High School Equivalents and Disability Status: The Role of Context

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This paper is released to inform interested parties of ongoing research and to encourage discussion of work in progress. The views expressed in this paper are those of the author and not necessarily those of the U.S. Census Bureau. Any errors are my own.
Why look at GEDs?

▶ Growing evidence of variation in the education gradient in health (e.g., Hayward et al., 2015; Hendi 2015; Zajacova & Everett 2014)
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- Growing evidence of variation in the education gradient in health (e.g., Hayward et al., 2015; Hendi 2015; Zajacova & Everett 2014)

- GEDs important to consider
  - GEDs are about 20% of new high school credentials
    (Heckman & LaFontaine 2006; National Council on Education 2013)
  - Debate about whether GED holders have outcomes equivalent to traditional high school graduates
GED and Health

- GED earners tend to have worse health than high school graduates
  - Worse physical health (Caputo 2008)
  - More likely to be obese and smoke (Kenkel, Lillard, & Mathios 2006)
  - Twice the odds of reporting fair/poor health (Zajacova & Everett 2014)
  - More likely to have a disability (Liu et al. 2012)

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GED and Health: Explanations

- Traditional explanations (Ross & Wu, 1995 and Montez & Zajacova, 2016)
  - Health-related behaviors
  - Social and psychological ("noncognitive") resources
  - Economic resources
  - Selection

- Disability: gap between an individual’s ability and environmental demands (Verbrugge and Jette 1994)
Increased focus on the geographic patterning of health and disability (e.g., Chetty et al. 2016; Ezzati et al., 2008; Howard 1999; Montez, Zajacova, & Hayward, 2017; Subramanian et al. 2001)

Variation in education-disability relationship across states (Montez, Hayward, & Wolf 2017)

Especially for people with a high school education or less
Research Questions

1. Does the relationship between GED status and disability vary across U.S. counties?
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1. Does the relationship between GED status and disability vary across U.S. counties?
2. Do individual-level characteristics (race, poverty, etc.) and/or county-level characteristics (poverty rates, unemployment rates) explain this variation?
Data

- 2012-2016 American Community Survey (ACS)
- Contextual data
  - Poverty rates: Small Area Income and Poverty Estimates (SAIPE; U.S. Census Bureau)
  - Unemployment rates: Local Area Unemployment Statistics (LAUS; Bureau of Labor Statistics)
  - Percent with a GED and percent with a HS diploma (calculated from the ACS)
  - Considering Medicaid enrollment, mortality rates, etc.
Measures

- **Education:** Highest educational attainment
  - “Regular high school diploma," “GED or alternative credential," or less than high school
  - Limit analyses to those who attained $\leq 12$ years of schooling

- **Disability**
  - Reports at least one of 6 limitations (hearing, seeing, concentrating/remembering/making decisions, walking/climbing stairs, dressing/bathing, doing errands)

- **Individual-level covariates**
  - Age, sex, race/ethnicity, poverty status, marital status, and whether born in a different state
Analytic Strategy

- Limit analyses to people who were 45-84 years old at the time of survey
- Exclude counties with an average population < 1000 persons and/or which changed boundaries during 2012-2016
  - n = 3,107 counties
- Results weighted using ACS person weight (but not replicate weights)
Analytic Strategy

\[ \ln \left( \frac{p_{ij}}{\bar{p}_{ij}} \right) = \pi_{0ij} + \pi_{1ij} \text{GED} + \pi_{2ij} \text{Less} + \delta X_i + e_{ij}, \]

\[ e_{ij} \sim N(0, \sigma_{e_0}^2) \quad (1) \]

\[ \pi_{0ij} = \beta_{00} + \gamma_{0j}, \quad \gamma_{0j} \sim N(0, \sigma_{\gamma_0}^2) \quad (2) \]

\[ \pi_{1ij} = \beta_{10} + \gamma_{1j}, \quad \gamma_{1j} \sim N(0, \sigma_{\gamma_1}^2) \quad (3) \]

\[ \pi_{2ij} = \beta_{20} + \gamma_{2j}, \quad \gamma_{2j} \sim N(0, \sigma_{\gamma_2}^2) \quad (4) \]

- Estimated models separately for men and women
- Also estimated sex-by-age models, but results did not appreciably differ
### Evidence of variation across counties

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A. Fixed Components</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>HS Diploma</td>
<td>Ref.</td>
<td>Ref.</td>
</tr>
<tr>
<td>GED</td>
<td>0.480</td>
<td>0.522</td>
</tr>
<tr>
<td></td>
<td>(0.011)**</td>
<td>(0.011)**</td>
</tr>
<tr>
<td>HS Noncompletion</td>
<td>0.334</td>
<td>0.400</td>
</tr>
<tr>
<td></td>
<td>(0.018)**</td>
<td>(0.019)**</td>
</tr>
<tr>
<td>Intercept</td>
<td>-1.114</td>
<td>-1.281</td>
</tr>
<tr>
<td></td>
<td>(0.007)**</td>
<td>(0.007)**</td>
</tr>
<tr>
<td><strong>B. Random Components</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>GED</td>
<td>0.364</td>
<td>0.333</td>
</tr>
<tr>
<td></td>
<td>(0.011)**</td>
<td>(0.010)**</td>
</tr>
<tr>
<td>HS Noncompletion</td>
<td>0.885</td>
<td>0.960</td>
</tr>
<tr>
<td></td>
<td>(0.029)**</td>
<td>(0.032)**</td>
</tr>
<tr>
<td>Corr(GED,H)</td>
<td>0.073</td>
<td>0.049</td>
</tr>
<tr>
<td></td>
<td>(0.013)**</td>
<td>(0.013)**</td>
</tr>
<tr>
<td>Intercept</td>
<td>0.150</td>
<td>0.144</td>
</tr>
<tr>
<td></td>
<td>(0.004)**</td>
<td>(0.013)**</td>
</tr>
</tbody>
</table>

Models control for age, age-squared and interview mode. Analytic sample restricted to individuals with who attained a high school education (or its equivalent) or less.

*** p < .001.
But candidate explanations do not account for this variation

Random coefficient on GED
Change in Intercept

Random intercept
Robustness Check: Core-Based Statistical Areas (n=917)
Robustness Check: Core-Based Statistical Areas

Random coefficient on GED
Discussion

- Results highlight county-level variation in the magnitude of the relationship between GED and disability
  - Appreciable variation across counties
  - "Contingent" relationship between education and health/disability
- Yet, individual- and county-level factors cannot explain this variation
Limitations

- Only GED holders who did not attain more education are captured
- Substantial heterogeneity during 2012-2016
- Analytic strategy did not explicitly account for spatial autocorrelation, etc.
- Unable to account for selection into GED and into counties
- Need to consider other individual- or county-level characteristics
Conclusion

- Relationship between GED and disability depends on where an individual lives
  - Disability as a gap between an individual's ability and environmental demands
- Additional research is necessary to unpack the importance of geography for the relationship between education and health
Thank You!

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ACS Disability Questions

1. Was deaf or had serious difficulty hearing
2. Was blind or had serious difficulty seeing even when wearing glasses
3. Had serious difficulty concentrating, remembering, or making decisions because of physical, mental, or emotional conditions
4. Had difficulty walking or climbing stairs
5. Had difficulty dressing or bathing
6. Had difficulty doing errands alone because of a physical, mental, or emotional condition