Activity, Cognitive Performance, and Participation in the Senior Odyssey Program

Jeanine M. Parisi, Elizabeth A. L. Stine-Morrow, Daniel G. Morrow, Jennifer C. Greene, Denise C. Park, and Michelle L. Meade

University of Illinois at Urbana-Champaign

RATIONALE

Some have argued that engagement in activities that place demands on intellectual resources may maintain or even enhance cognition (e.g., Schooler & Mulatu, 2001; Schaie, 2005), however, the evidence is mixed (e.g., Hultsch et al., 1999; Aartsen et al., 2002). One possibility is that engagement-based cognitive maintenance through activity depends on the type of activity, as well as personality attributes that predispose an individual toward mindful interaction with everyday experience.

The aims of the present study were to:

- conceptualize dimensions of activity.
- explore the relationships between these dimensions of activity, cognitive performance, and personality.
- examine how activity and cognitive ability contribute to participation in further intellectual activity.

METHOD

Participants

Participants (N=189) were community-dwelling elders and residents of local retirement apartments. Following pretest, participants were randomly assigned to participate in the Senior Odyssey program or to a wait-list control (Table 1).

The Program

Senior Odyssey (based on the principles of Odyssey of the Mind,www.odysseyofthemind.org) incorporates both divergent and convergent collaborative problem solving to exercise cognition (i.e, working memory, divergent thinking, inductive reasoning) and creativity over a 20-week season.

Measures and Procedure

Participants were administered a battery assessing performance on a variety of cognitive measures (Ekstrom et al., 1976; Salthouse, 1991); self-reported frequency of participation in 70 activities over the past 2 years (Hultsch et al., 1999); and personality attributes reflecting cognitive engagement (PACE; Mindfulness, Openness to Experience, and Need for Cognition (α=.84)). Initial scores from these measures were used to explore the relationships between patterns of activity, cognitive performance, and personality.

Immediately after each Senior Odyssey session, coaches used anchored scales to rate each participant in the experimental group (n=107) on the levels of cognitive (1=disengagement, 7=active engagement) and social (1=low social interaction, 7=high social interaction) engagement. Ratings were averaged across time to form a reliable scale reflecting program participation (α=.73).

Table 1. Participant characteristics

	Overall (N=189)		Experimental (n=107)	
	M	**SD**	**M**	**SD**
Age	72.9	8.2	73.7	8.4
Education	16.1	2.7	16.3	2.6
MMSE	28.0	1.7	27.9	1.7
Activity	279.3	43.6	279.7	44.0
Mindfulness	106.5	15.1	107.7	15.9
Openness	20.7	3.8	21.1	4.0
Need Cog	14.0	21.4	15.9	22.3

RESULTS

Table 2. Factor Loadings from Principal Components Analysis of Activity Participation

Activity	Factor 1 Construction / Repairs	Factor 2 Literacy/ Non-comp Leisure	Factor 3 Domestic Pursuits	Factor 4 Competitive Leisure
woodworking/carpentry	0.57			
product assembly	0.69			
household repairs	0.72			
mechanical repairs	0.72			
read books		0.52		
give public lecture		0.55		
attend concerts/plays		0.57		
writing (poems, articles)		0.61		
attend public lecture		0.66		
dinner parties			0.52	
food shopping			0.58	
housework			0.66	
prepare meal			0.67	
jigsaw puzzles				0.53
play Trival Pursuit				0.65
TV game shows				0.68

Note. Factor loadings over .5

Table 3. Correlations among Activities, Cognition, Personality, and Program Participation

Measure	Factor 1 Construction/ Repairs	Factor 2 Literacy/ Non-comp Leisure	Factor 3 Domestic Pursuits	Factor 4 Competitive Leisure	PACE	Prog Part
Speed	0.16	0.06	0.32 **	0.16 *	0.10	0.09
Inductive	0.29 **	0.14	0.24 **	0.10	0.18 *	0.18
Visuo-spatial	0.32 **	0.07	0.10	0.09	0.11	0.13
Divergent	0.24 **	0.29 **	0.38 **	-0.01	0.40 **	0.22 *
Vocabulary	0.04	0.22 **	0.13	-0.10	0.12	0.09
Working Memory	0.17 *	0.12	0.22 **	0.12	0.05	0.18
PACE	0.29 **	0.39 **	0.29 **	0.03	1.00	0.12
Prog Part	0.05	-0.09	0.15	-0.08	0.07	1.00

Note. * $p<.05$, ** $p<.01$,

Table 4. Regression Analyses of Activities on Cognition

Predictor	R^2	Δ R^2	β	*t*
Visuo-Spatial				
Construction/Repair	0.11		0.32	4.04***
Processing Speed				
Domestic Pursuits	0.13		0.36	4.78***
Competitive Leisure	0.16	0.03	0.17	2.13*
Vocabulary				
Literacy/Non-Comp Leisure	0.04		0.20	2.35**
Divergent Thinking				
Domestic Pursuits	0.13		0.36	4.87***
Literacy/Non-Comp Leisure	0.18	0.05	0.22	2.95**
Construction/Repair	0.20	0.02	0.15	2.11*
Working Memory				
Domestic Pursuits	0.13		0.36	4.63***
Construction/Repair	0.16	0.03	0.17	2.15*

Note. ***$p<.001$, **$p<.01$, *$p<.05$

FINDINGS

- A principal components factor analysis with varimax rotation was used to decompose the Activity measure into four scales (Table 2).

  Construction/Repair: activities that require repairing or assembling an object (e.g., mechanical repairs)
  Literacy and Non-competitive Leisure: socio-cultural and literacy activities that involve processing information that has a wide variety of schemas and do not ordinarily include an element of competition (e.g., reading, attending concerts)
  Domestic Pursuits: home-based activities (e.g., preparing meals, housework)
  Competitive Leisure: games (e.g., playing Trivial Pursuit) that depend on deriving a single correct answer

- Dimensions of activity over the previous two years showed differential patterns of relationships with cognitive abilities and PACE (Table 3).

- Regression analysis suggested that individual differences in cognitive abilities were differentially predicted by activity patterns (e.g., construction and repair by visuospatial processing; literacy and noncompetitive leisure by vocabulary) (Table 4).

- Initial level of divergent thinking was selectively related to participation in the Senior Odyssey program (Table 3).

CONCLUSION

Individuals reporting more frequent participation in specific activity domains showed differential performance on cognitive tasks and personality attributes reflecting cognitive engagement. Moreover, performance on cognitive and personality measures appeared to reflect the task demands of the activity. Similarly, in the context of the Senior Odyssey, initial scores of divergent thinking were related to program participation, reflecting the nature of the program. However, participation was not related to previous engagement in any of the activity domains, suggesting that the Odyssey experience is conceptually different from past activities. The present results highlight the importance of considering activity domains separately when exploring the relationship between activity, cognition, and personality.

REFERENCES

Aartsen, M. J., Smits, C. M. H., van Tilberg, T., Knipscheer, K. C. P. M., & Deeg, D. J. H. (2002). Activity in older adults: Cause or consequence of cognitive functioning? A longitudinal study of everyday activities and cognitive performance in older adults. *Journal of Gerontology: Psychological Sciences, 57B,* 153-162.

Ekstrom, R. B., French, J. W., & Harmon, H. H. (1976). *Manual for the kit of factor-referenced cognitive tests*. Princeton, NJ: Educational Testing Service.

Hultsch, D. F., Small, B. J., Hertzog, C., & Dixon, R.A. (1999). Use it or lose it: Engaged lifestyle as a buffer of cognitive decline in aging? *Psychology and Aging, 14,* 245-263.

Schaie, K. W. (2005). *Developmental influences on adult intelligence: The Seattle Longitudinal Study*. New York: Oxford University Press.

Schooler, C., & Mulatu, M. S. (2001). The reciprocal effects of leisure time activities and intellectual functioning in older people: A longitudinal analysis. *Psychology and Aging, 16,* 466-482.

We are grateful from support from the National Institute on Aging (R03 AG024551) and NIA Roybal Center for Healthy Minds (P30 AG023101). We also would like to thank Joanne Rompel and Sammy Micklus from Odyssey of the Mind for their advice, support, and materials.

Contact Information: jmparisi@uiuc.edu or eals@uiuc.edu