

# THE ASSOCIATION OF EDUCATIONAL ATTAINMENT, COGNITIVE LEVEL OF JOB, AND LEISURE ACTIVITIES DURING THE COURSE OF ADULTHOOD WITH COGNITIVE PERFORMANCE IN OLD AGE: THE ROLE OF OPENNESS TO EXPERIENCE

Andreas Ihle<sup>1,2,3</sup>, Michel Oris<sup>2,3</sup>, Delphine Fagot<sup>2,3</sup>, Christian Maggiori<sup>3,4</sup>, & Matthias Kliegel<sup>1,2,3</sup>

<sup>1</sup> Cognitive Aging Lab, Department of Psychology, University of Geneva, Switzerland

<sup>2</sup> Center for the Interdisciplinary Study of Gerontology and Vulnerability, University of Geneva, Switzerland

<sup>3</sup> Swiss National Centre of Competence in Research LIVES—Overcoming vulnerability: life course perspectives

<sup>4</sup> University of Applied Science and Arts Western Switzerland – School of Social Work, Fribourg, Switzerland

## INTRODUCTION

### Predictors of inter-individual differences in cognitive functioning in old age

Multiple markers of *cognitive reserve* (Stern, 2002; Tucker & Stern, 2011) have been discussed such as:

- Education:** cognitive reserve is developed already in early life by cognitive activity (e.g., via education; Foubert-Samier et al., 2012; Gatz et al., 2001)
- Engaging in leisure activities:** contributes to cognitive reserve and is related to better cognitive functioning in later life (Hertzog et al., 2008; Hultsch et al., 1999; Wang et al., 2013)
- Cognitive level of one's occupation:** makes a further contribution to cognitive reserve and is related to better cognitive functioning in old age (Schooler et al., 1999; Stern et al., 1995)

### Interplay with individual difference characteristics such as certain personality dimensions?

- Openness to experience:** reflects the degree of intellectual curiosity, creativity, and preference for variety (McCrae & Costa, 1999)
- Individuals with high openness to experience engage more in stimulating leisure activities (Hultsch et al., 1999; Soubelet & Salthouse, 2010)
- and show better cognitive functioning in old age (DeYoung et al., 2014; Williams et al., 2013)
- Investment hypothesis: individuals with high openness to experience more engage in stimulating activities and this engagement improves cognitive ability level (Chamorro-Premuzic & Furnham, 2004)
- Yet, results are sparse and so far inconclusive
- Pattern of interplay of a cognitively engaged lifestyle with openness to experience in their effects on cognitive functioning remains unclear so far (mediation vs. moderation)

## OBJECTIVES

The present study set out to investigate the interplay of engaging in cognitively stimulating activities (i.e., educational attainment, cognitive level of one's occupation, and leisure activities), openness to experience, and cognitive performance in a large sample of older adults in more detail.

- Does a greater engagement in cognitively stimulating activities throughout adulthood mediate the relation between openness to experience and cognitive functioning in old age?
- Are alternative mechanisms in terms of a moderation at work, i.e. dependent effects of cognitive engagement and openness to experience?

## METHOD

The Vivre-Leben-Vivere (VLV) project aims to explore the lives and health of the population aged  $\geq 65$  living in Switzerland.

### Participants

	Overall $N = 2812$	
<b>Age group</b>	65-69: 549 (19.5%)	70-74: 576 (20.5%)
	75-79: 530 (18.8%)	80-84: 459 (16.3%)
	85-89: 405 (14.4%)	90+: 293 (10.4%)
<b>Gender</b>	Women: 1330 (47.3%)	Men: 1482 (52.7%)
<b>Canton</b>	Bale: 591 (21.0%)	Berne: 662 (23.5%)
	Geneva: 531 (18.9%)	Ticino: 501 (17.8%)
	Valais: 527 (18.7%)	

### Materials

#### Cognitive performance

- Verbal abilities (Mill Hill; Deltour, 1993)
- Processing speed (Trail Making Test Part A; Reitan, 1958)

#### Markers of cognitive reserve

- Educational level
- Cognitive level of job
- Leisure activities at age 45

#### Openness to experience

- Big Five Inventory (Rammstedt & John, 2007)

## RESULTS

### Correlation analyses

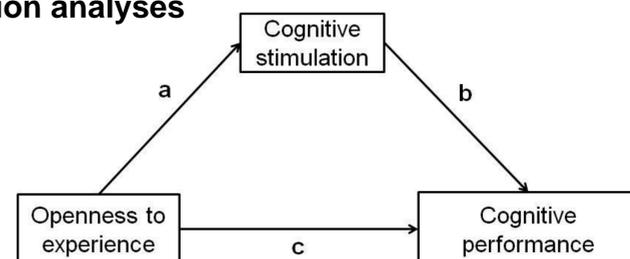
*Relations with cognitive performance measures*

	Verbal abilities	Processing speed
Educational attainment	.33***	.18***
Cognitive level first job	.33***	.14***
Cognitive level last job	.28***	.17***
Leisure activities	.13***	.14***
Openness to experience	.13***	.10***

\*\*\*  $p < .001$ .

In addition, higher scores in openness to experience were significantly associated with higher educational attainment ( $\rho = .22$ ), higher cognitive level of job (first job:  $r = .16$ ; last job:  $r = .18$ ), and higher number of leisure activities ( $r = .18$ , all  $ps < .001$ ).

### Mediation analyses



General structure of the path models applied to investigate whether the effect of openness to experience on cognitive performance in old age was mediated through engaging in cognitive stimulation in early and middle adulthood.

Mediator	Verbal abilities	Processing speed
Educational attainment	.07*** (51.3%)	.03*** (35.0%)
Cognitive level first job	.05*** (39.1%)	.02*** (20.8%)
Cognitive level last job	.05*** (36.3%)	.03*** (26.9%)
Leisure activities	.02*** (15.0%)	.02*** (22.0%)

\*\*\*  $p < .001$ .

### Moderation analyses

There were no significant interactions of openness to experience with educational attainment, cognitive level of job, nor the number of leisure activities (all  $ps > .131$ ) in their effects on cognitive performance.

## CONCLUSION

The present results suggest that

- engaging in cognitive stimulation throughout the life course is related to better cognitive performance in old age
  - such engagement is greater in individuals with high openness to experience
  - individuals with higher openness to experience also show better cognitive performance in old age
- Present data most strongly speak for a mechanism in which individuals with high openness to experience were more engaged in stimulating activities in early and mid-life.
  - By increasing their cognitive reserve throughout adulthood, this finally enhanced their cognitive performance level later in old age.
  - Applied and clinical implications for planning interventions and prevention policies