The health impacts of work organization

Part II – Cardiovascular Disease

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THE WAY WE WORK AND ITS IMPACT ON OUR HEALTH

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April 22, 2004

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Worldwide CVD Epidemic

- **CVD is the cause of 41% of all deaths in the U.S.**
- **Cardiovascular disease (CVD) is the major cause of morbidity and mortality in the industrialized world.**
- **Dramatic increases in CVD morbidity and mortality over last 30 years in Eastern European countries.**
- **Rising prevalence rates in many developing countries.**
- **"It has been projected that cardiovascular disease worldwide will climb from the second most common cause of death…in 1990, to first place, with more than 36 percent of all deaths in 2020" (Braunwald 1997, p.1364).**

Social Basis of CVD Risk factors

- Cigarette smoking
- Elevated Cholesterol
- Obesity
- Sedentary life style
- Diabetes
- Hypertension

Essential Hypertension: the "Silent Killer"

- **Approximately ½ of the adult population in industrialized countries has a persistently elevated BP >140/90mmHg by age 60**
- **Although risk factors such as age, obesity, alcohol intake etc., have been identified, these factors explain only a part of the risk**
- **The definition of essential hypertension remains:**

PATIENTS WITH ARTERIAL HYPERTENSION AND NO DEFINABLE CAUSE

Hypertension as a Disease of Industrialized Society

There is a minimal hypertension disease burden among non-market agricultural communities, and other non-industrialized societies.

Cross-cultural comparison of Systolic BP (mm Hg), men aged 50-60

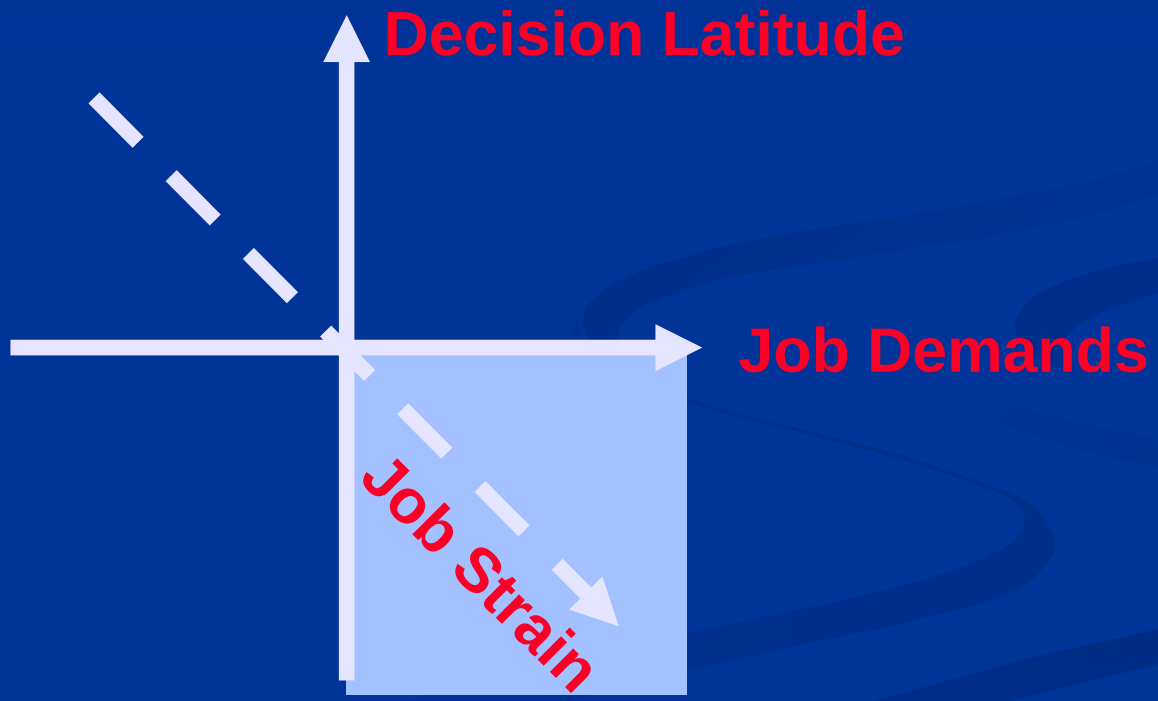
Waldron I, et al. Cross-cultural variation in blood pressure. Soc Sci Med 16:419-430, 1982.

Hypertension as a Disease of Industrialized Society cont:

- Within industrial society, hypertension is patterned by class, race, ethnicity, urbanicity, and gender.
- The "unidentified" causes of essential hypertension most likely include one or more ubiquitous exposures – e.g., diet, lifestyle, work or community.

Job Strain (Karasek)

- Combination of: HIGH psychological job demands and LOW job decision latitude

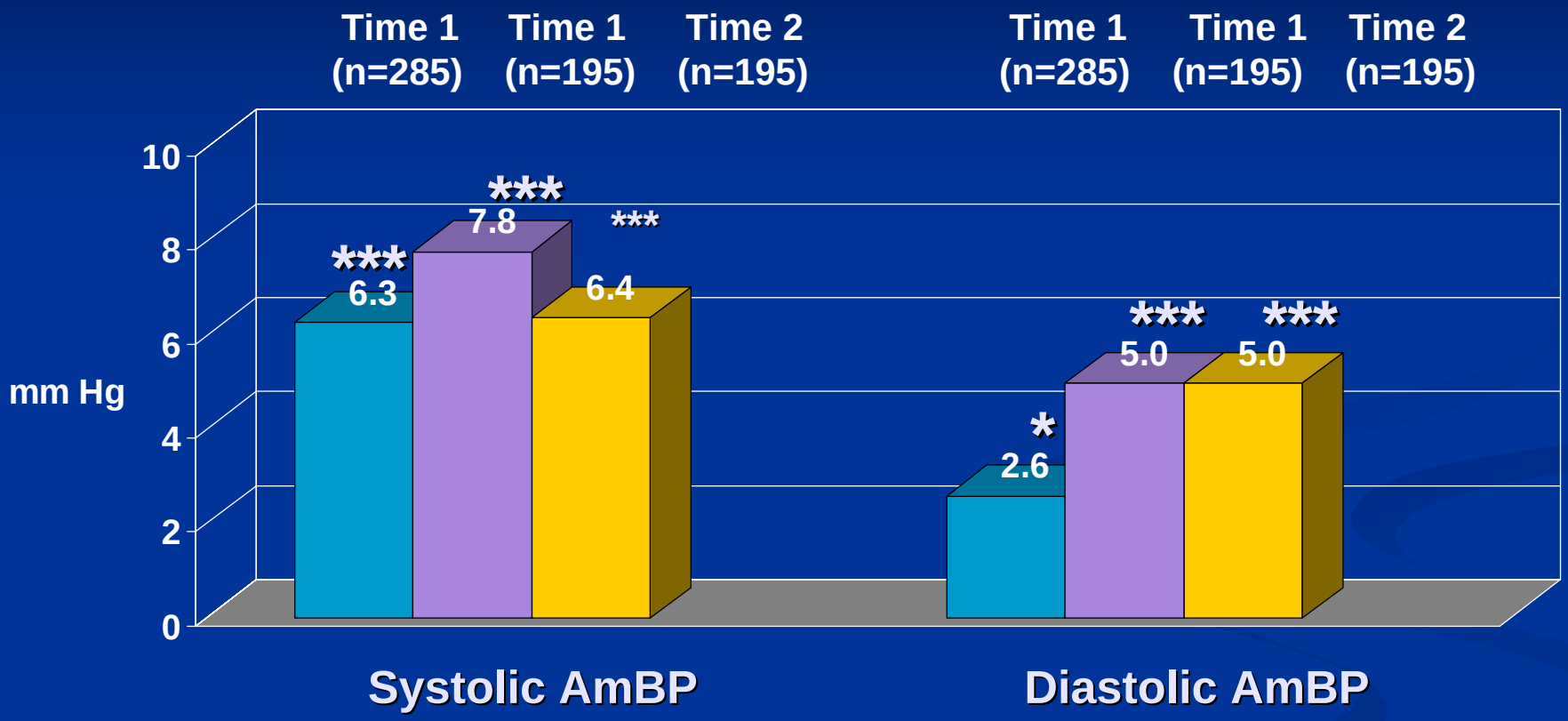


New York City Work Site Blood Pressure Study 1985-2001

- Based at Weill Medical College of Cornell University-New York Presbyterian Hospital
- Began in 1985 as a case-control study
- 283 men initially enrolled at 8 large NYC work sites
- Now prospective study with 10 years of follow-up
- 472 subjects enrolled at 10 sites (38% women)

Source: Schnall et al. *JAMA* 1990;263(14):1929-1935.

Effect of Job Strain on Work Ambulatory BP in Men (c-s analyses)



controlling for age, education, body mass index, race, smoking, alcohol use, work site

***p<.001, **p<.01, *p<.05

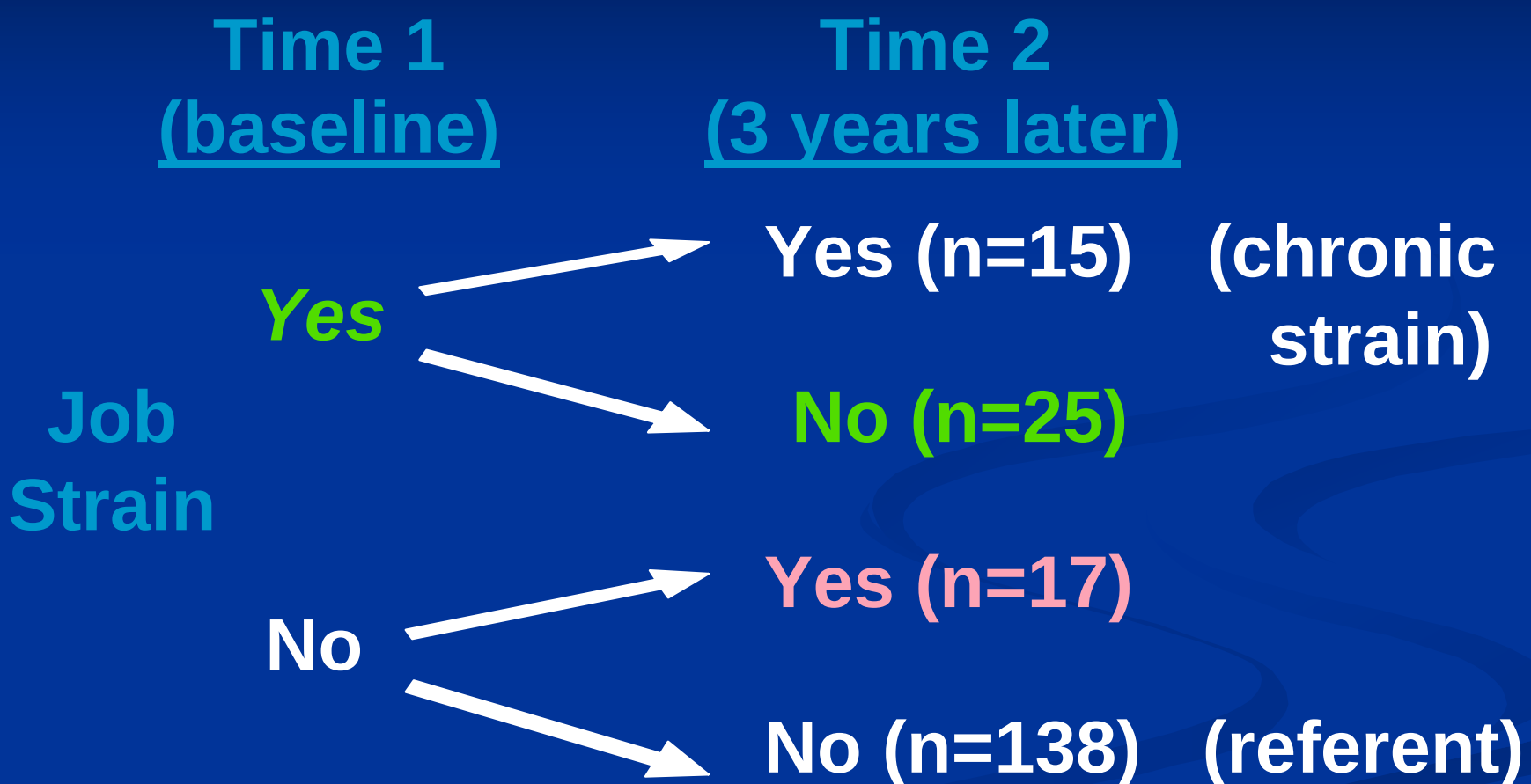
Source: Schnall et al. *Psychosomatic Medicine* 1998;60:697-706.

Increased LVMI with Exposure to Job Strain

- LVMI increased 7.3 gm/m^2 in subjects with job strain compared to those without job strain ($p=.03$, $N=149$).

Schnall etal, JAMA 1990, 1992

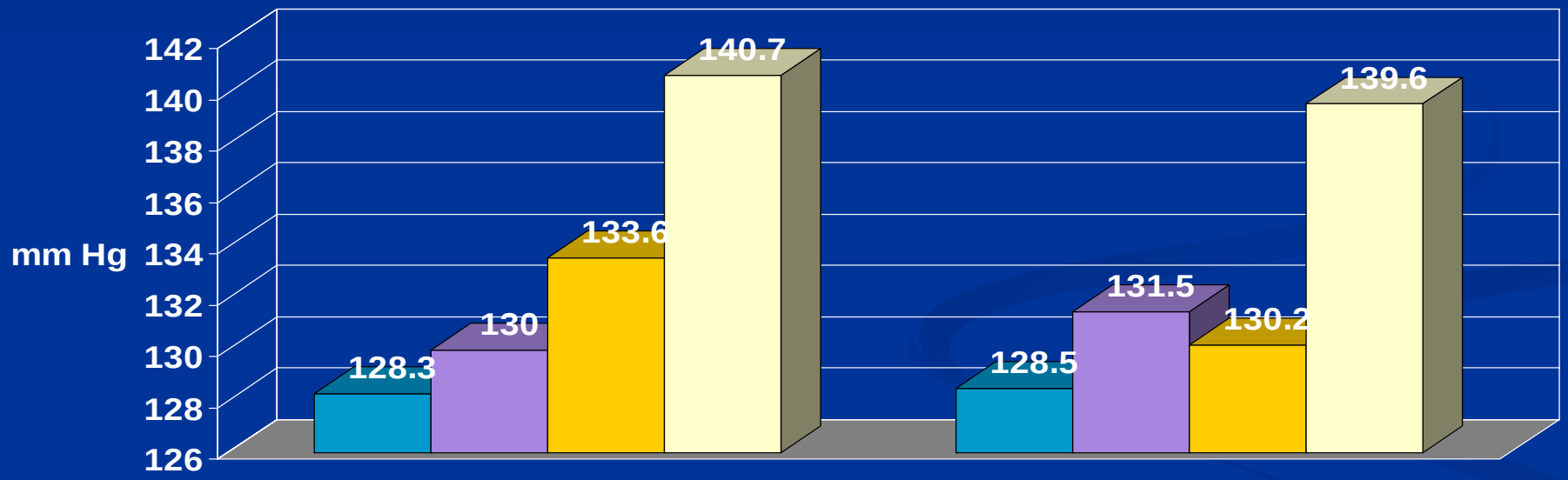
Job Strain Change Variable



Source: Schnall et al. *Psychosomatic Medicine* 1998;60:697-706.

Job Strain Change and Work Systolic Ambulatory BP (n=195 men, longitudinal analyses)

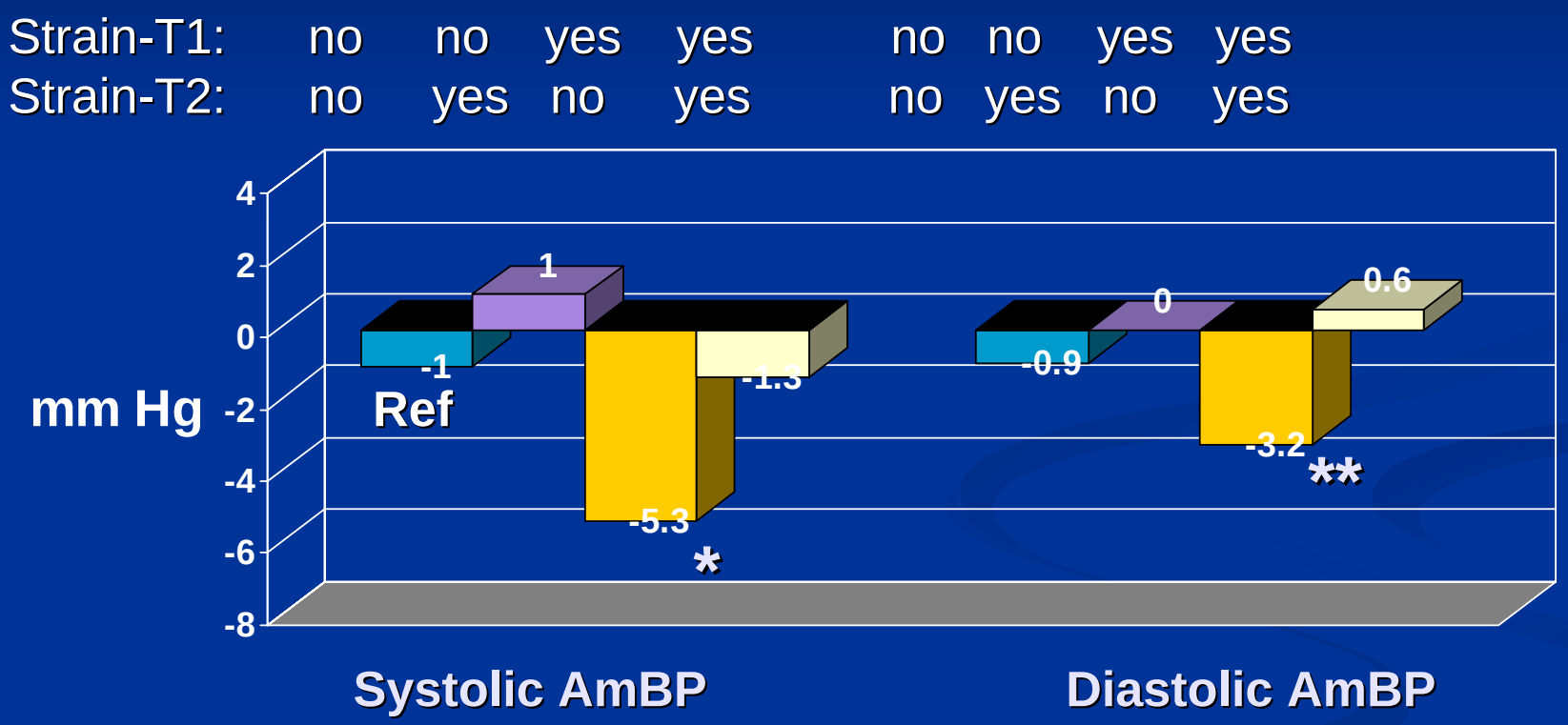
Strain-T1:	**no**	**no**	**yes**	**yes**		**no**	**no**	**yes**	**yes**
Strain-T2:	**no**	**yes**	**no**	**yes**		**no**	**yes**	**no**	**yes**



controlling for age, education, body mass index, race, smoking, alcohol use, work site

Source: Schnall et al. *Psychosomatic Medicine* 1998;60:697-706.

Job Strain Change and 3-yr Work AmBP Change (n=195 men, Time 1-2)

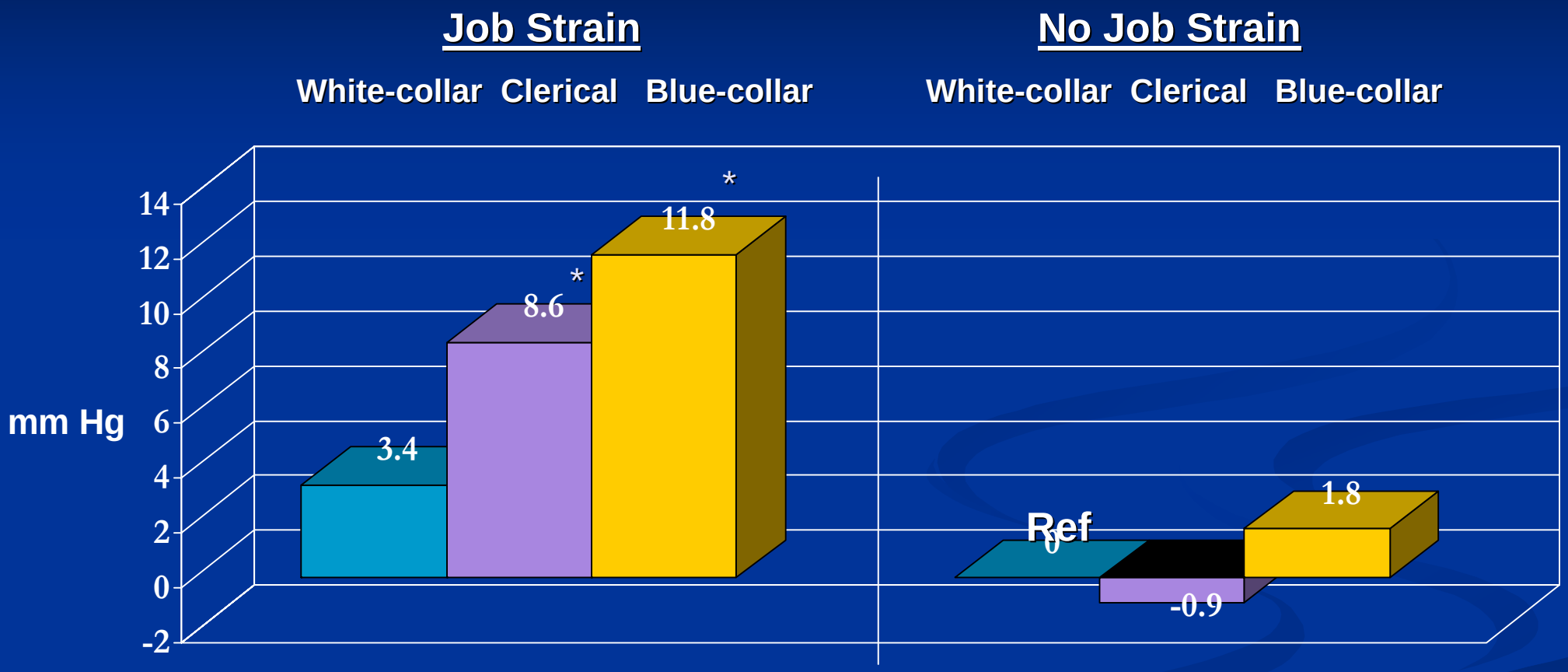


controlling for age, race, body mass index, smoking, alcohol use, work site

*p<.05, **p<.01, (vs Ref group)

Source: Schnall et al. *Psychosomatic Medicine* 1998;60:697-706.

Job Strain and Work Ambulatory Systolic BP by Occupational Status (n=283 men, Time 1)



controlling for age, body mass index, race, smoking, alcohol use and work site

*p<.05 (vs Ref group)

Landsbergis P, Schnall P, Pickering T, Warren K, Schwartz J. Lower socioeconomic status among men in relation to the association between job strain and blood pressure. Scandinavian Journal of Work, Environment and Health 2003;29(3):206-215.

Hypertension and Psychological Symptoms

- Job strain not associated with anxiety or self-reported feelings of stress in the Cornell Worksite Study

Fits with idea of hypertension as "silent killer"

Workplace Exposures Other than Job Strain Related to Heart Disease

- Effort-Reward Imbalance
- Shift Work
- Long Work Hours
- Threat-avoidant-vigilant work (high risk groups such as bus and truck drivers)
- Physical factors (noise, heat, cold, etc.)
- Chemical factors (lead, carbon monoxide, etc.)

Evidence from Longitudinal Studies of Relationship Between Job Strain and CVD

Conclusion from recent review[1] of 17 longitudinal studies:

- **Of 17 studies 11 had positive results.**
- **The evidence, particularly among men…is strong and consistent, that an association exists between exposure to job strain and risk of CV disease.**
- ***Since bias towards the null is present in all but 2 of these studies, the magnitude of this association appears to have been substantially underestimated.***

[1]Belkic K, Landsbergis PA, Schnall PL, Baker D. Is job strain a major source of cardiovascular disease risk? Scand J Work Environ Health 2004;30(2):85–128.

Clinical Implications – Occupational Cardiology

- What are the clinical implications of the finding that work stressors play a role in the development of essential hypertension and CVD?

Occult Workplace Hypertension in NYC Work Site BP Study: A public health epidemic?

- There were 175 study participants who had normal clinic casual blood pressures (measured in a clinic setting at the workplace)
- Of these 175 participants 36 or 21% had elevated work time ambulatory blood pressures. (were false negatives)

Occult Workplace Hypertension: Association with LVMI

- In NYC study, the "false negatives" had an LVMI 13g/m^2 greater (enlarged left ventricle), than those with normal waking AmBP and clinic BP's

- Individuals with "occult hypertension" during waking life had similar LVMI and prevalence of discrete atherosclerotic plaques compared to study participants with both increased clinic and AmBP (true positives).

- Both groups differed significantly from those with normal AmBP and normal CCBP, after adjusting for covariates.

Liu etal. Cardiac and arterial target organ damage in adults with elevated ambulatory and normal office blood pressure. Ann Intern Med 1999; 131: 564-572.

Return to Work

- Working people are at increased risk of a repeat MI if they return to work with a job characterized by having "job strain"

- Theorell, et al. 1993

Occupational Cardiology

- Recognize role of work in etiology of hypertension and CVD.
- Establish concept of occupational sentinel health events within realm of cardiology (identification of clusters of work-related hypertension and CVD).
- Incorporate occupational history-taking into standard history
- Encourage broad application of ambulatory monitoring techniques
- Develop and validate protocols for diagnostic work-up of patients with cardionoxious jobs
- Provide guidelines for modification of high-risk workplace, to protect individual patient-workers
- Define and implement a "heart healthy" work environment for all working people

The End

- The Job stress network – www.workhealth.org