Varieties of Engagement as Pathways to Cognitive Resilience

Elizabeth A. L. Stine-Morrow

Department of Educational Psychology,

Psychology, and the Beckman Institute

University of Illinois

A Paradox

- Studies of cognitive training suggest that experience has very narrow effects in improving abilities (i.e., limited transfer),
  - (e.g., Ball et al., 2002; Willis et al., 2006; Rebok et al., 2014; Simons et al., 2016)
- And yet intelligence emerges as a positive manifold of correlated abilities.
  - (e.g., Horn, 1968; van der Maas et al., 2006; Deary, 2012)
- How does this happen?
  - There must be something orderly about the ecology of everyday life that engenders this manifold in a system that is built for stimulus-specific plasticity.

What is Engagement?

(from Webster-Merriam)

3. to bind (as oneself) to do something.

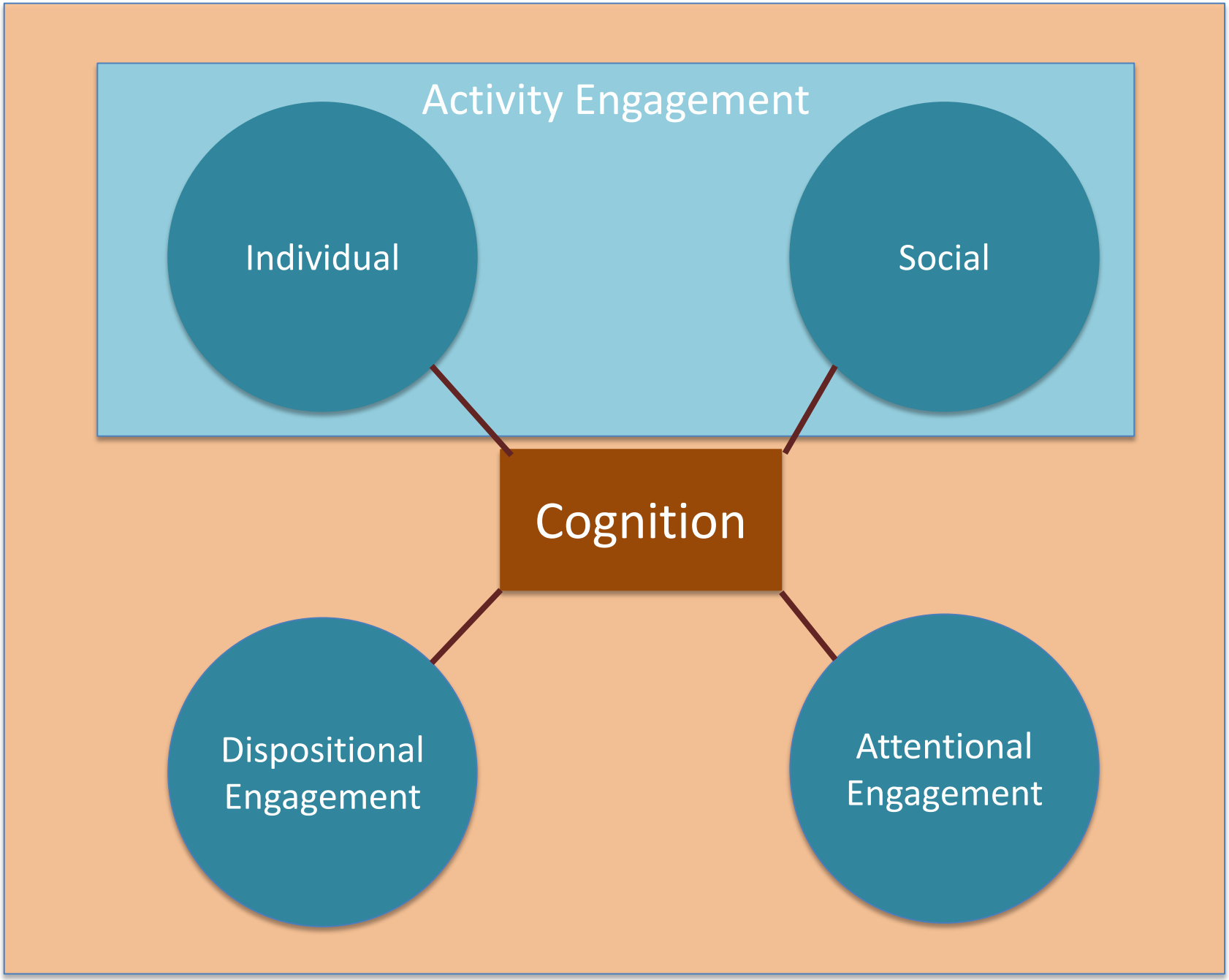
4. **a :** to provide occupation for **:** involve <*engage* him in a new project>
b : to arrange to obtain the use or services of **:** hire <*engage* a lawyer>

5. **a :** to hold the attention of **:** engross <her work *engages* her completely>
b : to induce to participate <*engaged* the shy boy in conversation>

6. **a :** to enter into contest or battle with <*engage* the enemy>
b : to bring together or interlock (weapons)

7. to deal with especially at length

Commitment to invest personal resources over time


Activity Engagement
Individual
Social
Cognition
Dispositional Engagement
Attentional Engagement

Uninteresting Reasons for Social Integration – Cognition Link

- Reverse causation
- Third variable(s)
  - Health
  - Dispositional engagement (e.g., conscientiousness, openness, well-being, self-efficacy)
- Bias in reporting

If Social Integration→ Cognitive Resilience, what might be the mechanisms?

- Cognitive stimulation
  - e.g., environmental complexity, executive control related to communication, proxy for activity engagement
- Emotional support to buffer stress
- Motivational
  - e.g., cultivation of cognition-friendly dispositions (e.g., conscientiousness) or activities; encourage perseverance.
- Environmental fit
  - Two examples…

"TROY"	"ITHACA"	WAITLIST CONTROL
Engagement Model	Training Model	
Creative Problem Solving	*Inductive Reasoning*	

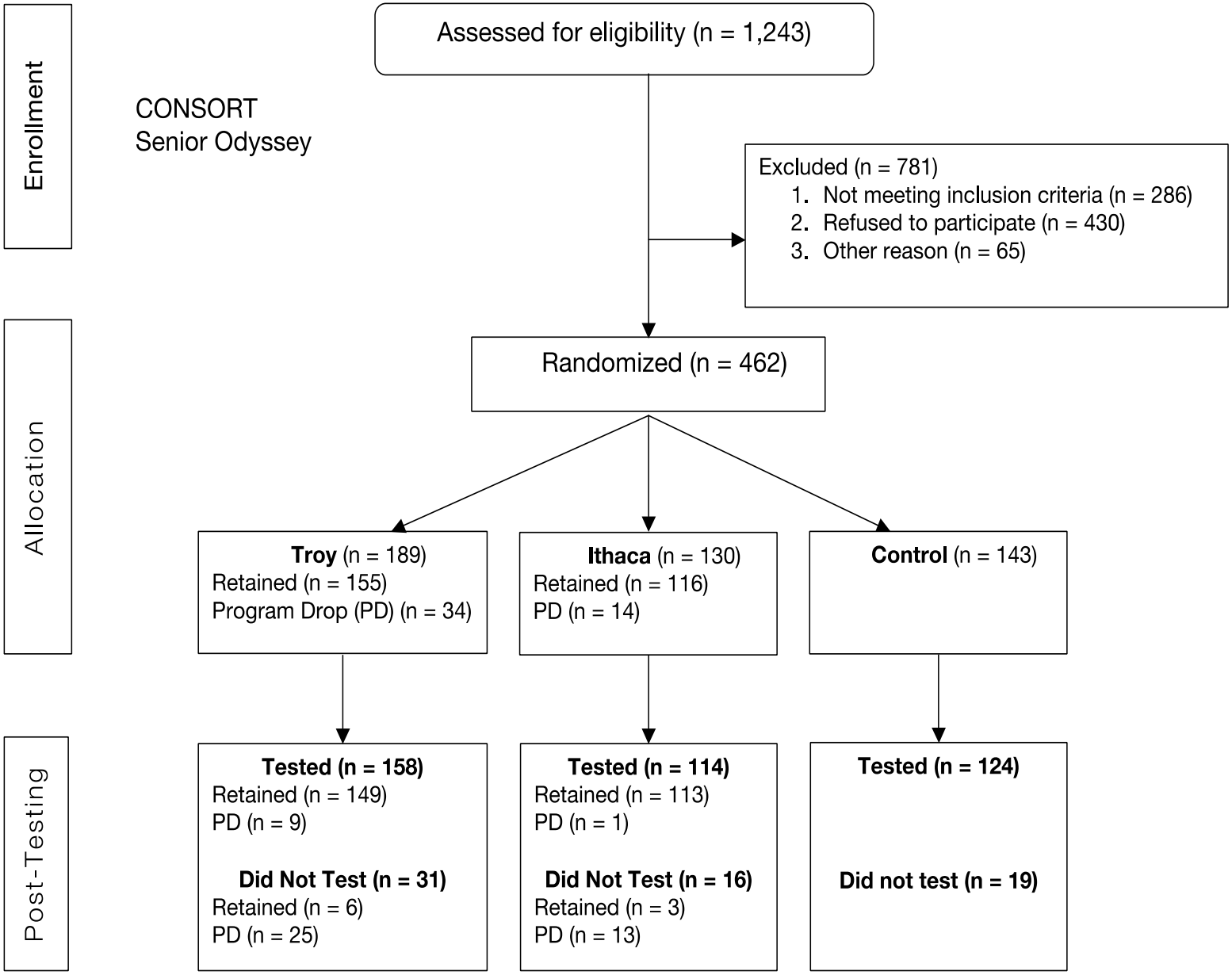
- Team-based creative problem solving
- Collaboration within teams that engage in tournament competition
- Activities built around creativity and ideational fluency

- Home-based inductive reasoning training (ACTIVE)
- Puzzles (crosswords, sudoku)

A test of the Schooler et al. (1999, 2002) "complexity hypothesis"

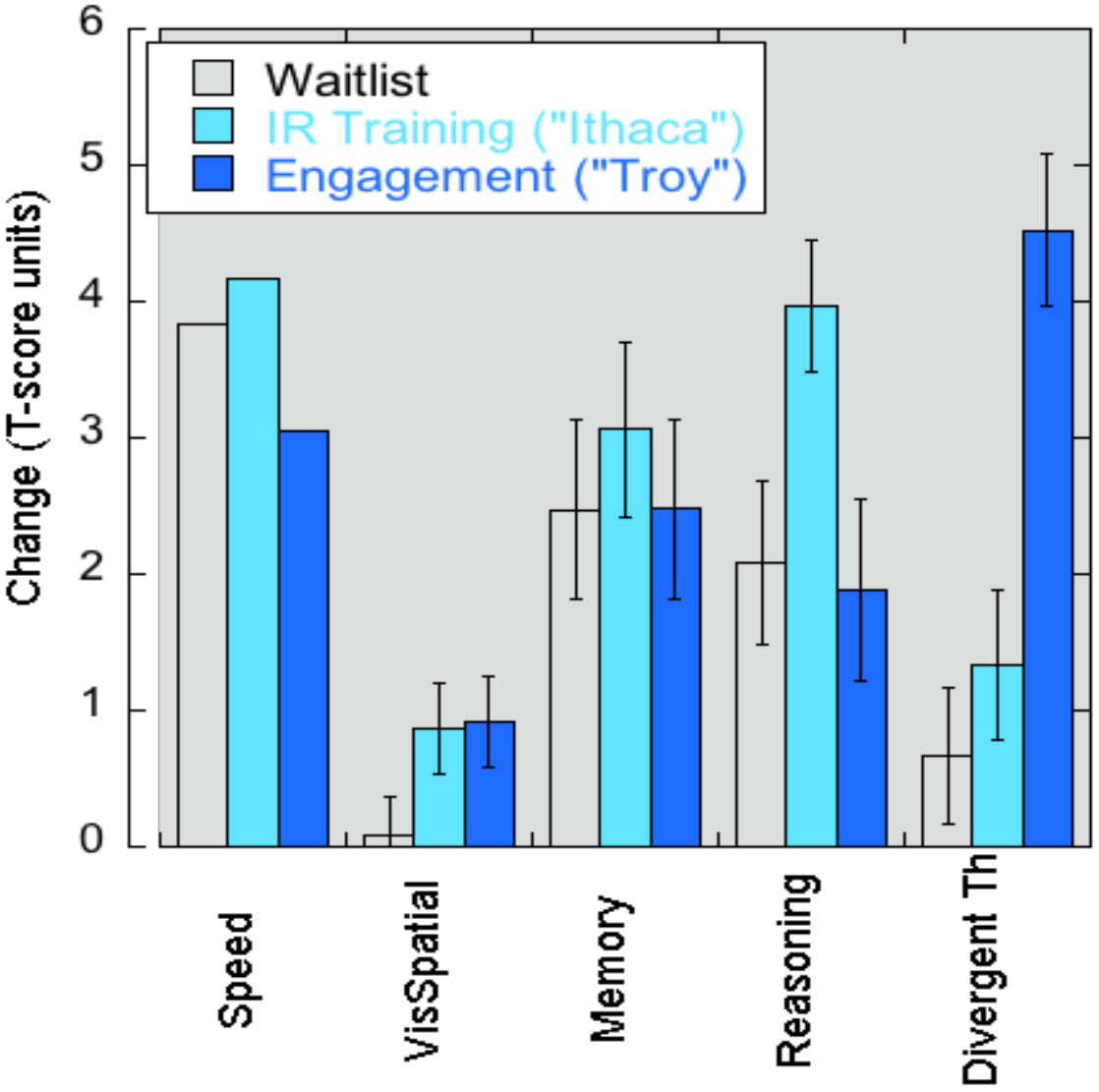
Stine-Morrow et al. (2007, JGPS; 2008, PandA; 2014, PandA)


FINALS
Odyssey of the Mind 2009 World Finals
Iowa State University
May 27-30, 2009


Enrollment
Allocation
Post-Testing
CONSORT
Senior Odyssey
Assessed for eligibility (n = 1,243)
Excluded (n = 781)
1. Not meeting inclusion criteria (n = 286)
2. Refused to participate (n = 430)
3. Other reason (n = 65)
Randomized (n = 462)
Troy (n = 189)
Retained (n = 155)
Program Drop (PD) (n = 34)
Ithaca (n = 130)
Retained (n = 116)
PD (n = 14)
Control (n = 143)
Tested (n = 158)
Retained (n = 149)
PD (n = 9)
Did Not Test (n = 31)
Retained (n = 6)
PD (n = 25)
Tested (n = 114)
Retained (n = 113)
PD (n = 1)
Did Not Test (n = 16)
Retained (n = 3)
PD (n = 13)
Tested (n = 124)
Did not test (n = 19)

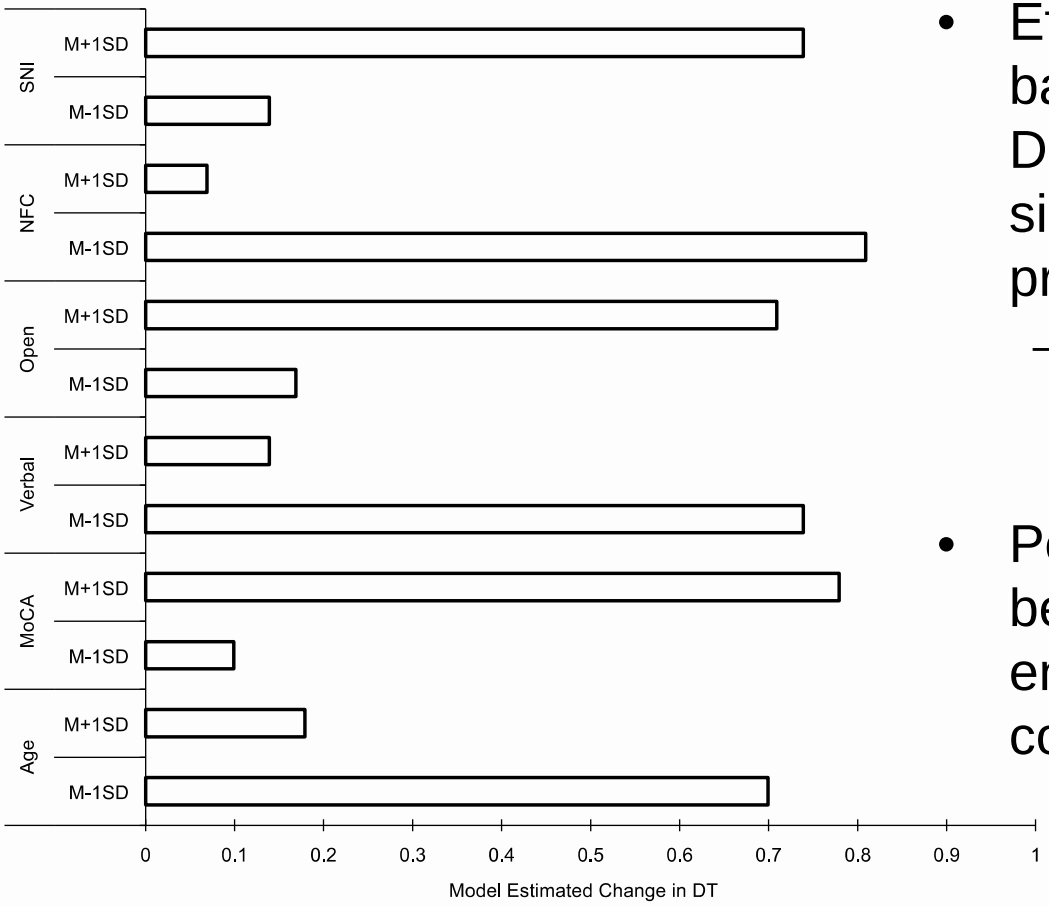
- We can learn skills **implicitly** – clear transfer from everyday exercise to the psychometrically measured skill.

- BUT even the effects of this complex experience were narrowly focused on the core skill that was valued and practiced through all the activities.



NIA R01 AG029475

Stine-Morrow et al. (2014, PandA)



- Effects of Engagement (in team-based creative problem solving) on Divergent Thinking was magnified by size of social networks (SNI) at pretest.
  - Effects of IR training only moderated by MoCA and VIQ.
- Perhaps social “experts” could take better advantage of activity engagement in this rich (and socially complex) context.

NIA R01 AG029475

Stine-Morrow et al. (2014, PandA)

- Motivation for activity engagement can depend on its relationship to our social world…

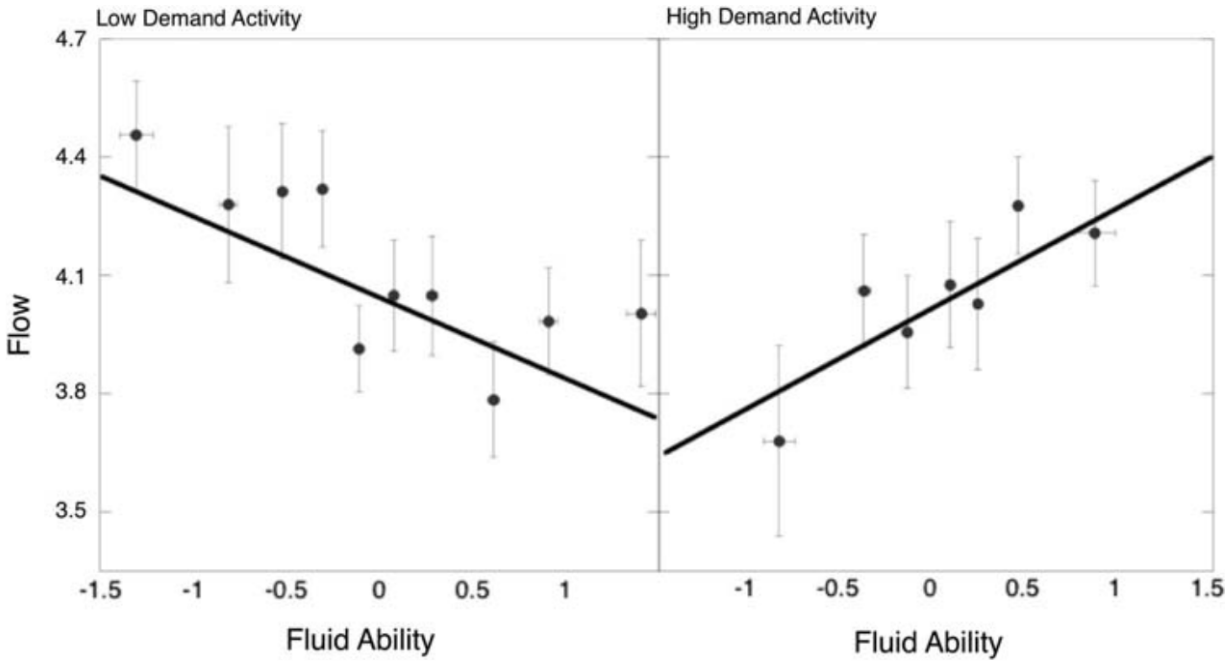
Flow – a State and a Trait

- Originally described by Csikszentmihalyi (1990; Csikszentmihalyi et al., 2005)

- Behaviors and experiences that support mastery are integral to human nature
  - Curiosity, exploration, seeking challenge
  - Existential/evolutionary argument:
    - "What makes people want to go on with the effort required of life?"
    - With development of consciousness, evolution favors individuals with mastery and control.
- Proximal experience of this mastery attainment is called "Flow"
    - Total emersion in an activity
    - Sense that the challenge faced is well-balanced with skill
    - Highly pleasurable
- Theoretically, then, Flow is a key motivator for cognitive and intellectual growth.

- Flow State is attained at higher levels of challenge for brighter people
  - (Payne, Jackson, Noh, & Stine-Morrow, 2011)

  - Adults (N=197; 60-94 yrs old) selected an activity from the previous week and rated Flow State (FS Scale).
  - Factor structure consistent with theory; α = .90
  - Flow state for cognitively demanding (e.g., reading, classes, music) versus non-demanding (e.g., resting, TV, cooking) activities depended on fluid ability.



- Flow Trait is reliable over 6-mo (r=.82), predictive of life satisfaction and activity engagement, but NOT cognition (Parisi, Payne, Worm, & Stine-Morrow, in preparation).
  - Adults (N=135; 60-91 yrs old)

Social Context, Communal Purpose, and Flow

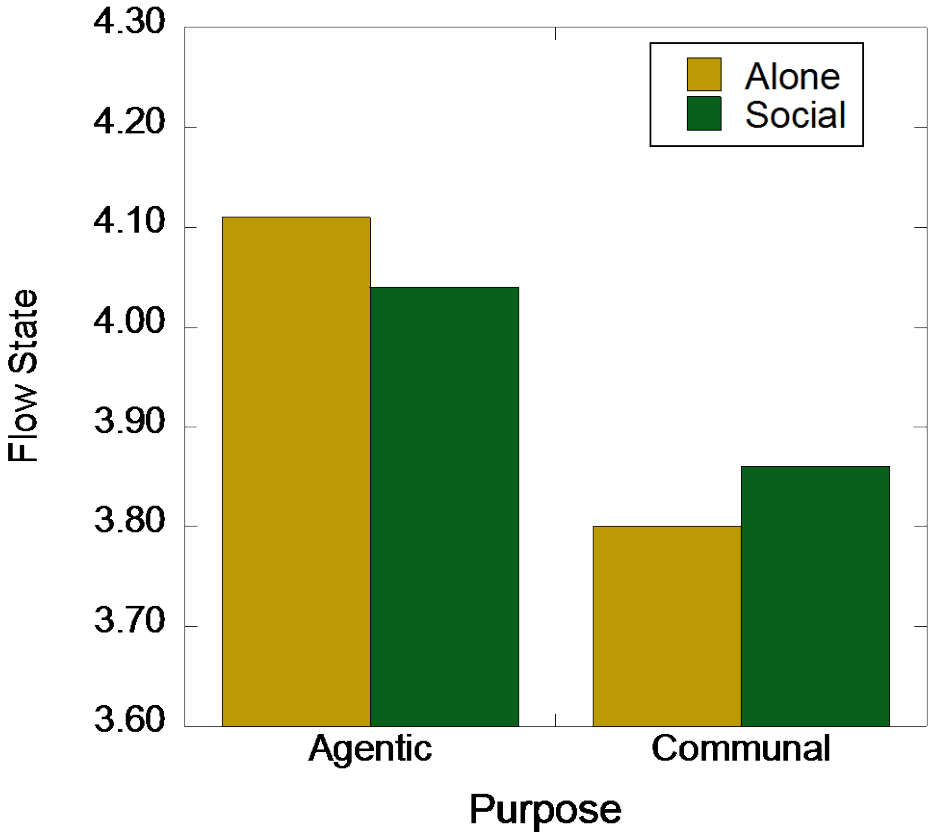
- Flow State in Context Scale (FSCS)
  - Participants generated recollections of particular activities
  - Rated Flow State during those experiences
- Amazon M-Turk (N=292; 19-65 yrs old)
  - Disproportionately female in Y and M groups
  - No difference in Education Level (M = 15.02 yrs, 11-20), F(2,291)=1.86, ns
  - 18% minority; no age differences

Purpose of the Activity

Context of the Activity	**For Yourself (agentic)**	**For Others (communal)**
By Yourself (individual)	Studying for an exam.	Making cookies for a church bake sale
With Others (social)	Taking a class.	Preparing for a public performance.

- Flow is experienced more strongly in activities engaged for one's own purposes, $F(1,289) = 58.73$, $p<.001$.
  - Consistent with the view of Flow as deriving from mastery!

- But effects were exaggerated slightly by match with context, $F(1,289) = 5.85$, $p<.02$.

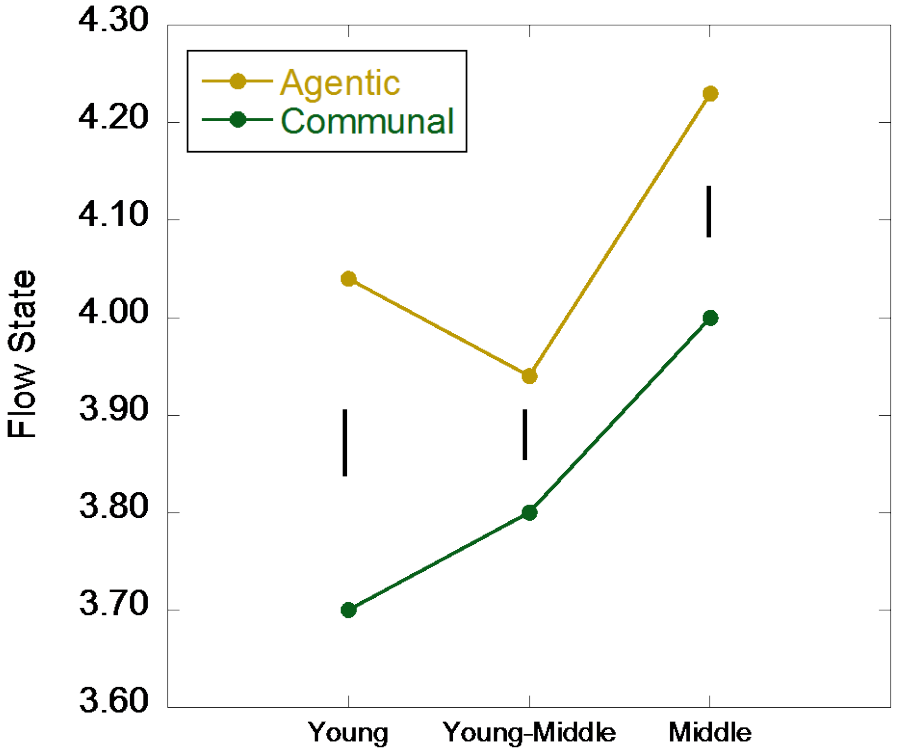


(Worm & Stine-Morrow, in prep)

- Contrary to the view of an age-related shift away from motivation for mastery, Flow actually increased with age, $F(2,289) = 6.94$, $p<.01$.

- Consistent with SST, increase in Flow with age was greater for Communal activities, $F(2,289) = 3.76$, $p<.03$.

- So middle-aged and older adults might be more motivated by social community-based purposes to embrace challenge.



(Worm & Stine-Morrow, in prep)

Limits and Where To?

- Theory
  - Social integration is probably multidimensional
    - Context vs. integration/social support vs. purpose
  - Transfer or mutualism? (van der Maas et al., 2006)
- Measurement
  - Self-report for activity and dispositional engagement.
  - In cognition, have good measures, but we will miss mutual effects of experience with static measures.
- Paths forward
  - Self-other reports for social integration (?)
  - Electronic diaries / technology
    - (e.g., Cornwell & Cagney, 2017, JGSS)
  - Experimental designs – even though they are expensive
  - Develop “successive-experience” paradigms

With gratitude to…

- Brennan Payne
- Jeanine Parisi
- Ted Worm
- Patrick Hill
- Josh Jackson
- Soo Rim Noh
- Xuefei Gao

- Brent Roberts
- Dan Morrow
- Art Kramer
- Laura Payne
- Megan Janke

- Donna Whitehill
- MT Campbell

National Institute on Aging
R01 AG029475
R21 AG054216
UI Campus Research Board