Supporting Information

Seeman et al. 10.1073/pnas.1710502115

SI Methods

Data. Table S1 provides descriptive statistics for the MESA cohort included in the current analyses, stratified by age (<65 vs. 65+) as of October 2008.

Participants. MESA is a prospective cohort study of the determinants of subclinical cardiovascular disease in a multiethnic, population-based sample of men and women. Participants (n = 6,814) were recruited in 2000 at ages 45 to 84 y from six large geographical areas in the United States, centered around Baltimore; Chicago; Forsyth County, NC; Los Angeles; New York; and St. Paul. The baseline examination took place between July 2000 and August 2002; examination 2 from September 2002 to February 2004; examination 3 from March 2004 to September 2005; examination 4 from September 2005 to May 2007; and examination 5 from June 2010 to April 2012. Among those screened and eligible for the baseline examination, the participation rate was 59.8%. Of the original cohort, retention rates, respectively, for examinations 2 to 5 were 92, 89, 87, and 76%, reflecting extensive tracking of all respondents, including those who moved. Details of the study design and recruitment for MESA have been published (1).

Outcomes. Main outcomes for this study are blood pressure (BP) and blood glucose levels, along with changes in the use of antihypertensive and antiglycemic medications from pre- to post-recession (possibly due to changes in health insurance and/or economic constraints on ability to purchase medications).

Measured blood pressure and glucose levels. Blood pressure measures included systolic blood pressure (SBP; based on the second and third of three resting, seated readings), pulse pressure (PP) [i.e., SBP minus diastolic blood pressure (DBP), an independent predictor of cardiovascular event risk] (2, 3), and mean arterial pressure [MAP = (SBP/3) + (2*DBP/3)] as an index of average arterial BP (4). Blood glucose levels (mg/dL) were only considered for those who fasted for at least 10 h, and the natural log of glucose level was used for the analyses due to its skewed distribution (5). All outcomes are transformed into rates of growth, relative to the baseline level.

Medication use. We also examined an indicator for whether or not any medication was used to control BP. To capture intensity of treatment, we examined a count of the number of classes of antihypertensive medications used (angiotensin-converting enzyme inhibitors, angiotensin receptor blockers, beta blockers, calcium channel blockers, diuretics, vasodilators). Due to the small number of people using more than three classes of BP medications, this latter variable is coded to indicate use of 0, 1, 2, or 3+ classes of medications. For glucose control, we examined, first, whether or not any antiglycemic medication (oral or insulin) is used and, second, an ordinal variable to capture intensity of treatment: no medication, oral antiglycemic medications only, and insulin use (with or without oral medications).

Covariates. All models include a fixed effect for each individual to take into account all time-invariant factors that might affect the trajectory of health outcomes during the study period. Potential time-varying confounders included in the models are employment status, income, and medication use. Employment status, which was assessed at the first MESA examination and updated in subsequent examinations, is categorized as employed full-time; employed part-time; homemaker; retired while volunteering/working; retired and not working; and unemployed. Each respondent reported a household income in 1 of 13 categories; income is expressed in constant 2010 US$ using the midpoint of each category and the Bureau of Labor Studies all urban consumer price index. Missing income at any examination (n = 665 instances) was imputed as the income value corresponding to the percentile of the individual's income at the closest available consecutive examination, with priority given to a prior examination. Data at examination 5 (2010 to 2012) was not used to impute missing income at previous examinations, since our main hypothesis is that income as of 2010 to 2012 was influenced by the GR. Income was not obtained at examination 4, so examination 4 (2005 to 2007) income was set to examination 3 (2004 to 2005) values in real terms.

In models of actual BP and glucose levels, we also took account of the extent of medication use. Antihypertensive medication was included with three terms: one for any use of medication (vs. no use), and the other indicating the number of classes of medications used (2 classes, ≥3 classes, vs. only 1). Diabetes medication use was included with two terms: one for indicating use of any medication (oral hypoglycemic or insulin), and the other indicating use of insulin (an indicator of higher intensity treatment). Like the terms for intensity of BP medication (number of classes of medication), these indicators allow us to account for intensity of diabetes medication.

1. Bild DE, et al. (2002) Multi-Ethnic Study of Atherosclerosis: Objectives and design. *Am J Epidemiol* 156:871–881.
2. Blacher J, et al. (2000) Pulse pressure not mean pressure determines cardiovascular risk in older hypertensive patients. *Arch Intern Med* 160:1085–1089.
3. Franklin SS, Khan SA, Wong ND, Larson MG, Levy D (1999) Is pulse pressure useful in predicting risk for coronary heart disease? The Framingham Heart Study. *Circulation* 100:354–360.
4. Palaniappan L, Simons LA, Simons J, Friedlander Y, McCallum J (2002) Comparison of usefulness of systolic, diastolic, and mean blood pressure and pulse pressure as predictors of cardiovascular death in patients >/=60 years of age (The Dubbo Study). *Am J Cardiol* 90:1398–1401.
5. Wallace TM, Levy JC, Matthews DR (2004) Use and abuse of HOMA modeling. *Diabetes Care* 27:1487–1495.

Table S1. Descriptive statistics for key variables stratified by age as of October 2008 (onset of the Great Recession)

	Age <65 October 2008 (n = 2,050)			Age ≥65 October 2008 (n = 2,549)		
	Baseline (2000)	Interim examinations	Change from baseline	Baseline (2000)	Interim examinations	Change from baseline
Biomarkers						
Blood pressure, mmHg						
Systolic blood pressure	117.7		1.5	129.7		−2.0
(SD)	(17.6)		(18.5)	(20.2)		(22.3)
Pulse pressure	45.5		3.6	58.1		2.9
(SD)	(11.7)		(12.7)	(16.3)		(16.1)
Mean arterial pressure	87.4		−0.9	91.0		−3.9
(SD)	(11.8)		(11.7)	(11.9)		(13.2)
Fasting glucose, mg/dL	92.5		9.7	97.0		4.7
(SD)	(24.6)		(23.0)	(24.6)		(21.4)
Medication use						
Hypertension, %	22.4		19.8	43.0		21.7
Insulin or oral, % hypoglycemics	5.1		9.3	10.4		6.8
Sociodemographics						
Age as of October 2008, y		57.8			73.7	
(SD)		(3.8)			(5.9)	
Male, %	47.2			46.5		
Education at baseline						
Not completed college, %	57.2			63.3		
Completed college, %	42.8			36.7		
Homeownership (2003–2004), %		70.8			71.8	

Table S2. Estimates of the impact of the Great Recession on blood pressure and glucose by education and homeownership: Offsets relative to the postrecession level predicted by individual-specific prerecession aging trends

	On medication postrecession			Not on medication postrecession		
	<65 y	≥65 y	Effect difference (<65 − ≥65)	<65 y	≥65	Effect difference (<65 − ≥65)
Education (completed vs. not completed college) Offset [SE] in blood pressure postrecession, mmHg						
Systolic blood pressure						
Completed college	13.18	12.30	0.88	4.64	3.94	0.70
	[2.01]*	[1.70]*	[2.63]	[0.87]*	[1.31]*	[1.57]
Not completed college	12.39	5.68	6.71	4.34	2.12	2.22
	[1.62]*	[1.16]*	[1.99]*	[0.84]*	[1.25]	[1.51]
Effect difference	0.79	6.62		0.30	1.83	
(Complete − not comp.)	[2.58]	[2.06]*		[1.21]	[1.81]	
Pulse pressure, mmHg						
Completed college	9.25	8.22	1.03	3.60	3.59	0.01
	[1.31]*	[1.15]*	[1.75]	[0.61]*	[0.94]*	[1.12]
Not completed college	7.46	4.45	3.01	4.08	3.6	0.47
	[1.12]*	[0.86]*	[1.41]*	[0.59]	[0.96]*	[1.12]
Effect difference	1.80	3.78		−0.48	−0.02	
(Complete − not comp.)	[1.73]	[1.44]*		[0.85]	[1.34]	
Mean arterial pressure, mmHg						
Completed college	7.04	6.78	0.27	2.30	1.62	0.68
	[1.25]*	[1.02]*	[1.61]	[0.56]*	[0.79]*	[0.97]
Not completed college	7.33	2.79	4.54	1.63	−0.35	1.98
	[1.03]*	[0.67]*	[1.23]*	[0.55]*	[0.71]	[0.90]*
Effect difference	−0.29	3.99		0.67	1.97	
(Complete − not comp.)	[1.62]	[1.22]*		[0.79]	[1.06]	
Offset [SE] in log (blood glucose) postrecession (log mg/dL), scaled by 100						
Completed college	−3.07	3.91	−6.98	1.20	1.01	0.19
	[6.01]	[5.81]	[8.35]	[0.58]*	[0.67]	[0.88]
Not completed college	15.75	5.99	9.76	1.67	0.24	1.43
	[5.52]*	[3.91]	[6.76]	[0.62]*	[0.65]	[0.90]
Effect difference	−18.81	−2.07		−0.48	0.77	
(Complete − not comp.)	[8.16]*	[7.00]		[0.85]	[0.93]	
Homeownership prerecession						
Offset [SE] in blood pressure postrecession, mmHg						
Systolic blood pressure						
Own home	12.96	8.99	3.97	4.61	2.08	2.53
	[1.52]*	[1.15]*	[1.90]*	[0.73]*	[1.03]*	[1.26]*
Do not own home	11.98	5.66	6.32	4.31	5.65	−1.34
	[2.32]*	[1.76]*	[2.91]*	[1.09]*	[1.90]*	[2.19]
Effect difference	0.98	3.33		0.30	−3.57	
(Own − not own home)	[2.76]	[2.10]		[1.31]	[2.16]	
Pulse pressure						
Own home	8.08	6.15	1.93	3.76	2.96	0.79
	[1.03]*	[0.81]*	[1.32]	[0.51]*	[0.76]*	[0.92]
Do not own home	8.22	5.04	3.18	4.16	5.73	−1.57
	[1.52]*	[1.33]*	[2.02]	[0.75]*	[1.48]*	[1.66]
Effect difference	−0.15	1.11		−0.40	−2.77	
(Own − not own home)	[1.84]	[1.55]		[0.85]	[1.36]	
Mean arterial pressure, mmHg						
Own home	7.59	4.93	2.66	2.14	0.10	2.04
	[0.94]*	[0.68]*	[1.16]*	[0.47]*	[0.61]	[0.77]*
Do not own home	6.33	2.33	4.00	1.56	1.81	−0.25
	[1.51]*	[1.00]*	[1.81]*	[0.71]*	[1.06]	[1.28]
Effect difference	1.26	2.60		0.58	−1.71	
(Own − not own home)	[1.77]	[1.21]*		[0.85]	[1.22]	
Offset [SE] in log (blood glucose) postrecession (log mg/dL), scaled by 100						
Own home	8.76	11.11	−2.35	1.28	0.40	0.88
	[5.76]	[4.93]*	[7.58]	[0.50]*	[0.59]	[0.77]
Do not own home	11.32	−2.84	14.17	1.74	1.01	0.73
	[6.65]*	[4.03]	[7.77]*	[0.80]*	[0.86]	[1.17]
Effect difference	−2.56	−13.95		−0.46	−0.61	
(Own − not own home)	[8.79]	[6.37]*		[0.95]	[1.04]	

*$P < 0.05$. All models include controls for time-varying covariates and individual-specific fixed effects (for the rate of change in the biomarker since baseline). SEs reported in brackets are robust to heteroscedasticity. Changes in log glucose, scaled by 100, can approximately be interpreted as percentage change. The approximation is better the smaller the change; approximation errors are typically in the third significant digit.