

The Importance of Cognitive Skills and Majors in Determining Future Earnings

Karly Ford
Pennsylvania State University

Junghee Choi
Pennsylvania State University

Choice of Major Determines Unemployment and Earnings

- Non-technical majors like Art (11.1%), Architecture (13.9%), and Social Science (8.9%) generally have high unemployment rates.

MAJOR GROUP	MAJOR	UNEMPLOYMENT RATES			EARNINGS		
		RECENT COLLEGE GRADUATE	EXPERIENCED COLLEGE GRADUATE	GRADUATE DEGREE HOLDER	RECENT COLLEGE GRADUATE	EXPERIENCED COLLEGE GRADUATE	GRADUATE DEGREE HOLDER
	ICES	—	4.2%	—	—	\$45,000	—
	TECHNICAL	—	3.4%	—	—	\$44,000	—
	NON-TECHNICAL	—	5.3%	—	—	\$53,000	—
	ART	13.9%	—	—	—	—	—
	ARCHITECTURE	12.6%	—	—	—	—	—
	HEATER	7.8%	—	—	—	—	—
	TECHNICAL	9.2%	—	—	—	—	—
	ART AND ARCHITECTURE	11.8%	—	—	—	—	—
	NON-TECHNICAL	12.9%	—	—	—	—	—
	ARTS	—	—	—	—	—	—

Copyright Material
Two Steps to Your Best College Major Options


50 Best College Majors for a Secure Future

Part of JST's Best Jobs Series

50 Major Descriptions

40+ Best Majors Lists, Including Majors Leading to Jobs with the Best Pay and Fastest Growth

- Find majors that lead to secure and prosperous jobs.
- Best majors lists organized by potential earnings, growth, interests, and more.
- Descriptions of majors and related jobs packed with useful, eye-opening details.



Learned Shelton, Ph.D., and The Editors © JST


Copyright Material

jst
Jobs
Success
A Career Publisher

College Majors Handbook

Third Edition

Quoted in USA TODAY



HANDBOOK
with Real Career Paths and Payoffs

The Actual Jobs, Earnings, and Trends for Graduates of 50 College Majors

"This book focuses on perhaps an even more important decision than where to go to school: what to study once you get there. . . a heavy dose of reality to what happens after you receive that diploma."

TERESA WOOD, Fox North Star Magazine

Our Contribution

- Question the seemingly tight connection between majors and earnings
- Consider the role of **cognitive skills** on earnings
- Consider 2 dimensions of Human capital
 - General (numeracy, literacy)
 - Specific (college majors)

Cognitive Skills

- The core skills your brain uses to **think, read, learn, remember, and reason**
- E.g., Numeracy, Literacy
- **General, flexible** skills that can be developed regardless of academic major

Literature Review

- Earnings vary across majors
- Rarely takes into account cognitive skills
- Tends to assume majors determine “human capital”

Research Question

- Do general cognitive skills explain within-major differences in earnings?
- How do general cognitive skills interact with specific skills acquired in majors to explain earnings?

Why it matters...

- ▣ Lead to better informed decisions
- ▣ Contribute to more productive policy discussions
- ▣ Implications for curricular development

Data & Models

PIAAC 2012/2014

- Sample
 - USA; 4-yr degree & above; Age 25-65
 - Full-time wage earners
 - Work at least 30 hrs/week
 - Exclude self-employed
 - N=970.

OLS Model

Dependent Variable: Monthly income (logged)

Independent Variables

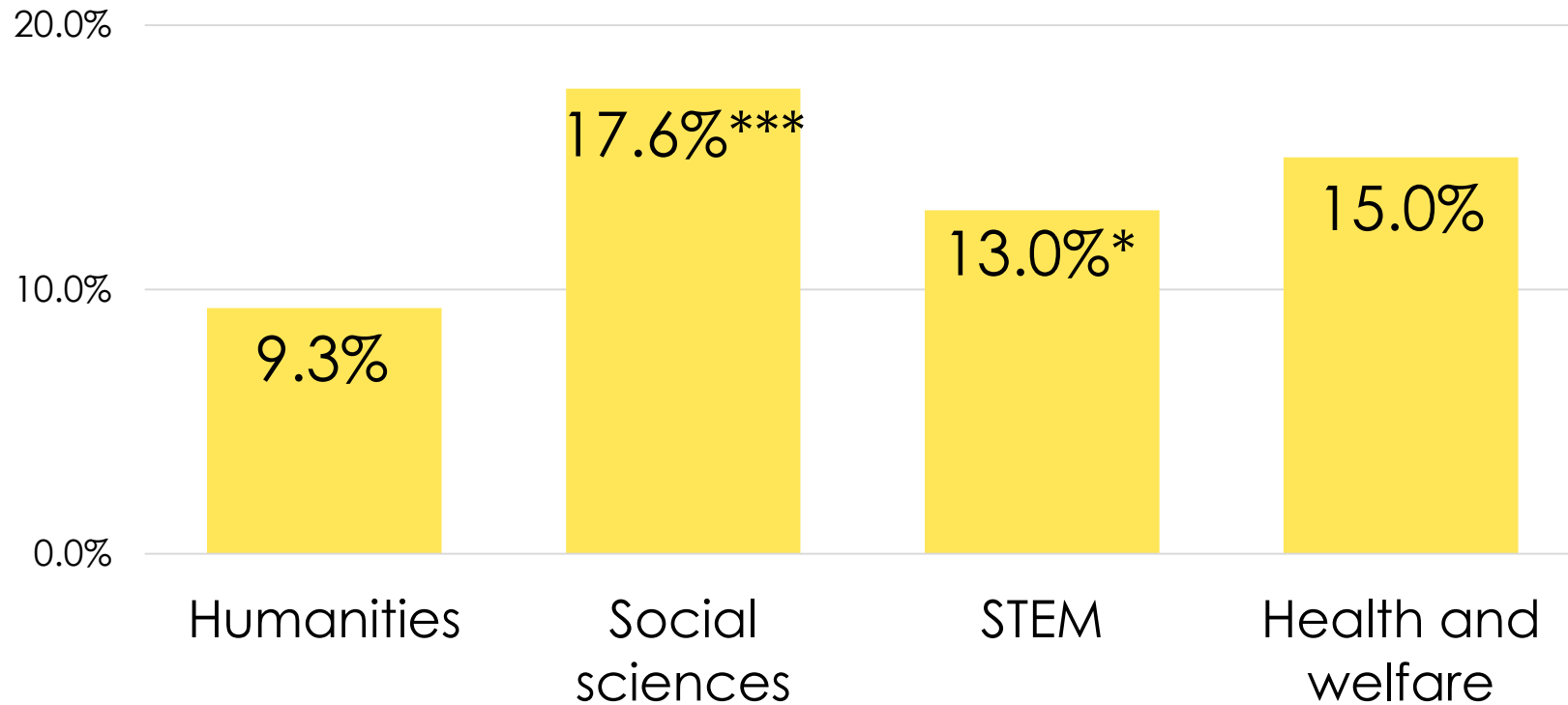
- Academic Majors (dummy variables)
 - major of highest degree attained
- Cognitive skill (standardized)
- Interaction of Majors and Cognitive skill
- *Note:* Numeracy and Literacy separately

Findings

Within-major Estimates of Cogn. Skill

Dependent Variable: Log (Monthly Earnings)	(1) Numeracy	(2) Literacy
<i>Major</i>		
Education (omitted)		
Humanities	0.144* (0.072)	0.138 (0.072)
Social sciences	0.340*** (0.057)	0.344*** (0.057)
STEM	0.309*** (0.065)	0.323*** (0.064)
Health and welfare	0.324*** (0.069)	0.310*** (0.068)
Cogn. skill (standardized)	0.119*** (0.026)	0.118*** (0.022)

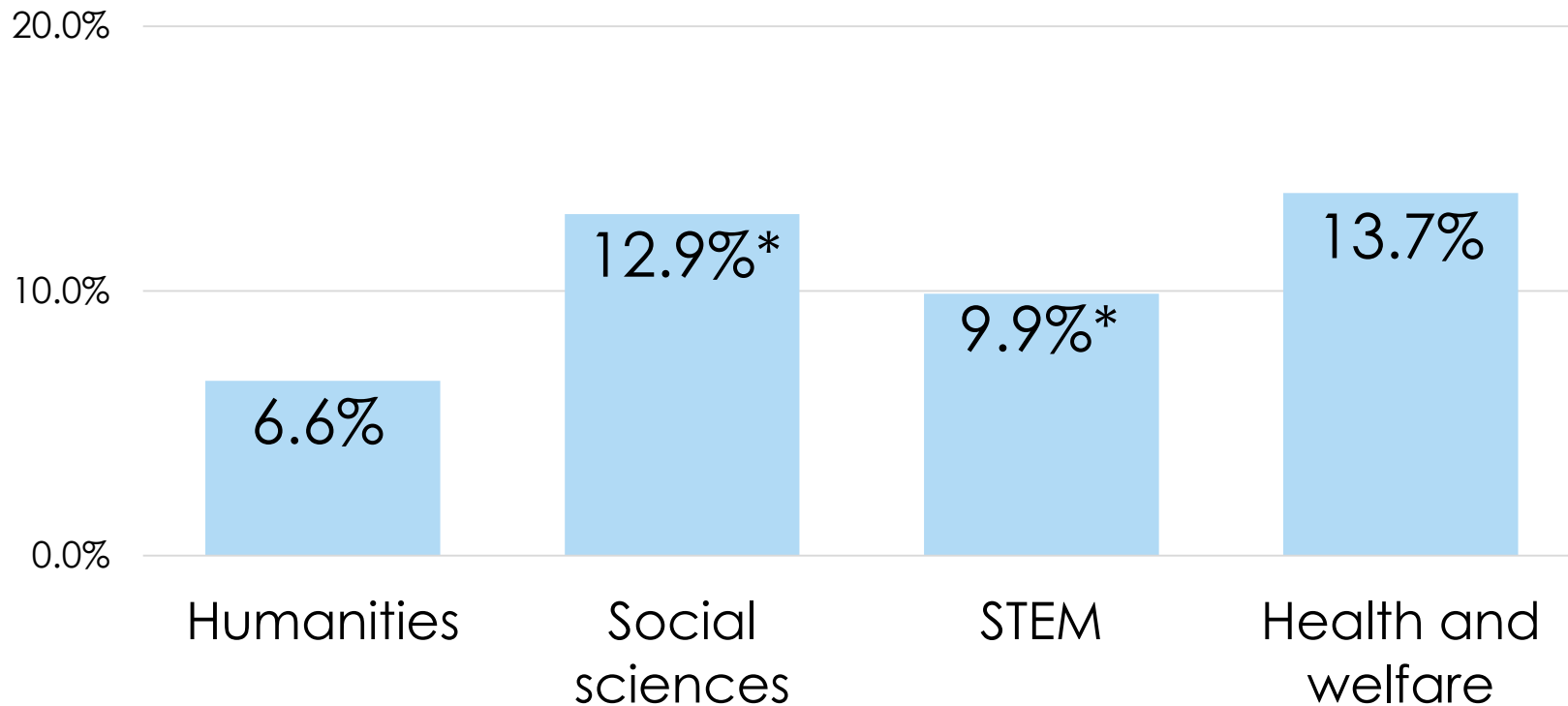
Interaction Between Majors and Numeracy



*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Reference Group: Education × Numeracy

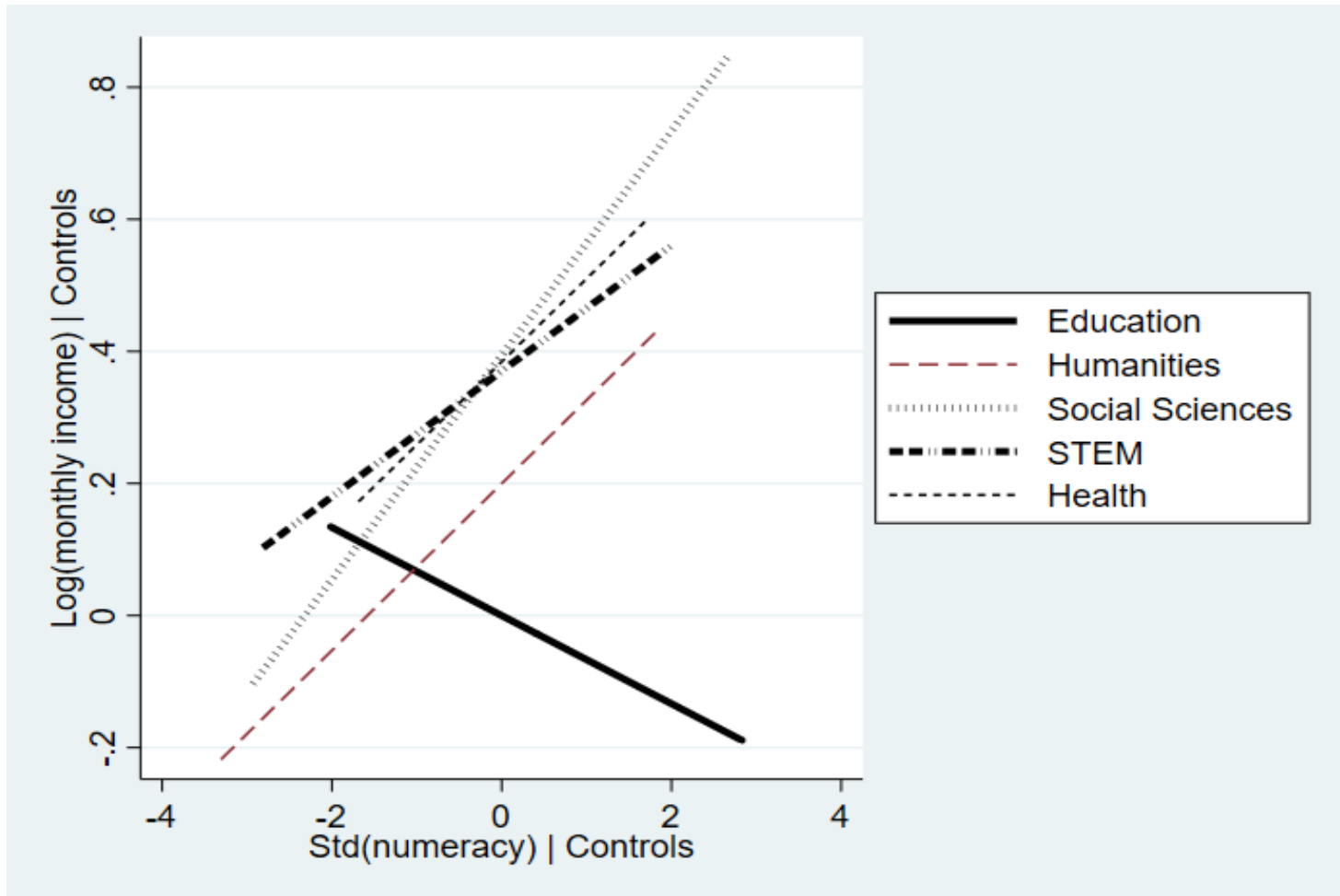
Interaction Between Majors and Literacy



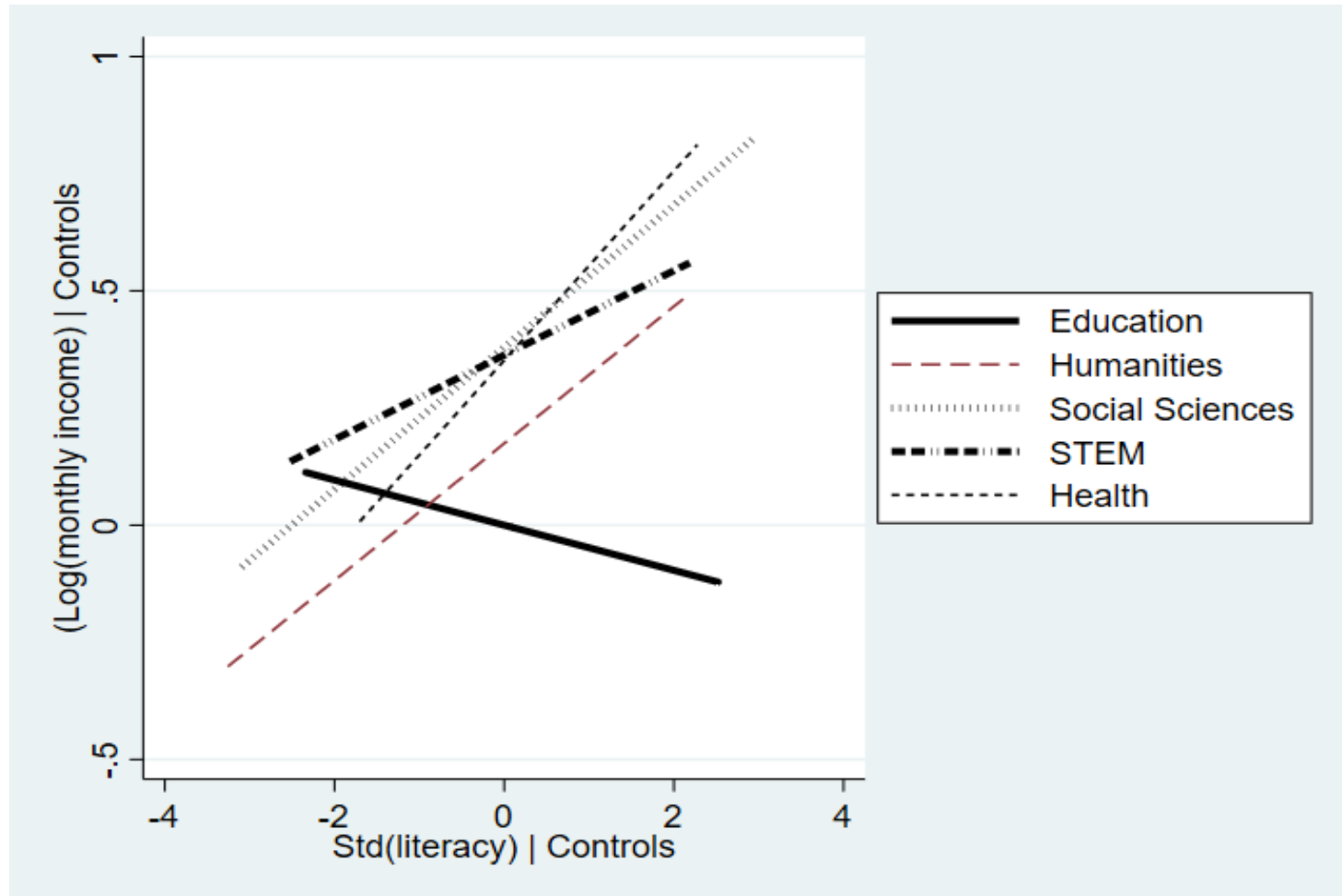
*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$

Reference Group: Education × Literacy

Numeracy and Predicted Earnings



Literacy and Predicted Earnings



Limitations

- ❑ Data does not disentangle cognitive skill developed before / during / after college
- ❑ “Academic major” is the major of the highest level of education (not necessarily bachelor’s degree)
- ❑ Do not consider institutional selectivity
- ❑ Other non-controllable factors that may affect earnings

Conclusion

- College majors are not the end all be all when thinking about earnings – cognitive skills matter
- Future research:
 - Consider skill-job match
 - Consider non-cognitive skills
 - International comparisons

Thank you.

Karly Ford: ksf16@psu.edu

Junghee Choi: jchoi@psu.edu