EdSHARe
Education Studies for Healthy Aging Research

NLS-72 HIGH SCHOOL & Beyond

Session 3: Educational and Workplace Contexts/Policy

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CENTER FOR DEMOGRAPHY OF HEALTH & AGING
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Why education and work?

- Cognitive reserve theory
  - “In essence, an individual who uses a brain network more efficiently, or is more capable of calling up alternate brain networks or cognitive strategies in response to increased demand may have more cognitive reserve and might maintain effective performance longer in the face of brain pathology.”

  Stern 2003*

* References at the end of these slides

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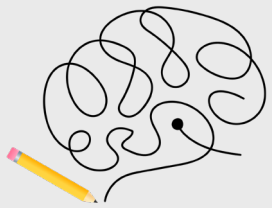

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Why education and work?

- Education and work have the potential to build and sustain cognitive reserve
  - Engage the brain in developing new pathways
  - Recruit additional networks to perform complex tasks

- This translates into delayed symptoms of cognitive decline even in the face or biological change

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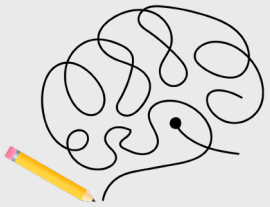

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Learning and complexity

- Focus on the organizational context of education
  - What shapes learning *opportunities* and learning *outcomes*?

- Focus on work over the course of adulthood
  - What about work contributes to (cognitive) health as we age?
    - Think in particular about different aspects of work *complexity*

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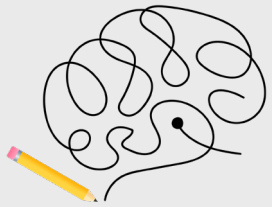

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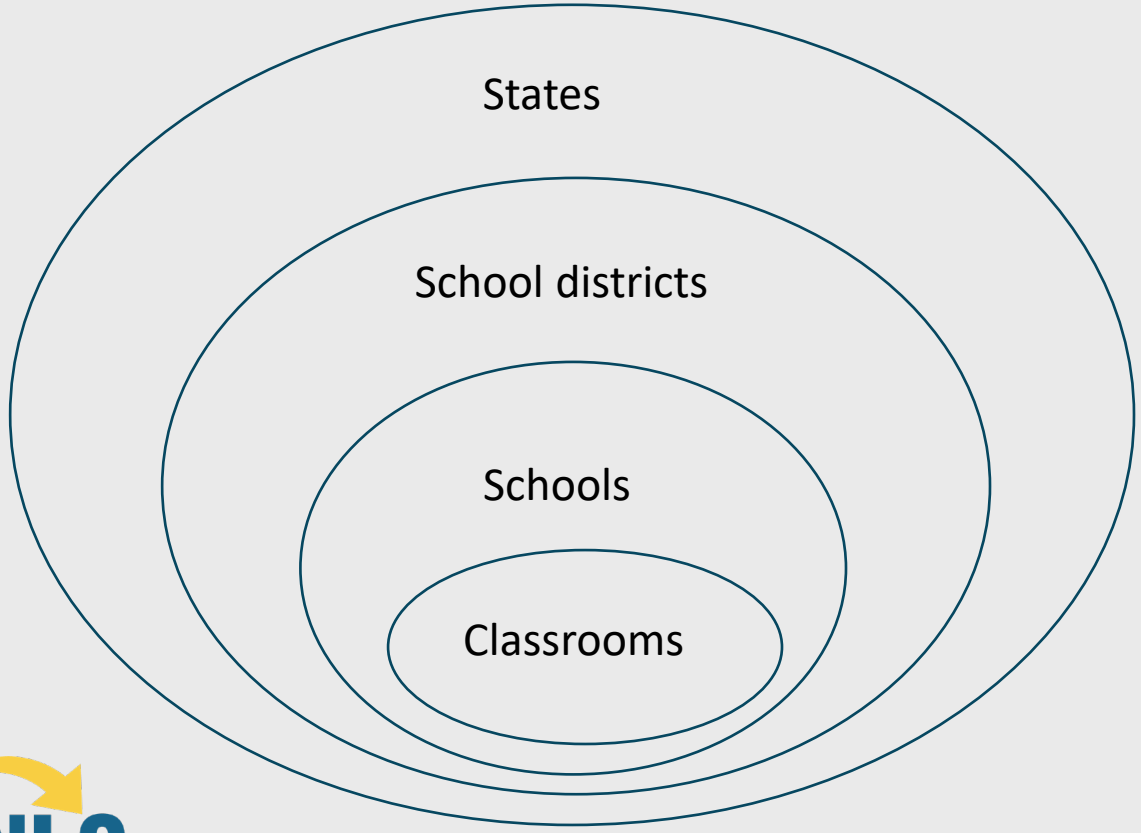
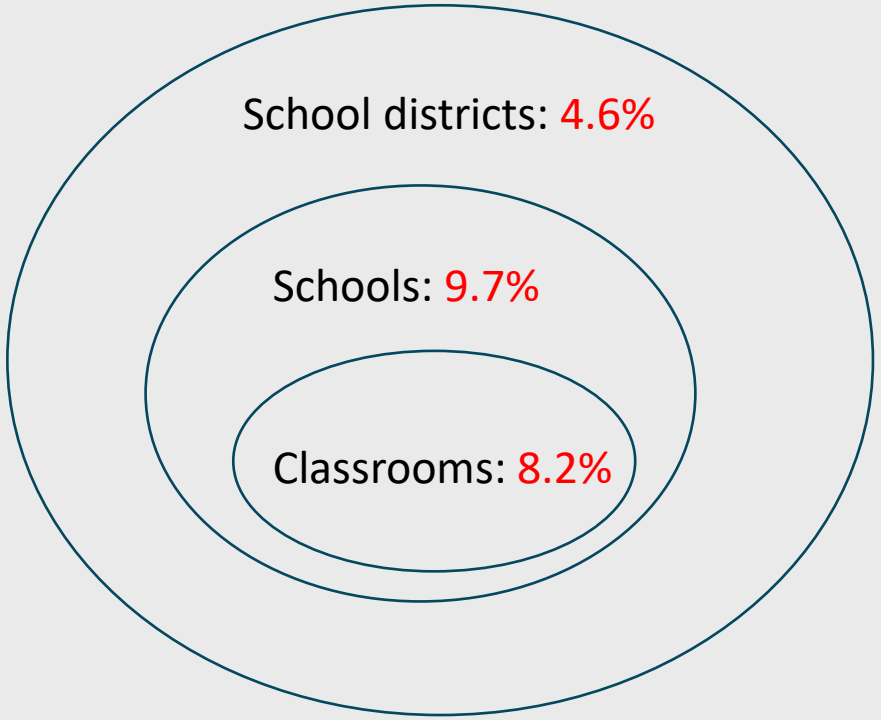
Where does learning happen?

- Focus on the organizational context of education



Variation in 4th and 5th grade math test scores (North Carolina 2009-10)



Students within classrooms: 77.5%

Chingos, M. M., Whitehurst, G. J., & Gallaher, M. R. (2015). School Districts and Student Achievement. *Education Finance and Policy, 10(3), 378-398. doi:10.1162/EDFP_a_00167*

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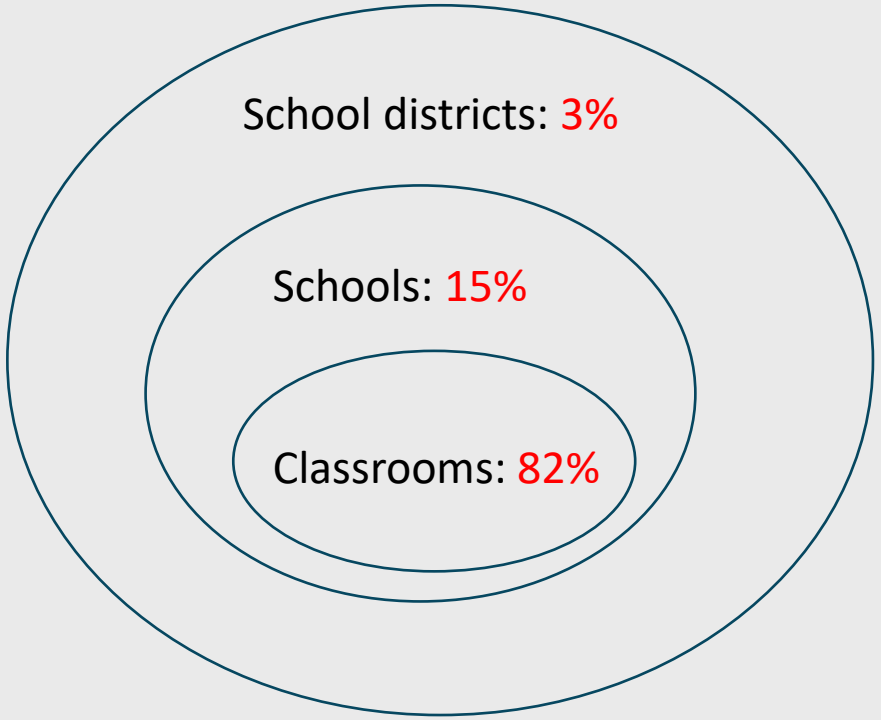
Institutional shares of variation in 4th and 5th grade math growth (North Carolina 2009-10)



Students within classrooms:0% (by definition)

Chingos, M. M., Whitehurst, G. J., & Gallaher, M. R. (2015). School Districts and Student Achievement. *Education Finance and Policy, 10(3), 378-398. doi:10.1162/EDFP_a_00167*

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Why should you care?

- Much of the research we have on the ‘effects’ of schools on cognitive function & risk of ADRD focuses on **states**
  - Avila et al. 2020; Soh et al. 2023; Walsemann et al. 2022b
  - Some looks at **districts**
    - Moorman, Greenfield, and Garcia 2019
  - Some looks at **schools**
    - Mantri et al. 2020; Moorman and Khani 2024; Sisco et al. 2015; Walsemann at al. 2022a
- Most of the action may be in **classrooms**
  - The context where most formal learning happens

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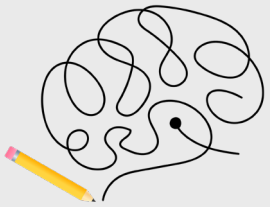

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Why should you care?

- The educational gradient in cognitive skills later in life is largely present by the end of secondary school
  - About 80% of the credential gradient in cognitive skills at age ~60 is attributable to educational opportunities and achievements observed at the end of high school (Grodsky et al., under review)
- This is *not* reducible to an immutable component of intelligence (if there is such a thing)
  - Understanding variation in learning, and how context affects it, is a critical next step

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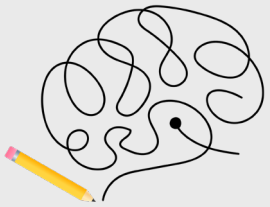

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What have we learned about educational contexts and cognitive aging?

- State-level policies (school term length, student-teacher ratio) and outcomes (average attendance) are associated with lower risk of dementia
- School segregation is associated with higher risk of dementia
- High school curriculum may be associated with cognitive function later in life
- High school 'academic press' may be associated with cognitive function later in life

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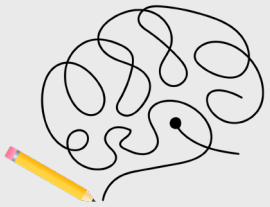

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The importance of work

- The kind of (cognitive) work we do may *mediate* the effect of education on cognitive aging (and other health outcomes)
  - Education->cognitive complexity at work
  - Complexity also varies among those with the *same* level of education

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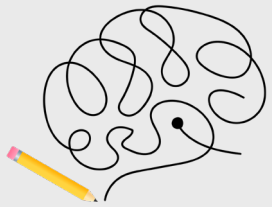

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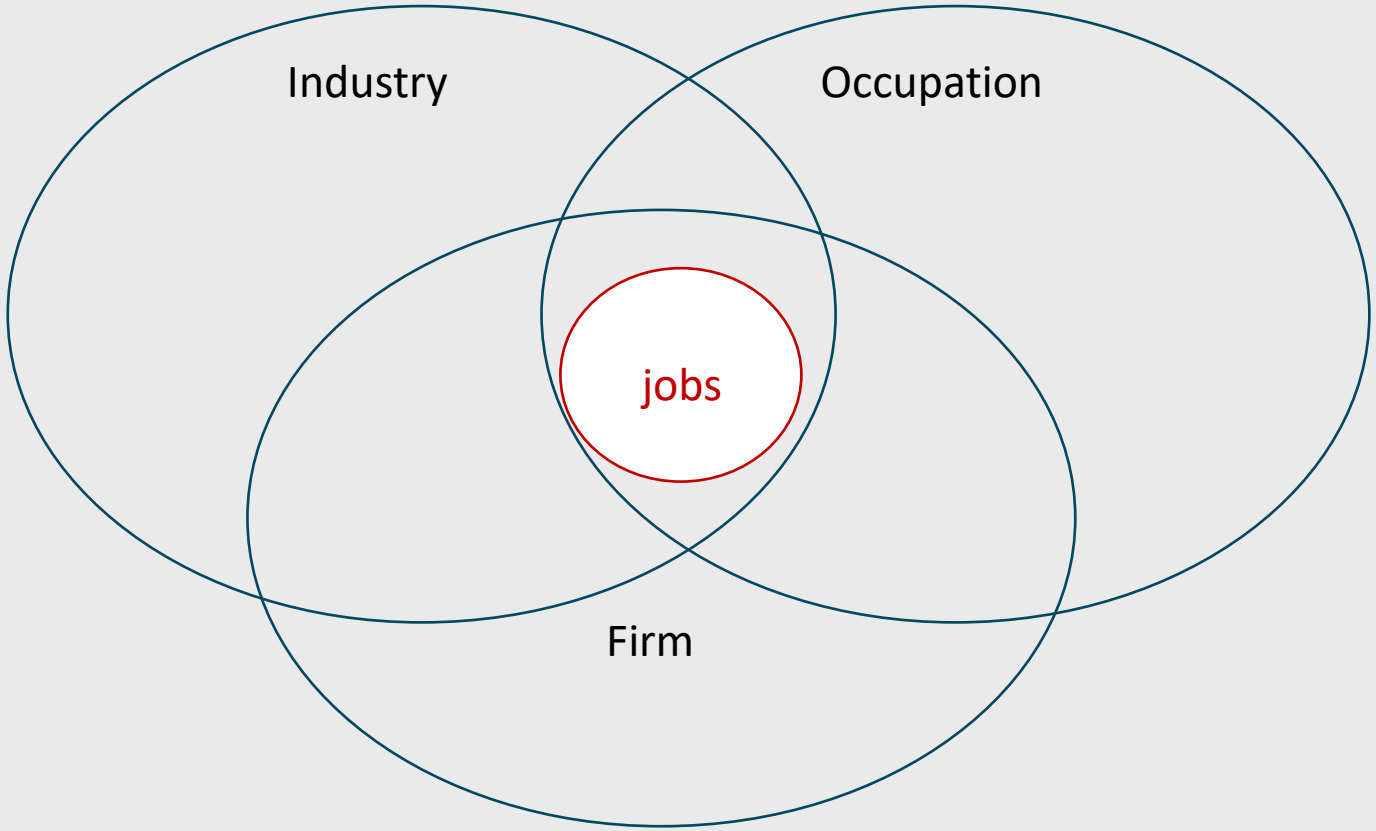
Where does work happen?



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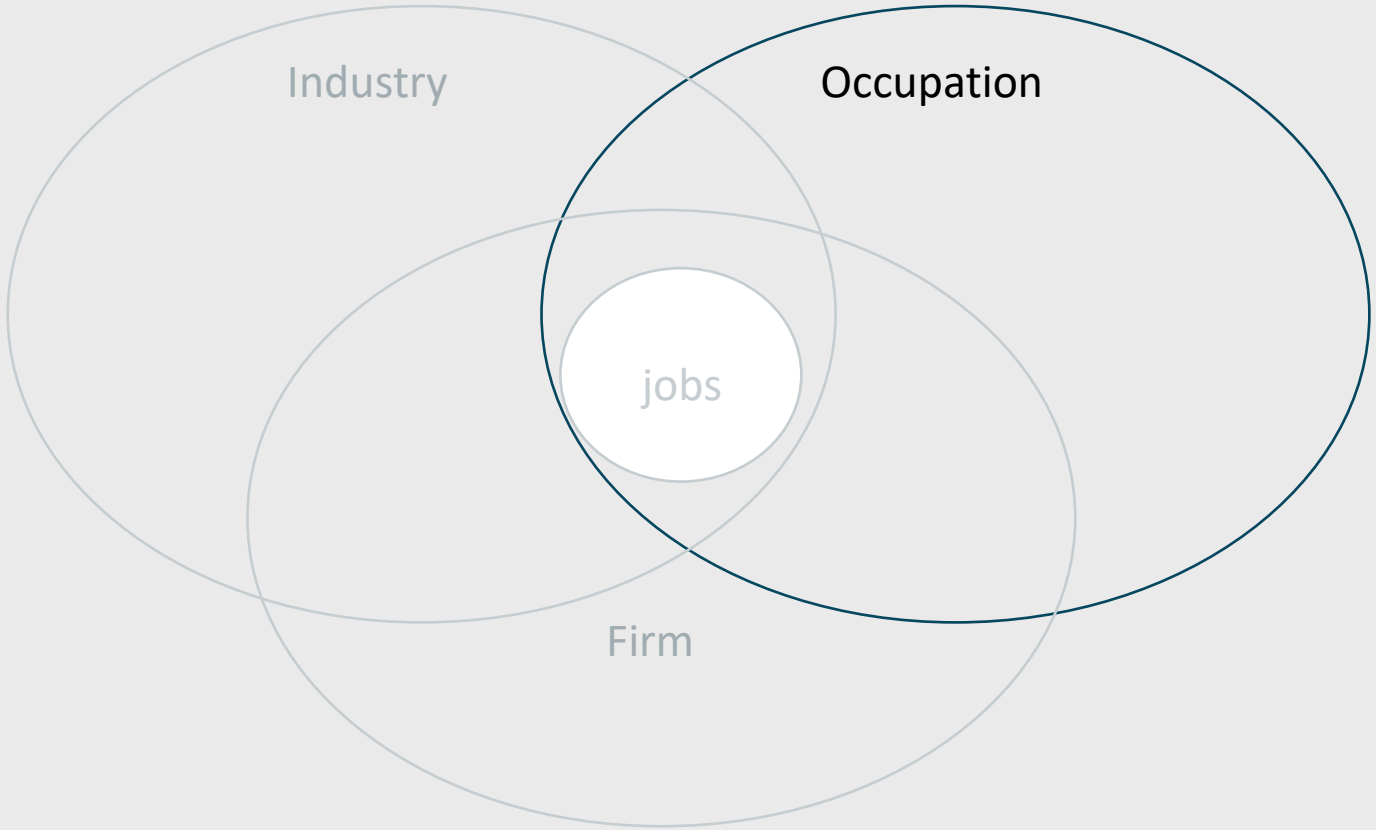
How do we measure work?



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How do we measure work?

- A few main sources of data on occupational skill demands in the literature
  - The Dictionary of Occupational Titles (DOT)
    - Occupational analyst estimates of attributes of occupations, like complexity working with data, people, and things
    - Goes back to 1939, last (partially) updated in 1991
  - O*NET replaced DOT in 2000
    - Now based on worker responses to surveys about skill demands in their jobs, aggregated to occupation level

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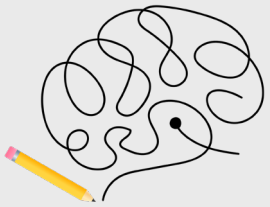

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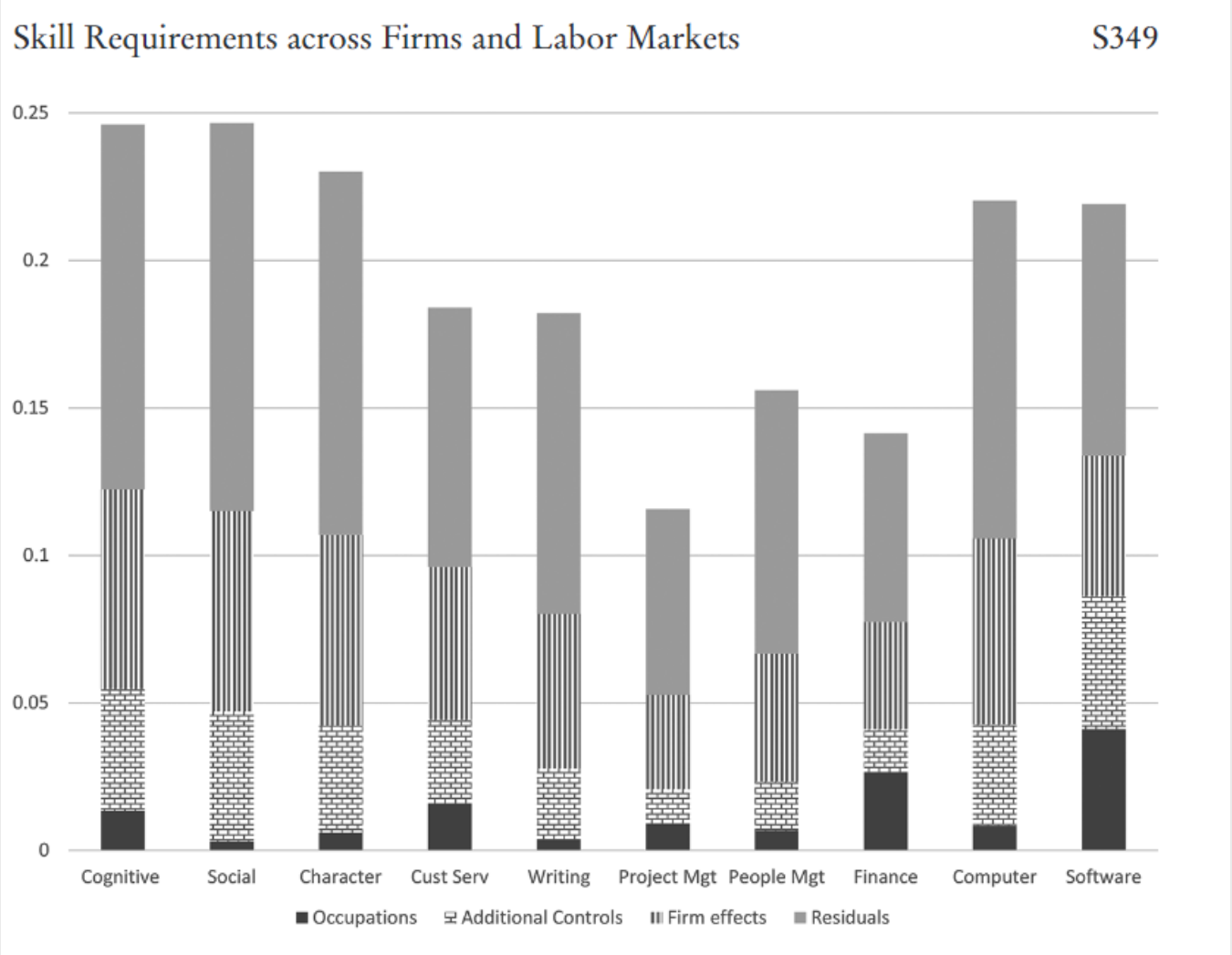
Job skill demands and occupations

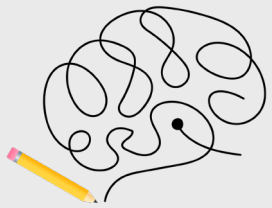
- How good a proxy is occupation?
- Deming & Kahn (2018) used Burning Glass job ads for professional jobs
- 2%-20% of variance in skill reqs between occupations



Job skill demands and occupations

- How good a proxy is occupation?
- Autor & Handel (2013) analyzed 1,333 responses to Princeton Data Improvement Initiative survey
  - Task content measured by time engaged on the job

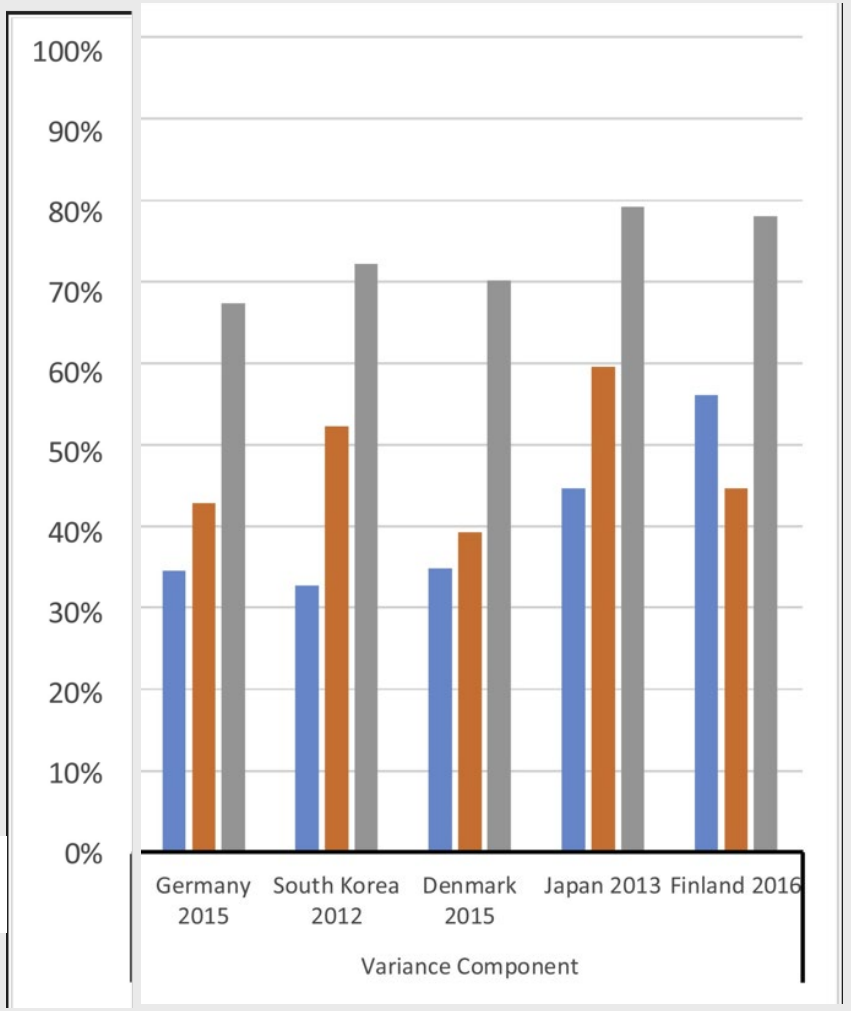
Variance in tasks due to six-digit occupation			
managing/supervising	>30 minutes solving problems	use high school+ math	routine work
46%	42%	38%	49%



Job skill demands and occupations

To the extent that earnings=f(skills)

- Avent-Holt et al. (2020) use administrative data to decompose log wages into components due to occupation, establishment, 'job'
  - Occupation accounts for 30% to 55% of variance



What have we learned about work and cognitive aging?

- Occupational complexity (data, people, things from DOT) associated with
  - Decreased hippocampal volume and increased whole-brain atrophy with given level of cognitive function (Boots et al. 2015)
  - People and data predicts cognitive skills at age 77 (Andel et al, 2007) and 70 net of IQ at age 11, years of education (Smart et al. 2014)
  - People and things reduce risk of dementia but not AD net of years of education (Kröger et al. 2008)

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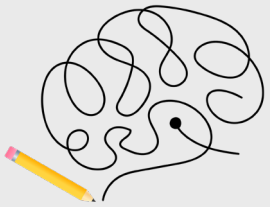

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Educational and workplace contexts

- Some observable components of context matter for cognitive function across the lifecourse
  - Characteristics of state educational policy, districts, and schools
  - The complexity of work

- Aggregation bias almost certainly leads to substantial understatements of the importance of context
  - May also contribute to bias in estimates of other coefficients in those models

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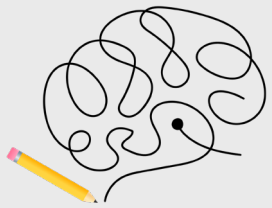

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Educational and workplace contexts

- Empirical results are consistent with cognitive reserve
  - There is space for educational policy to shape cognitive health at the population level.
  - Complex work enhances cognitive resilience over the life course.

- This is only the tip of the iceberg
  - Measuring the processes implicatec by cognitive reserve should be a priority in future work.

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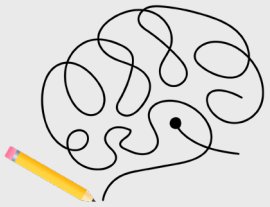

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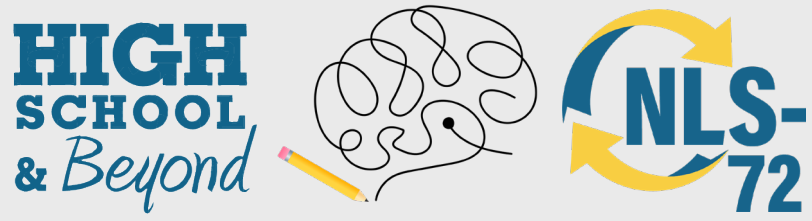
Opportunities for better data

- Ask people about their *jobs*
  - Surveys like NLSY, Add Health, HRS (for those working) can ask about work prospectively
  - Surveys like HSB:80, NLS72 can ask about work retrospectively

- Further in the future
  - State Longitudinal Data Systems (K-16) started around the mid 1990s to early 2000s
  - Incorporate samples into future studies of aging and the life course



Opportunities for better data

- Further in the future
  - Collaborate with the U.S. Department of Education to transform early childhood panel studies into studies of aging and the life course
    - The Early Childhood Study Kindergarten Cohort (1998), now ~30 years of age
    - The Early Childhood Study Birth cohort (2001) now ~23 years old

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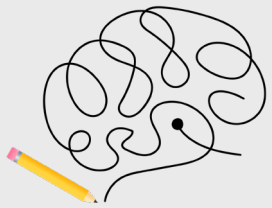

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Citations

- Andel, R., Kåreholt, I., Parker, M. G., Thorslund, M., & Gatz, M. (2007). Complexity of Primary Lifetime Occupation and Cognition in Advanced Old Age. *Journal of Aging and Health, 19(3), 397-415. doi:10.1177/0898264307300171*
- Avent-Holt, D., Henriksen, L. F., Hägglund, A. E., Jung, J., Kodama, N., Melzer, S. M., . . . Tomaskovic-Devey, D. (2020). Occupations, workplaces or jobs?: An exploration of stratification contexts using administrative data. *Research in Social Stratification and Mobility, 70. doi:https://doi.org/10.1016/j.rssm.2019.100456*
- Avila, J. F., Murchland, A. R., Glymour, M. M., & Manly, J. J. (2020). Relationship between state-level administrative school quality data, years of education, cognitive decline and dementia risk. *Alzheimer's & Dementia, 16(S10), e043633. doi:https://doi.org/10.1002/alz.043633*
- Autor, D. H., & Handel, M. J. (2013). Putting Tasks to the Test: Human Capital, Job Tasks, and Wages. *Journal of Labor Economics, 31(S1), S59-S96. doi:10.1086/669332*
- Boots, E. A., Schultz, S. A., Almeida, R. P., Oh, J. M., Koscik, R. L., Dowling, M. N., . . . Okonkwo, O. C. (2015). Occupational Complexity and Cognitive Reserve in a Middle-Aged Cohort at Risk for Alzheimer's Disease. *Archives of Clinical Neuropsychology, 30(7), 634-642. doi:10.1093/arclin/acv041*
- Deming, D., & Kahn, L. B. (2018). Skill Requirements across Firms and Labor Markets: Evidence from Job Postings for Professionals. *Journal of Labor Economics, 36(S1), S337-S369. doi:10.1086/694106*
- Grodsky, Eric, Soobin Kim, John R. Warren, Chandra Muller, Michael Culbertson and Adam M. Brickman. "Beyond Credentials: Understanding Educational Gradients in Cognitive Function at Midlife."
- Kröger, E., Andel, R., Lindsay, J., Benounissa, Z., Verreault, R., & Laurin, D. (2008). Is Complexity of Work Associated with Risk of Dementia?: The Canadian Study of Health and Aging. *American Journal of Epidemiology, 167(7), 820-830. doi:10.1093/aje/kwm382*
- Mantri, S., Nwadiogbu, C., Fitts, W., & Dahodwala, N. (2019). Quality of education impacts late-life cognition. *International Journal of Geriatric Psychiatry, 34(6), 855-862. doi:https://doi.org/10.1002/gps.5075*

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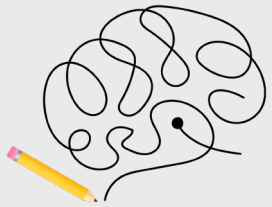

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Citations

- Moorman, S. M., Greenfield, E. A., & Garcia, S. (2019). School Context in Adolescence and Cognitive Functioning 50 Years Later. *Journal of Health and Social Behavior, 60(4), 493-508. doi:10.1177/0022146519887354*
- Moorman, S. M., & Khani, S. (2024). High School Curriculum and Cognitive Function in the Eighth Decade of Life. *Alzheimer Disease & Associated Disorders, 10.1097/WAD.0000000000000629. doi:10.1097/wad.0000000000000629*
- Sisco, S., Gross, A. L., Shih, R. A., Sachs, B. C., Glymour, M. M., Bangen, K. J., . . . Manly, J. J. (2015). The Role of Early-Life Educational Quality and Literacy in Explaining Racial Disparities in Cognition in Late Life. *The Journals of Gerontology: Series B, 70(4), 557-567. doi:10.1093/geronb/gbt133*
- Smart, E. L., Gow, A. J., & Deary, I. J. (2014). Occupational complexity and lifetime cognitive abilities. *Neurology, 83(24), 2285-2291. doi:doi:10.1212/WNL.0000000000001075*
- Soh, Y., Whitmer, R. A., Mayeda, E. R., Glymour, M. M., Peterson, R. L., Eng, C. W., . . . Gilsanz, P. (2023). State-Level Indicators of Childhood Educational Quality and Incident Dementia in Older Black and White Adults. *JAMA Neurology. doi:10.1001/jamaneurol.2022.5337*
- Walsemann, K. M., Kerr, E. M., Ailshire, J. A., & Herd, P. (2022a). Black-White variation in the relationship between early educational experiences and trajectories of cognitive function among US-born older adults. *SSM - Population Health, 19, 101184. doi:https://doi.org/10.1016/j.ssmph.2022.101184*
- Walsemann, K. M., Ureña, S., Farina, M. P., & Ailshire, J. A. (2022b). Race inequity in school attendance across the Jim Crow South and its implications for Black-White disparities in trajectories of cognitive function among older adults. *The Journals of Gerontology: Series B. doi:10.1093/geronb/gbac026*

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