The Relative Impact of Socioeconomic Status on Blood Pressure: Lessons from a Large Scale Survey of Young Adults

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The importance and etiology of hypertension

- Hypertension (HTN) - one of the most common cardiovascular risk factors
- Essential hypertension - largely unknown etiology (genetic, hormonal and environmental factors)
- Socioeconomic status (SES) might play a role:
  - Education
  - Income
  - Social position
  - Type of work

Data from previous studies

- Conflicting results
- Galobardes et al (2003): low SES is associated with higher prevalence of hypertension
- Mathews et al (2002): negative correlation between SES and blood pressure
- Other studies: no association
- In summary: no definite conclusions as to the impact of SES on blood pressure

Study objectives

- To quantify the relative impact of SES on blood pressure
- To compare this association with the effects of age and BMI (strong and well-established independent risk factors for hypertension)

Methods (1) – study population

- Officers of the Israel Defense Force career service personnel
- Wide range of occupations and education
- Assessed during periodic medical examination (93% compliance)
- **Included**: 1991-1999, males only, aged 25-45 years (n=11,053)
- Subjects with HTN were not excluded

Methods (2) – data analysis

- **Military rank** represents two major components of SES: income and position
  - Categorized into 3 groups
- Type of work
  - Physically active Vs. office/administrative work
- Level of education
  - Academic VS. non-academic

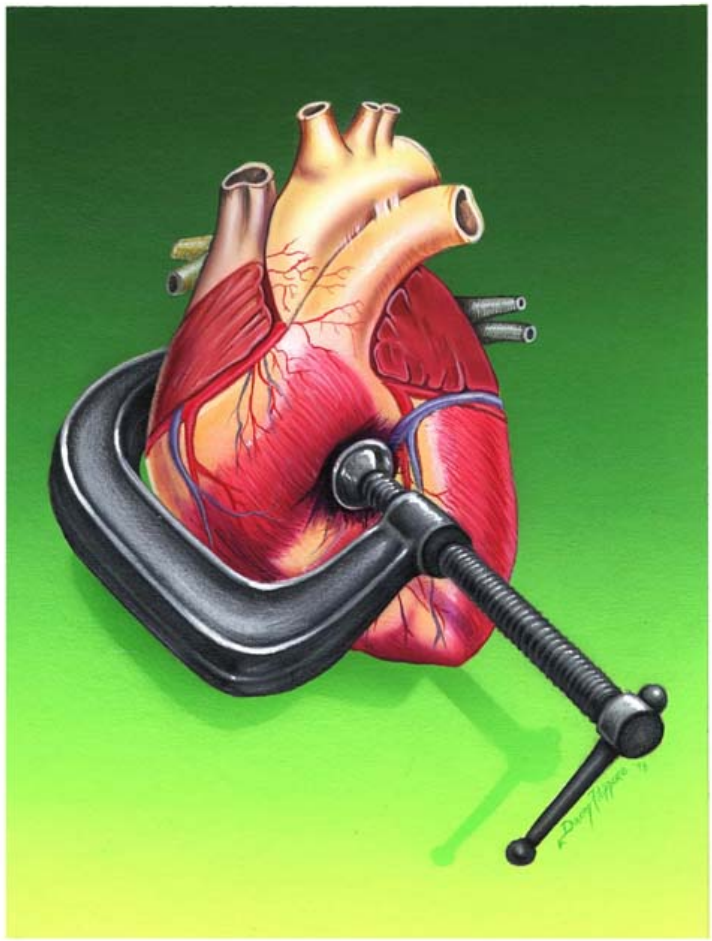
Characteristics of study participants (n=11,053)

Variable		Variable (cont')	
Age (years, mean ± SD)	33.8±6.6	Rank	
Origin		Low (%)	42.7
Israel (%)	78.0	Intermediate (%)	52.7
Western (%)	13.1	High (%)	4.7
Eastern (%)	8.9	Type of work	
Father's origin		Physical (%)	9.6
Israel (%)	22.8	Administrative (%)	90.4
Western (%)	40.9	Level of education	
Eastern (%)	36.3	Non-academic (%)	27.7
		Academic (%)	72.3

Methods (3) – statistical analysis

- Mean systolic and diastolic blood pressure (SBP & DBP) as the main outcome variables
- Stepwise ANOVA models – SES variables, origin, age and BMI
- Hypertension (SBP≥140 mmHg and/or DBP≥90 mmHg) as a secondary outcome variable

Results



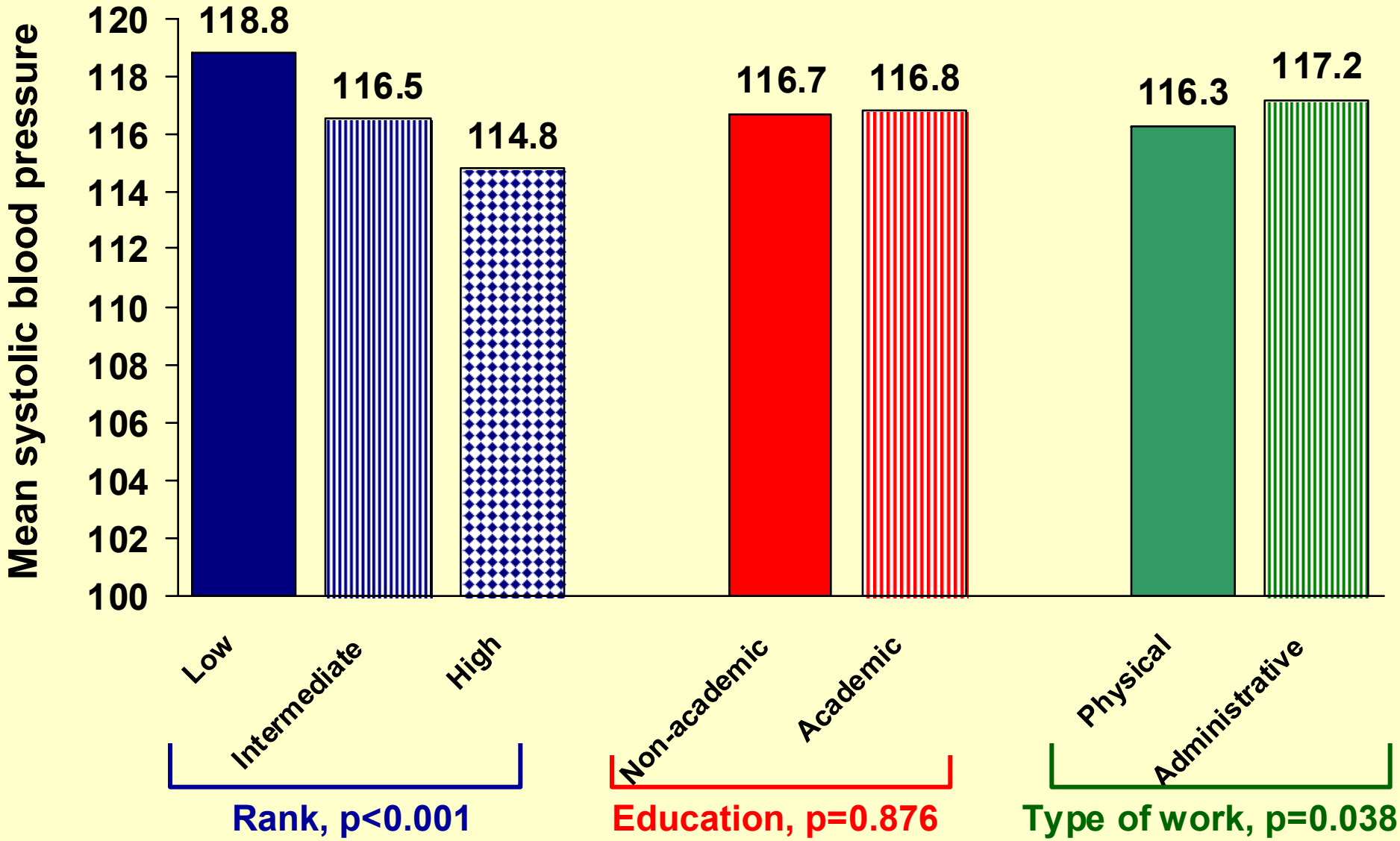
Age-adjusted mean SBP & DBP by SES variables

	SBP		DBP	
	Mean	P-value	Mean	P-value
Rank				
Low	119.3	<0.001	77.0	0.001
Intermediate	117.1		75.6	
High	115.7		76.0	
Education				
Non-academic	118.1	0.762	76.4	0.312
Academic	118.0		76.2	
Type of work				
Physical	117.1	0.019	76.1	0.539
Administrative	118.1		76.3	

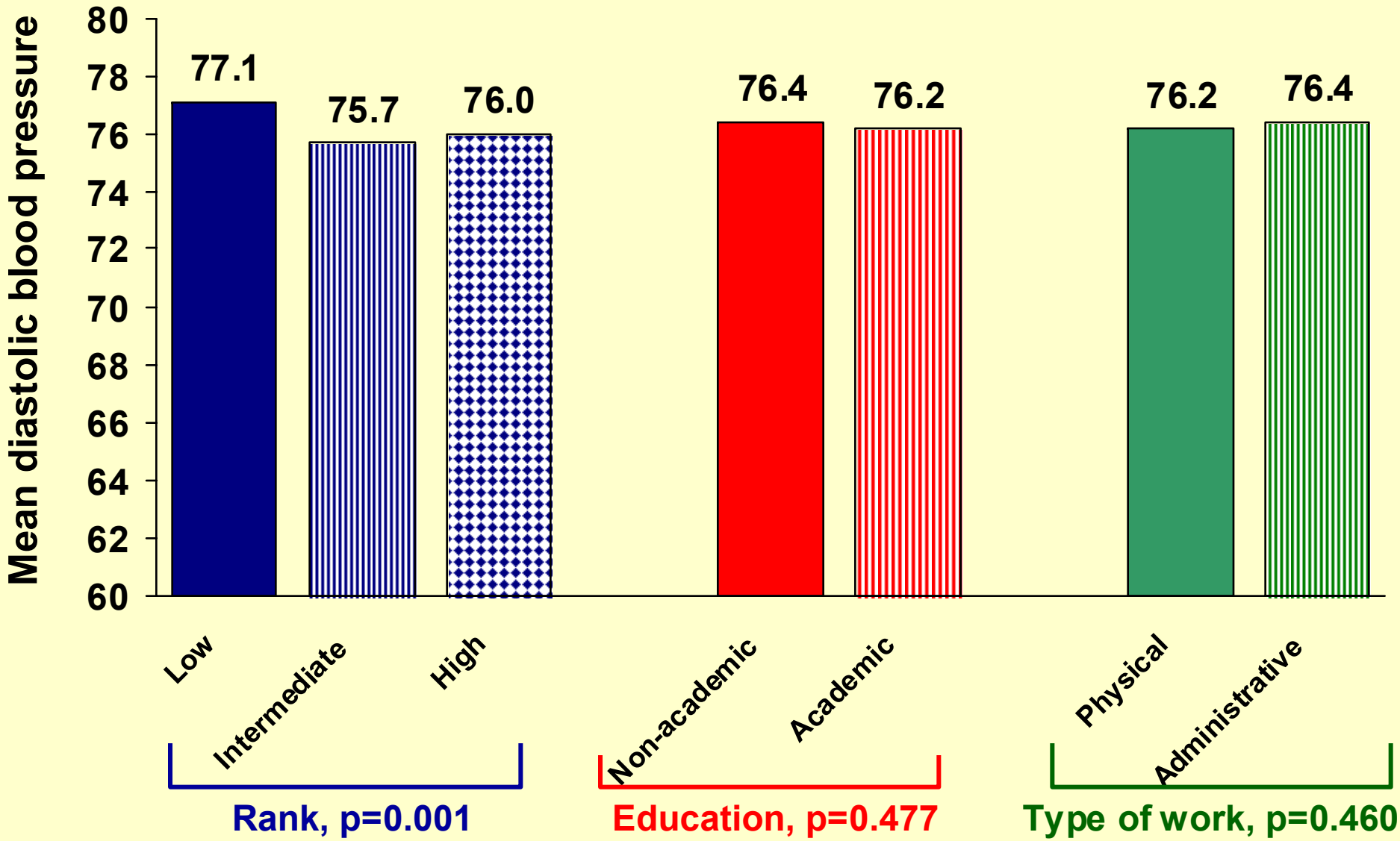
Age and SES adjusted mean SBP & DBP by SES variables

	SBP		DBP	
	Mean	P-value	Mean	P-value
Rank				
Low	118.9	<0.001	76.9	0.002
Intermediate	116.9		75.7	
High	115.6		76.1	
Education				
Non-academic	117.1	0.961	76.3	0.436
Academic	117.1		76.1	
Type of work				
Physical	116.8	0.095	76.1	0.660
Administrative	117.5		76.4	

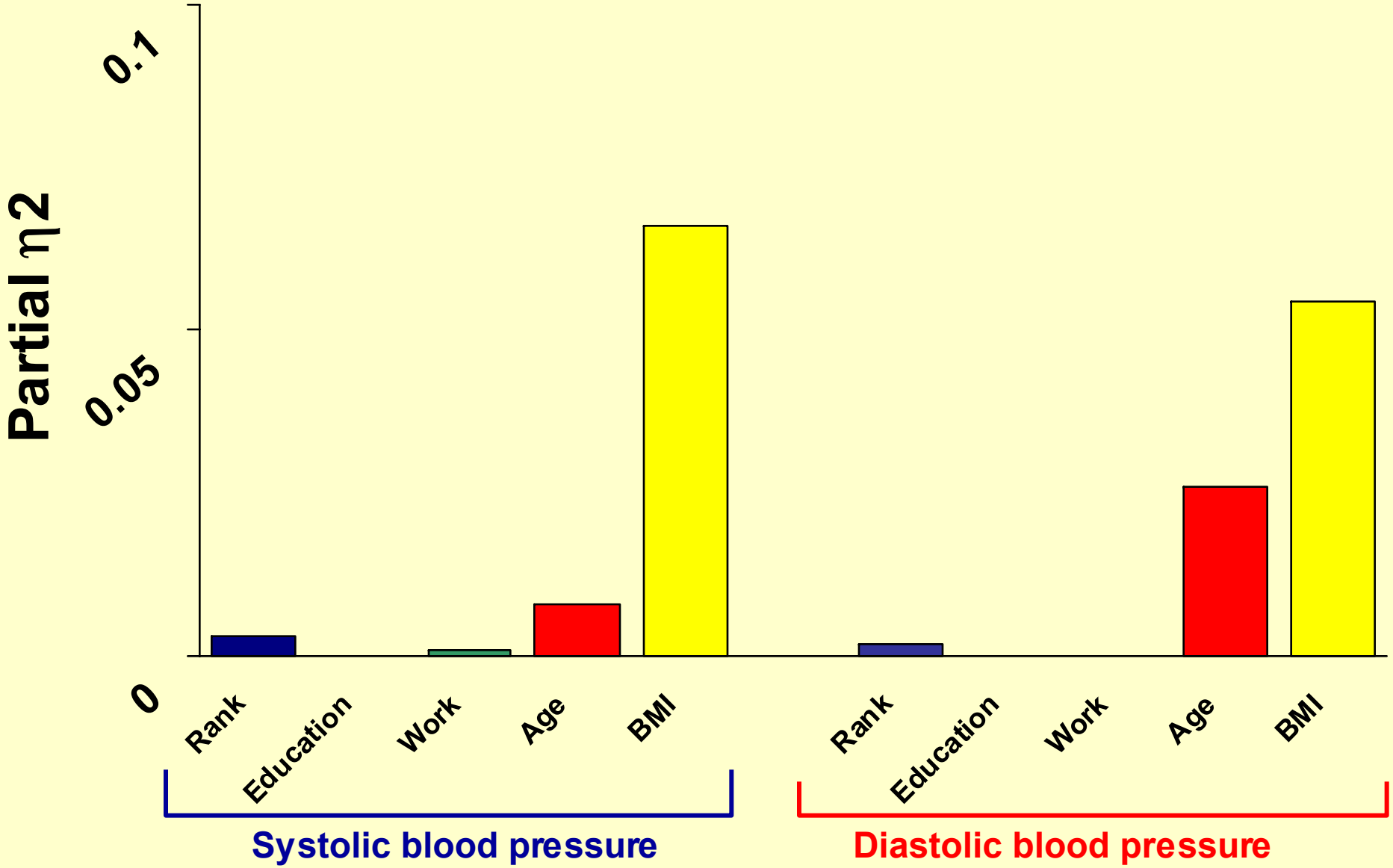
Fully adjusted SBP by SES variables



Fully adjusted DBP by SES variables



Partial η^2 of SES, age and BMI for SBP & DBP



HTN as categorical variable*

Variable	Odds ratio	95% CI
Low rank vs. others	1.31	1.06-1.63
Education	No difference	
Administrative vs. physical workers	1.24	1.01-1.52

* Multivariate logistic regression model adjusted for age, socioeconomic parameters, origin and BMI

Study limitations

- Homogenous population
- One measurement of blood pressure
- Difficulty in quantifying SES
- Results derived from military population and young adults

Conclusions

- **Low SES is associated with higher blood pressure**
- **Sedentary type of work is also associated with higher blood pressure**
- **Education, is not correlated with blood pressure**
- **The overall association between SES and blood is relatively weak**
- **Age and BMI are much stronger correlates of blood pressure**
- **Further research: Should low SES population be targeted for intensified identification and monitoring?**

Relative Impact of Socioeconomic Status on Blood Pressure

Lessons From a Large-Scale Survey of Young Adults

Itamar Grotto, Michael Huerta, Ehud Grossman, and Yehonatan Sharabi

Background: Although several studies reported on the association between socioeconomic status (SES) and hypertension, the results are conflicting, the quantification is problematic, only a few focused on young adults, and the effects of various key determinants of SES, such as education and job type, need further clarification. We aimed to assess the influence of SES on blood pressure in a large population of young adults.

Methods: We studied 11,053 male Israel Defense Force officers who underwent periodic medical evaluation during the years 1991 to 1999. Subjects completed a detailed medical questionnaire and underwent physical examination. We calculated mean systolic and diastolic blood pressure (SBP and DBP, respectively) by level of education, rank, and job type (as measures of SES), adjusting for demographic variables and body mass index (BMI).

Results: Adjusted means of SBP and DBP were highest among low-ranking officers (SBP, 119 mm Hg, compared with 117 and 115 mm Hg among intermediate and high-ranking officers, respectively, $P < .001$; DBP, 77 mm Hg, compared with 76 mm Hg among intermediate and high-ranking officers, $P = .001$). No differences were observed for level of education, but the mean SBP was higher among office workers (117 mm Hg *v* 116 mm Hg among physical workers, $P = .038$). The partial η^2 for rank, age, and BMI was found to be 0.003, 0.008, and 0.066, respectively, for SBP, and 0.002, 0.026 and 0.054, respectively, for DBP.

Conclusions: Low SES, as reflected by low rank, is associated with elevated blood pressure. However, as a whole, SES is a weak determinant of blood pressure compared with age and BMI. Am J Hypertens 2007;20: 1140–1145

Key Words: Hypertension, socioeconomic status, epidemiology, young adults.

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Questions?

Low

Intermediate

High