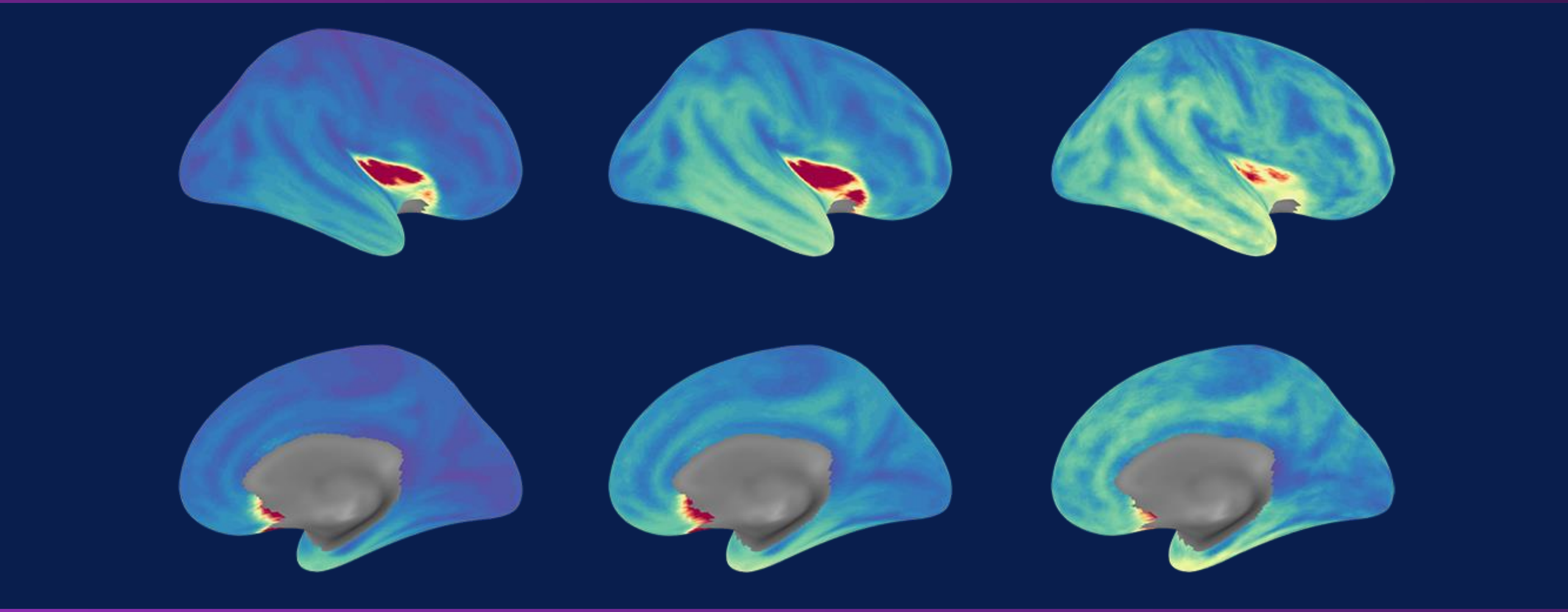
Which do you prefer?



Fredrickson & Carstensen 1990, Psychology and Aging
Carstensen & Fredrickson 1998, Health Psychology
Fung, Carstensen, Lutz 1999, Psychology and Aging

Hypothesis: Age effects on behavior and frontostriatal function will depend on goal-relevance of rewards

DOES DOPAMINE FUNCTION CHANGE WITH AGE?



Can we generalize across all brain regions?

STUDY 1: DOPAMINE FUNCTION ACROSS ADULTHOOD

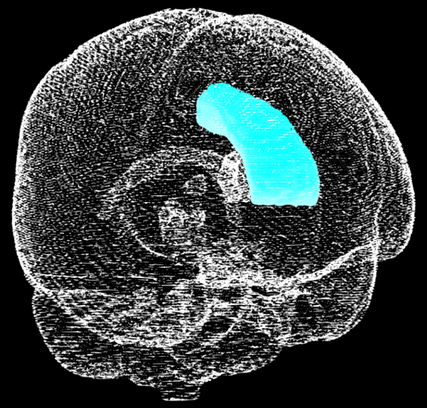
Study Design

- 132 adults ages 22–83 (53% Female) from the Nashville community
- PET imaging with the [18F]fallypride to estimate dopamine receptors across various cortical and subcortical brain regions

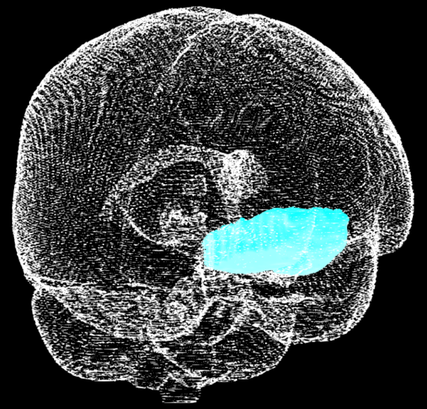
Seaman, et al., under review

Preprint - https://doi.org/10.1101/358200
Web App - http://13.58.222.229:3838/agebp/

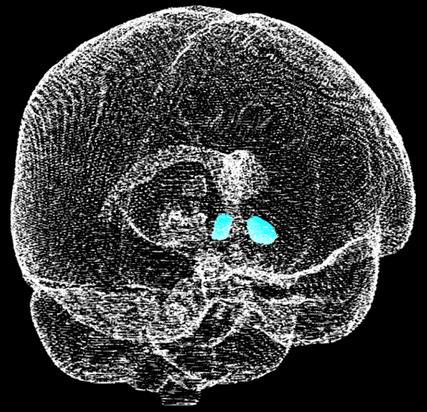
Anterior cingulate gyrus

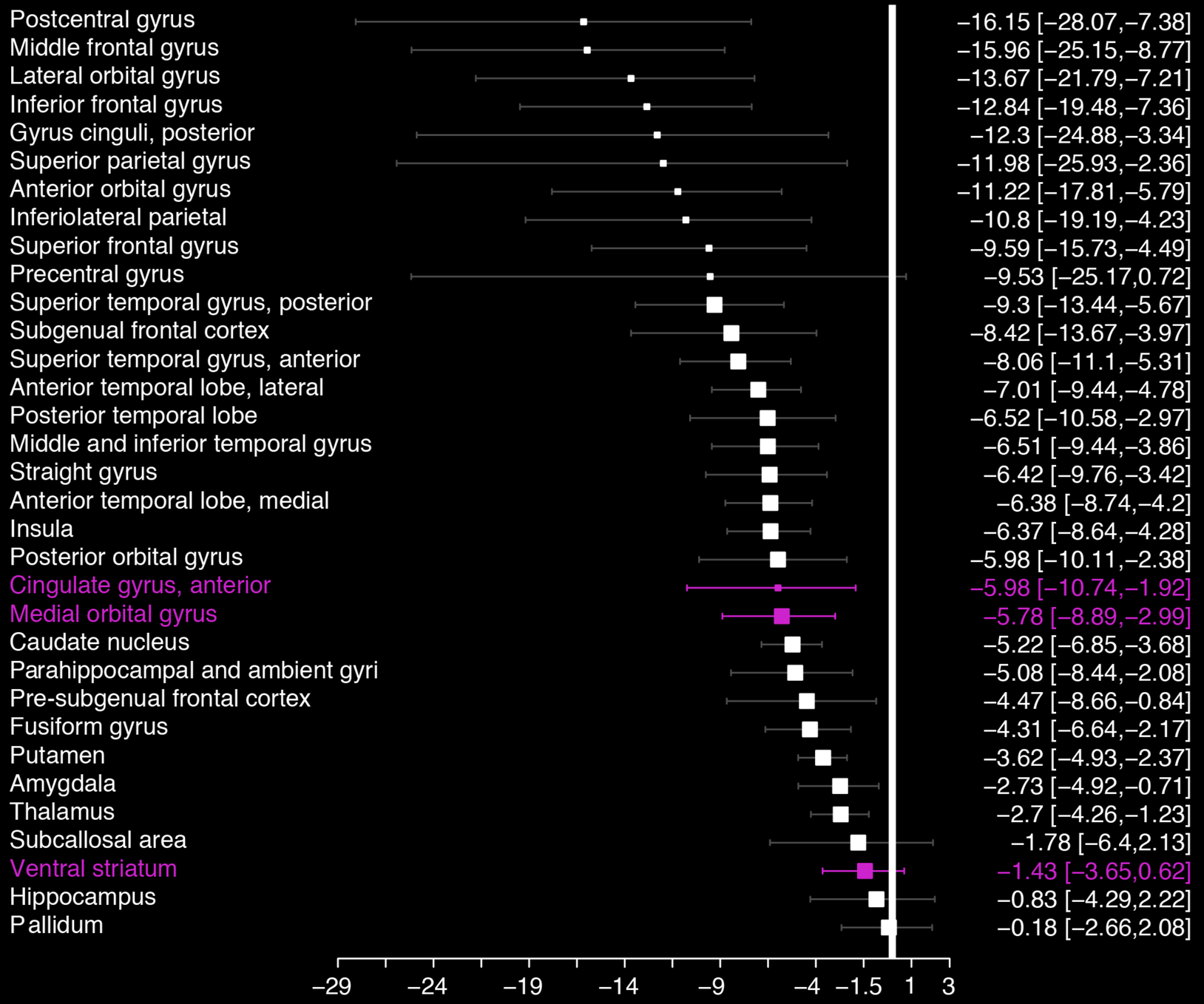


Medial orbital gyrus



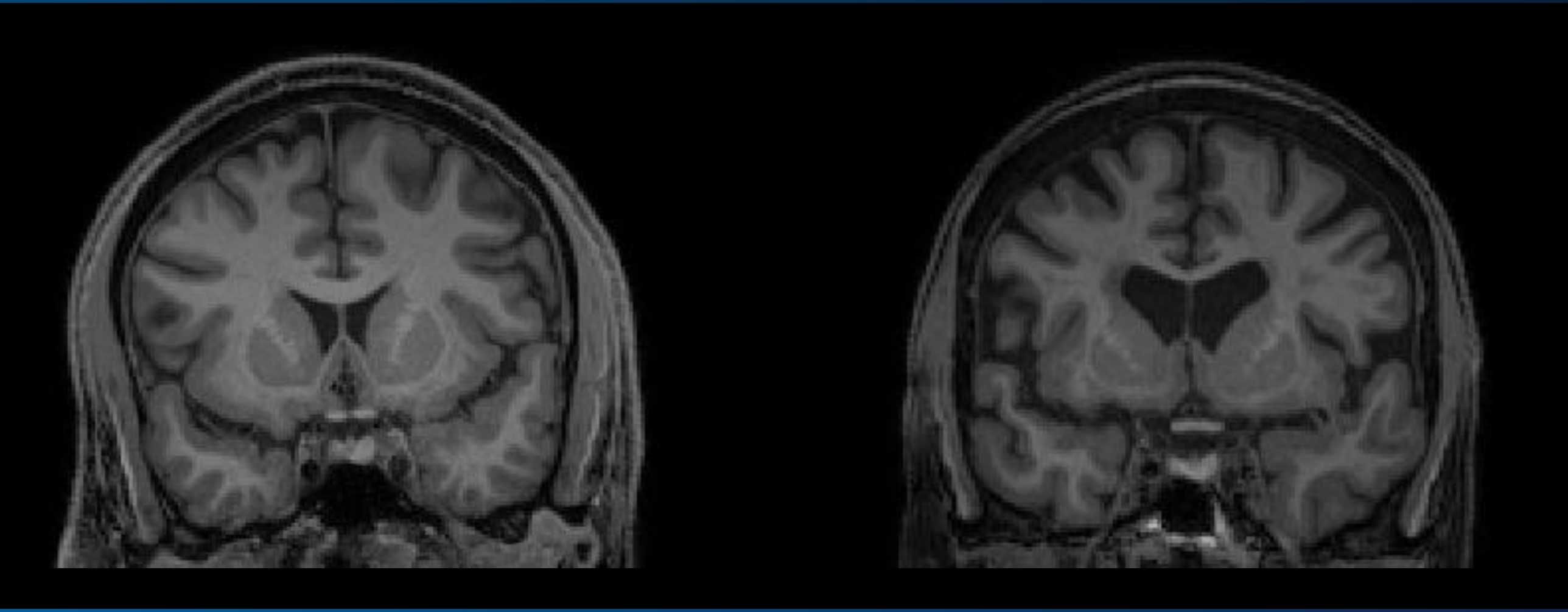
Ventral striatum





Seaman, et al., under review

DOES VALUE REPRESENTATION CHANGE WITH AGE?



Can we generalize across domains?

Kendra Seaman, "Achieving and Sustaining Behavior Change to Benefit Older Adults" Dec 6-7, 2018

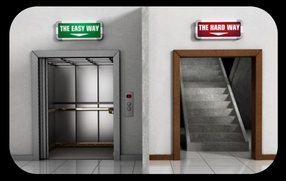
STUDY 2: VALUE REPRESENTATION ACROSS ADULTHOOD

Study Design

- 75 adults ages 22–83 (56% Female) from the Nashville community
- fMRI of effort, probability, and time discounting in financial domain

Seaman, et al., SCAN, 2018

SIMILAR REPRESENTATION OF SUBJECTIVE VALUE ACROSS COSTS AND ADULTHOOD



Effort

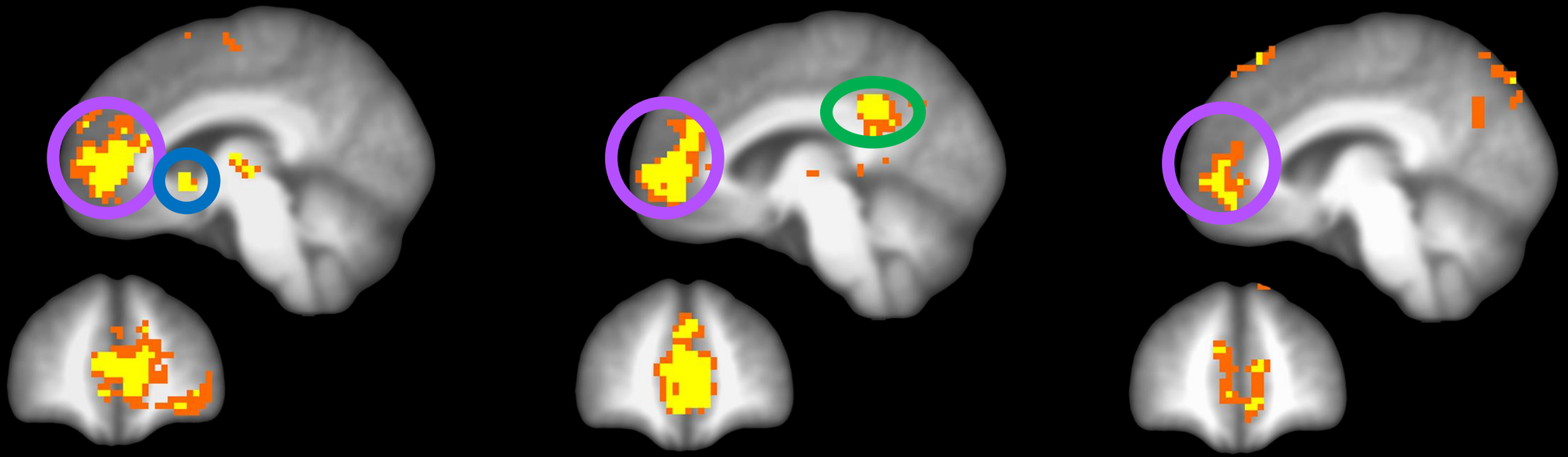
Probability

Time

MPFC

VS

PCC



Seaman, et al., SCAN, 2018

DOES TIME PREFERENCE CHANGE WITH AGE?

Can we generalize across domains?

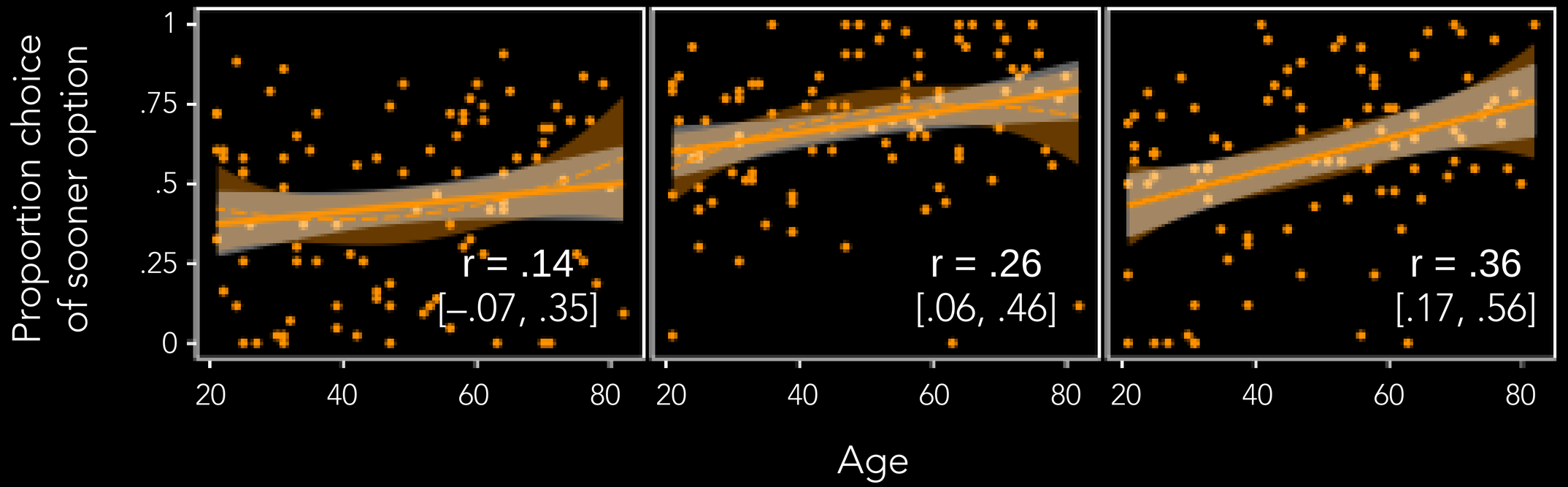
STUDY 3: TIME PREFERENCE ACROSS DOMAINS

Study design

- 92 adults ages 22–83 (60% female) from the Nashville community
- Behavioral decision battery
  - Time, probability, and physical effort discounting in financial, social, and health domains (3x3 within)

Seaman, et al., PAG, 2016

OLDER ADULTS WANT SOCIAL & HEALTH REWARDS NOW



Seaman, et al., PAG, 2016

SUMMARY

Study 1: Dopamine function across adulthood

- **Relative preservation** of dopamine receptors in motivational brain regions across adulthood

Study 2: Value representations across adulthood

- Similar brain regions represent value across adulthood

Study 3: Time preference across domains

- Increased discounting with age for social and health-related rewards

CAN WE MOTIVATE PEOPLE TO BE MORE PHYSICALLY ACTIVE?

Several studies in development

Kendra Seaman, "Achieving and Sustaining Behavior Change to Benefit Older Adults" Dec 6-7, 2018

MOTIVATING PHYSICAL ACTIVITY

- Sensitivity of brain motivational systems to social and non-social motivational messages (fMRI)
- Real-world activity tracking (FitBit)
- Physical activity promotion messaging (Text messages)


Nick Brooks


Teresa Karrer


Linh Dang


Jaime Castrellon


Scott Perkins


Ming Hsu


David Zald

Value representations across adulthood

Dopamine function across adulthood

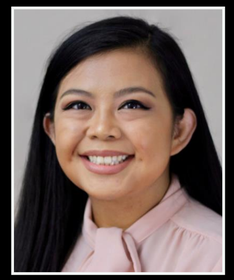

Chris Smith

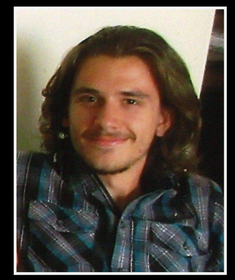

Eric Juarez

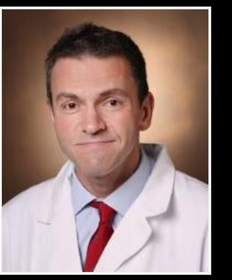

Linh Dang


Jaime Castrellon


Leah Burgess


Danica San Juan


Paul Kundzicz


Ronald Cowan


David Zald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NIH National Institute on Aging

R00-AG042596
R01-AG044838
T32-AG000029

Time preferences across domains


Marissa Gorlick


Kruti Vekaria


Ming Hsu


David Zald