In the Zone: Flow State and Cognition in Older Adults

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INTRODUCTION

• Engagement in complex and intellectual activities is often found to be related to cognitive abilities in later life (e.g., Schooler & Mulatu, 2001). Though intrinsic motivation seems to influence the activities in which we choose to participate (Riediger et al., 2006), little research has investigated motivational aspects of activity engagement and cognitive outcomes in older adults. In the present study, we examine the nature of flow (Csikszentmihalyi, 1975; the experiential state that occurs as one approaches optimal engagement with a task) and its relationship with cognitive abilities among older adults.

METHODS

Participants

• Participants were 197 community dwelling older adults (60-94 yrs of age, *M*=72.1, *SD*=7.7).

Measures

Cognitive Measures

Processing Speed (PS) α=.80
- Letter Comparison
- Pattern Comparison
- Identical Pictures

Working Memory (WM)
- Letter-Number Sequencing

Inductive Reasoning (IR) α=.90
- Letter Sets
- Number Series
- Letter Series
- Word Series
- Everyday Problem Solving

Visual Spatial (VSP) α=.71
- Card Rotation
- Hidden Patterns

Divergent Thinking (DT) α =.69
- Different Uses
- Opposites Test

Fluid Ability (composite) α=.91

Flow Measure

• Respondents identified an enjoyable activity from the last week and then rated this activity on 34 items representing the nine dimensions of the flow state proposed by Csikszentmihalyi (1975). Items (Table 1) were adapted from earlier instruments (Jackson & Marsh, 1996; Vollmeyer & Rheinberg, 2006).

Procedure

• Participants completed our flow scale as part of a larger set of measures that were mailed to their home. The battery of cognitive measures was completed in a 2-hr laboratory session.

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RESULTS

Confirmatory Measurement Model of Flow

• χ^2=479.39, df= 266, NNFI/TFI= .90, CFI = .92, RMSEA=0.06, 90% CI=. 05, .07.

Table 1. *Factor Loadings from Confirmatory Factor Analysis of Flow State Scale*

Factor	Item	Standardized Loadings
Merging Action and Awareness		
	I performed automatically, without having to think about it.	.74
	Things just seemed to happen automatically	.84
	I did things spontaneously without having to think	.82
Clear Goals		
	I had a strong sense of what I wanted to accomplish.	.83
	I knew what I want to achieve.	.70
	My goals were clearly defined.	.81
Concentration on Task at Hand		
	My attention was focused entirely on what I was doing.	.70
	It was no effort to keep my mind on what was happening.	.77
	I had total concentration.	.77
	I had no difficulty concentrating.	.84
Unambiguous Feedback		
	It was really clear to me how my performance was going.	.93
	I had a good idea while I was performing about how well I was doing.	.89
Challenge-Skill Balance		
	I was challenged, but I believe my skills will allow me to meet that challenge.	.55
	The challenge and my skills were at an equally high level	.86
	I felt just the right amount of challenge.	.75
Transformation of Time		
	Time seemed to alter (either slows down or speeds up).	.73
	The way time passed seemed to be different from normal.	.86
	I lost my normal awareness of time.	.70
Sense of Control		
	I felt as though I had everything under control.	.85
	I felt that I had everything under control.	.92
Loss of Self-Consciousness		
	I was not concerned with how others might be evaluating me.	.77
	I was not concerned with how I was presenting myself.	.62
	I was not worried about what others might be thinking of me.	.72
Autotelic Experience		
	I really enjoyed the experience.	.93
	The experience left me feeling great	.92
	The experience was extremely rewarding.	.89

• Considering the high intercorrelations among the factors, a global flow composite score was created from all survey items (α=.91)

Activity Coding

• Participants' activity reports were coded in terms of level of cognitive demand (K=.86).

High cognitive demand (HC):	Low cognitive demand (LC):
• Working (14.3%)	• Parties or social events (34.8%)
• Art and music (12.5%)	• Physical exercise (10.2%)
• Educational activities (6.7%)	• Television (2.8%)
• Reading/ literacy activities (4.2%)	• Cooking (2.4%)
• Puzzles/ challenging games (3.6%)	• Vacation and resting (2.1%)
• Information search (e.g., library, computer (2.4%)	

• Those reporting high-demand activities did not differ from those reporting low-demand activities in age (M_{HC}= 72.1 yrs; M_{LC}= 72.2 yrs), t(168)= 0.40, education (M_{HC}=15.8 yrs; M_{LC}=15.4 yrs), t(168)=-0.91, or fluid ability (M_{HC}=0.07; M_{LC}=0.04), t(160)=-0.77.

Relationships Between Flow and Cognition in Activities of Low and High Cognitive Demand

• Age was negatively related to fluid cognitive abilities, but flow for both high-cognitive and low-cognitive activities was stable into very old age.

Table 2. *Correlations Between Age, Education, Cognitive Ability, and Flow*

	Age	Ed	PS	WM	VSP	DT	IR	Fluid
Age								
Ed	-.03							
PS	-.46 **	.23 **						
WM	-.36 **	.18 *	.44 **					
VSP	-.43 **	.24 **	.69 **	.49 **				
DT	-.33 **	.38 **	.47 **	.38 **	.57 **			
IR	-.42 **	.38 **	.61 **	.52 **	.77 **	.67 **		
Fluid	-.48 **	.35 **	.78 **	.63 **	.86 **	.73 **	.92 **	
C_Flow	-.01	.05	.20 †	-.07	.31 **	.21 †	.24 †	.27 *
NC_Flow	.02	-.11	-.16	-.12	-.16	-.25 *	-.38 **	-.29 **
G_Flow	.00	-.16	-.01	-.07	.02	-.03	-.13	-.08

C_Flow= Flow for cognitively demanding activities; NC_Flow= Flow for cognitively demanding activities; G_Flow= Global Flow Composite.

• Hierarchical regression was used to examine how fluid ability predicted the flow state as a function of cognitive demand. The interaction between fluid ability and demand was reliable (β= 14.88; t(160)=3.45, p< .01).
• Simple effects of the interaction were decomposed using the simple slopes technique (Preacher et al., 2006). Fluid ability was positively related to flow for demanding activities (B=8.47, SE(B)= 3.81; t(160) = 2.22, p < .05), but negatively related to flow for non-demanding activities (B=-6.40, SE(B)= 2.13; t(160)=-3.00, p < .01).

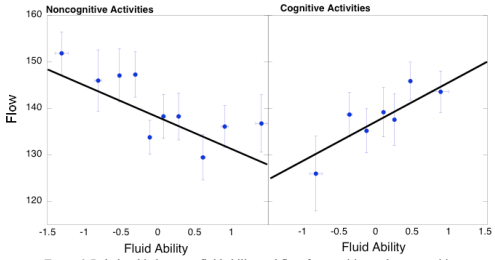

Figure 1. Relationship between fluid ability and flow for cognitive and non-cognitive activities. (Note: Data points are binned per 10 participants; vertical SE bars represent 95% confidence intervals for flow, Horizontal SE bars represent 95% confidence intervals for fluid ability).

• The three-way interaction between age, fluid ability, and activity demand was negligible (β=.04; t(160)=.05).

CONCLUSIONS

• Aging does not diminish the capacity to experience flow states.

• Consistent with the Csikszentmihalyi model, flow arises from an optimal balance between skill and challenge: older adults were more likely to experience flow from cognitively demanding activities if they were relatively high in fluid ability.

• Flow may be an important factor to consider in understanding choice of activity that promotes cognitive resilience.

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