The Impact of Late-Career Job Loss and Genotype on Changes in Body Mass Index

Dr. Lauren Schmitz, PhD, UW-Madison, La Follette School of Public Affairs; Julie Goodwin UW-Madison, Department of Sociology, Center for Demography and Ecology; Jiacheng Miao, UW-Madison, Department of Statistics; Dr. Qiongshi Lu, PhD, UW-Madison, Department of Biostatistics and Medical Informatics; Dr. Dalton Conley, PhD, Princeton University, Department of Sociology

BACKGROUND

Job loss in later life and health: There is extensive literature in the social sciences on the detrimental effects of losing a job on health, especially for older adults. Later life job loss is especially corrosive because it leads to scarring effects that are associated with longer periods of unemployment, gaps in health insurance, elevated levels of stress, and higher rates of depression and anxiety (Gallo et al., 2000; Gallo et al., 2004; Gallo et al., 2006; Strully, 2009; Deb et al., 2011; Marcus, 2014). However, researchers have found mixed results when using body mass index (BMI) as the primary outcome (e.g. Salm, 2009).

Genetic heterogeneity: These studies do not account for heterogeneity by genotype, or the possibility that changes in BMI over time have an underlying genetic component. In this project, we use both a traditional PGS for BMI that captures the heterogeneity in mean BMI (mPGS) and a variance PGS (vPGS) for BMI that captures population-level differences in BMI plasticity that are not driven by mean effects.

RESEARCH QUESTION

Does genotypic heterogeneity (using a BMI mPGS and vPGS), interacted with exogenous job loss, affect BMI?

METHODS

Data: Health and Retirement Study (HRS)
mPGS: Yengo et al. 2018 (also test Loh et al. PGS)
vPGS: Young et al. 2018
Method: Gene by environment interaction

- **Genetic component**: mPGS and vPGS
- **Environment**: whether a respondent lost their job due to a branch or plant closure
- Use a difference-in-difference model with propensity score matching between the treated (experienced job loss) and control (did not experience job loss) to be doubly robust against endogeneity

Outcome: BMI

Model:

$$E[BMI_t \mid W(X)] = \alpha BC_{i(t-1)} + \beta mPGS_i + (\delta mPGS_i * BC_{i(t-1)}) + \zeta vPGS_i + (\theta vPGS_i * BC_{i(t-1)}) + \rho BMI_{i(t-1)} + X'_{it-1}\omega + \varepsilon$$

Where BMI = Body mass index; W(X) = propensity score matching weights; BC = business closure; mPGS = mean polygenic score for BMI; vPGS = variance polygenic score for BMI; X = vector of covariates standard in job loss literature and controls for population stratification in the genotype data (first ten principal components).

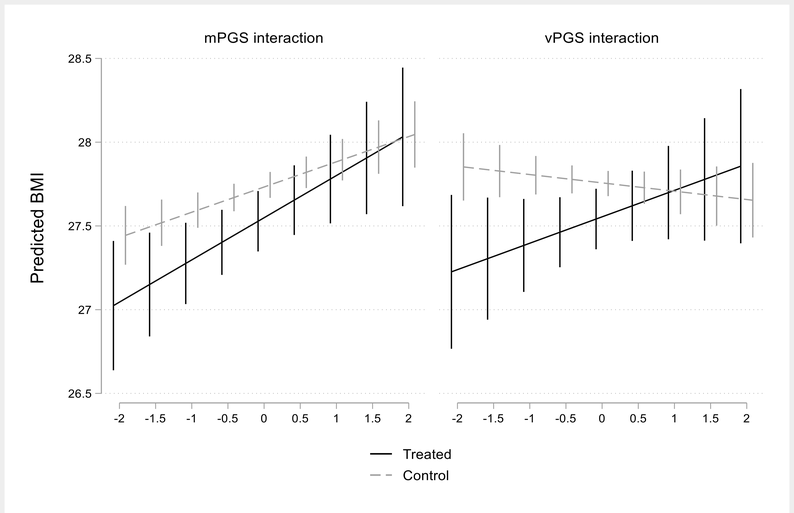
RESULTS

Table 1. Effects of job loss due to a business closure, mPGS, and vPGS on changes in BMI

VARIABLES	1 Without PGSs, full sample	2 Without PGSs, analytic sample	3 With mPGS	4 With mPGS inx	5 Full model
Business closure	0.124	-0.044	-0.101	-0.104	-0.105
	(0.108)	(0.104)	(0.104)	(0.103)	(0.102)
BMI (t-1)	0.944***	0.937***	0.925***	0.925***	0.926***
	(0.005)	(0.009)	(0.025)	(0.025)	(0.024)
mPGS			0.200***	0.151***	0.151***
			(0.051)	(0.043)	(0.042)
Business closure x mPGS				0.101	0.089
				(0.098)	(0.098)
HLMM vPGS					-0.050
					(0.051)
Business closure x HLMM vPGS					0.208**
					(0.094)
Constant	2.648***	2.608***	2.919***	2.865**	2.821***
	(0.341)	(0.447)	(1.122)	(1.125)	(1.119)
Observations	18,855	11,934	11,934	11,934	11,934
Treated	604	375	375	375	375
R-squared	0.87	0.882	0.868	0.868	0.869

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Figure 1. Effect of mPGS and vPGS interactions on predicted BMI in treated and control groups



FINDINGS

Regression analysis results: Table 1 presents nested models 1-5. Model 1 is the regression of BMI on job loss, controlling for BMI at the wave prior to when the respondent lost their job for all European ancestry respondents who were assigned treatment or control (n=18,855). Model 2 is the same regression but on the analytic sample, i.e., those who matched in the propensity score matching procedure (n=11,934). Model 3 includes the mPGS, model 4 includes the interaction of the mPGS with the job loss variable, and model 5, or the full model, includes the vPGS and the interaction between the vPGS and the job loss variable. Here we see that the job loss and vPGS interaction coefficient is positive and statistically significant, suggesting that the level of one's vPGS moderates the effect of job loss on changes in BMI. Notably, the mPGS interaction is not significant.

Interaction figures: Figure 1 presents the mPGS and vPGS interactions from model 5 in Table 1, with predicted BMI on the y-axis and the standardized mPGS and vPGS on the x-axis. On the left is the plotted mPGS interaction. Here we see there is no difference between treated (i.e. experienced job loss; solid black line) and control (i.e. did not experience a job loss; dashed gray line). On the right is the plotted vPGS interaction. For those who are in the treatment group and have low vPGSs, have lower BMIs compared to those in the control group.

CONCLUSIONS

Our findings suggest that older adults with a low BMI vPGS who experience a job loss later in life are more likely to lose weight compared to their continuously employed counterparts. Given that weight loss is especially detrimental for older adults and may increase frailty, these results have important policy implications. In particular, given the recent unemployment shocks from the COVID-19 pandemic, policy should aim to increase or extend unemployment benefits for older workers to ensure their health and well-being.

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