JOB COMPLEXITY INFLUENCES COGNITION IN A MIDDLE-AGED COHORT AT RISK FOR AD

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BACKGROUND

- Epidemiological findings indicate that education and occupation may moderate risk of Alzheimer's disease (AD) (Karp, et al., 2009).
- However, prospective studies are needed to demonstrate potentially protective effects of high education and mentally-demanding occupations.

OBJECTIVE

To determine if occupational complexity influenced baseline cognitive performance in a middle-aged cohort at risk for developing AD.

METHODS

- Participants were 1,211 middle-aged (35 to 67 years, mean = 54) participants (69% female) in the Wisconsin Registry for Alzheimer's Prevention (WRAP), a prospective study of children of person with AD (72% of the sample) and controls without a parental history of AD (27% of the sample). Most (98%) were non-Hispanic Caucasian.
- Baseline procedures included cognitive testing, medical and life-history questionnaires, APOE genotyping, and laboratory tests.
- Education ranged from some high school to postgraduate degrees (median = BA degree).
- Participants described up to three main jobs. Using classifications adapted from Roos and Trieman (1980), each job was rated on a 6- to 8-point scale (**see Table 1**) for three types of complexity:
  - Work with data
  - Work with people
  - Work with things
- Although diverse occupations were represented in the sample, jobs with high mental demand were typical.
- Two statistical approaches were used to examine relationships between job complexity and baseline cognitive performance:
  - Stepwise linear regression analyses were preformed with average job complexity ratings, education level, age, and gender as predictors. The dependent measures were cognitive factor scores identified from analysis of the WRAP baseline test battery (Dowling et al., in press).
  - Mean cognitive factor scores were compared for subgroups with higher vs. lower education (< BA degree vs. ≥ BA) and higher vs. lower job complexity (median split on job complexity ratings) by analysis of variance.

TABLES & FIGURES

TABLE 1. COMPLEXITY IN WORKING WITH DATA*

Numeric score	Complexity Level	Example
0	Synthesizing (most complex)	Architect
1	Coordinating	Administrative Assistant
2	Analyzing	Auto mechanic
3	Compiling	Bank Teller
4	Computing	Cashier
5	Copying	Waiter/Waitress
6	Comparing (least complex)	Supply clerk

*From the Dictionary of Occupational Titles and Roos TJ, Treiman DJ: DOT scales from the 1970 census classification, in work, jobs, and occupations: a critical review of occupational titles. Edited by Miller AR, Treiman DJ, Cain PS, et al. Washington, DC, National Academy Press, 1980:336-389.

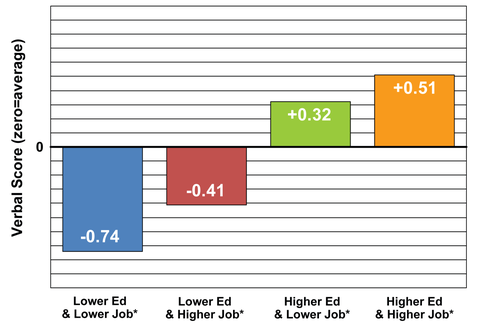
TABLE 2. COGNITIVE DOMAINS PREDICTED BY DIFFERENT ASPECTS OF WORK COMPLEXITY

Cognitive Domain	Work with Data	Work with People	Work with Things
Verbal ability	x		
Visuospatial ability	x		x
Working memory	x	x	
Immediate memory			x
Verbal learning and memory	x		
Speed and flexibilty			

Note: Work complexity ratings are averages for up to three main jobs.

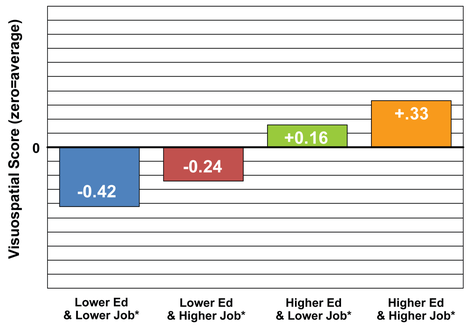
"x" indicates statistically significant ($p < .05$) association in linear regression analyses that included education, age, and gender as additional predictors of cognition.

FIGURE 1. VERBAL SCORE FOR EDUCATION/OCCUPATION GROUPS



*Lower vs. higher complexity in working with DATA

FIGURE 2. VISUOSPATIAL SCORE FOR EDUCATION/OCCUPATION GROUPS



*Lower vs. higher complexity in working with THINGS

RESULTS

- Occupational complexity ratings accounted for significant variance (R^2 change = 2% to 15%, p values <.05 to ≤.001) in five of six cognitive domains. **Table 2** shows how different aspects of work complexity related to specific cognitive skills.
- Subgroups defined by higher vs. lower education and higher vs. lower complexity in working with data differed significantly on four of six cognitive factors. **Figure 1** shows mean scores on the Verbal Ability factor for four groups differing in education and complexity in working with data.
- Subgroups defined by complexity in working with people or things also differed on some cognitive domains. **Figure 2** shows mean scores on the Visuospatial Ability factor for subgroups defined by education and complexity in working with things.

CONCLUSIONS

- Our findings underscore the importance of examining sources of mental enrichment beyond education in calculating estimates of cognitive reserve in prospective studies.
- For middle-aged persons, work is a major source of mental stimulation, and its effects are detectable on dementia-sensitive aspects of cognition such as verbal memory.
- Work history effects were present in our study despite the generally high levels of education and job complexity that characterize the WRAP sample.

Dowling MN, Hermann BP, La Rue A, et al. (in press). *An examination of the latent structure of the neuropsychological test battery of the Wisconsin Registry for Alzheimer's Prevention.* Neuropsychology.

Karp AK, Andel R, Parker MG, et al. (2009). *Mentally stimulating activities at work during midlife and dementia risk after age 75: follow-up study from the Kungsholmen project.* Am J Geriatr Psychiatry, 17:227-236.

Roos PA, & Treiman DJ (1980). Appendix F: DOT scales for the 1970 census classification. In AR Miller, DJ Treiman, PS Cain, PA Roos (Eds.), *Work, jobs, and occupations: A critical review of the dictionary of occupational titles* (pp. 336-389). Washington, DC: National Academy Press.

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