Psychometric Properties of Health & Self-Care

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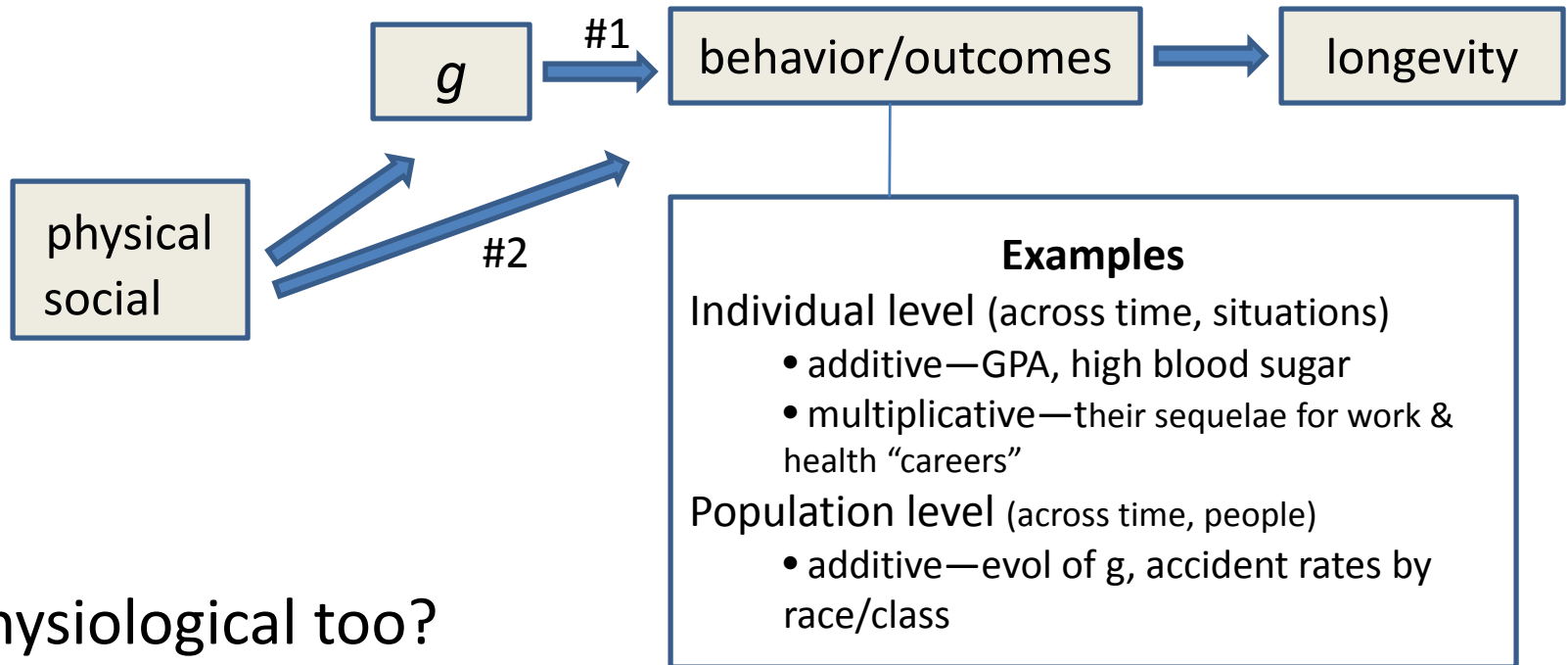
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December 13, 2007

Calculus of Inconspicuous Effects: Essential for Theory Testing
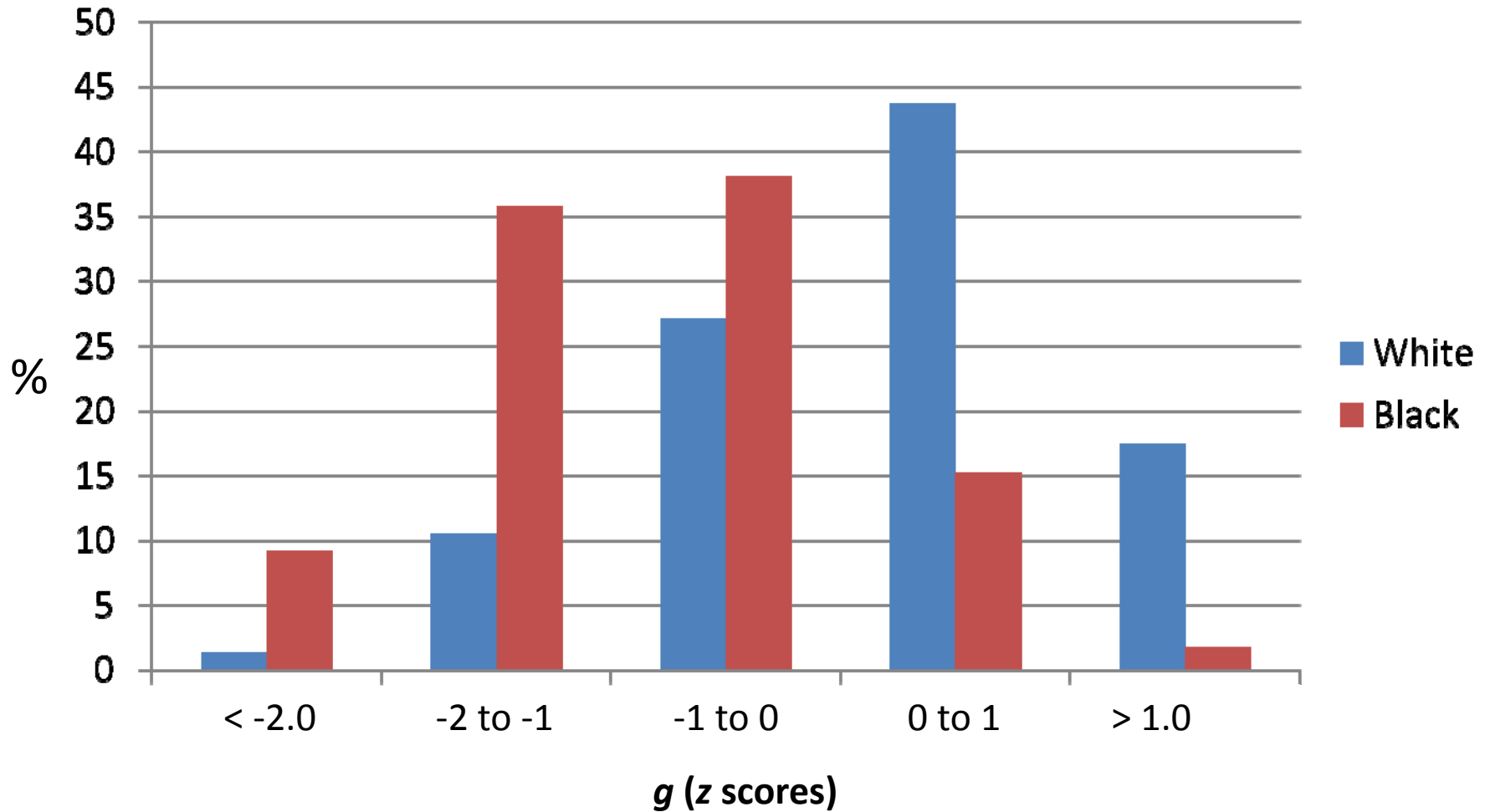
- Small but consistent influences add & compound

- Physiological too?
  – Essential for Fitness and System-Integrity theories of *g* & health (#2 above), where *g* signals overall physiological fitness

Vietnam-Era Veterans Data

- Study mandated by US Congress: Did defoliants affect health of Vietnam veterans?

- Born ~1950

- Inducted ~1970 (N ~18,000)

- Telephone interview ~1985 (N ~14,000)

- Physical/mental exam ~1985 (N ~4,500)

- Mortality follow-up 2000, age ~50

- Can replicate by race (~3,500 white, ~450 black)

% of Whites and Blacks by *g* Level

Ns = 3,417 (whites), 467 (blacks)

Typical Reliabilities for Measures

		r (intraclass)	kappa
Lab assays	Hematology Immunlogy Serological	.9+	.9+
Hearing, sight			.8 -.9
Lung function		.6-.9+	
Abnormal chest X-ray			.6
Clinical exams			
• dermatology	Birthmarks, warts, acne Alopecea, folliculitis, drug tracks		.2-.5
• general exam	Height Weight, pulse Blood pressure (arm) (ankle) Retinal Mouth-dental, throat Neoplasms, inflammations Abnormal heart sounds	.99 .7 .5-.6 .1-.7	 .4 .2 .2 .05
• skin hypersensitivity		.3-.6	
• reflex	Knee, plantar		.1-.3

To be explained:
Mortality 1985-2000, by *g* Level and Race
(% and Odds Ratios)
Ns=3,417 (whites), 467 (blacks)
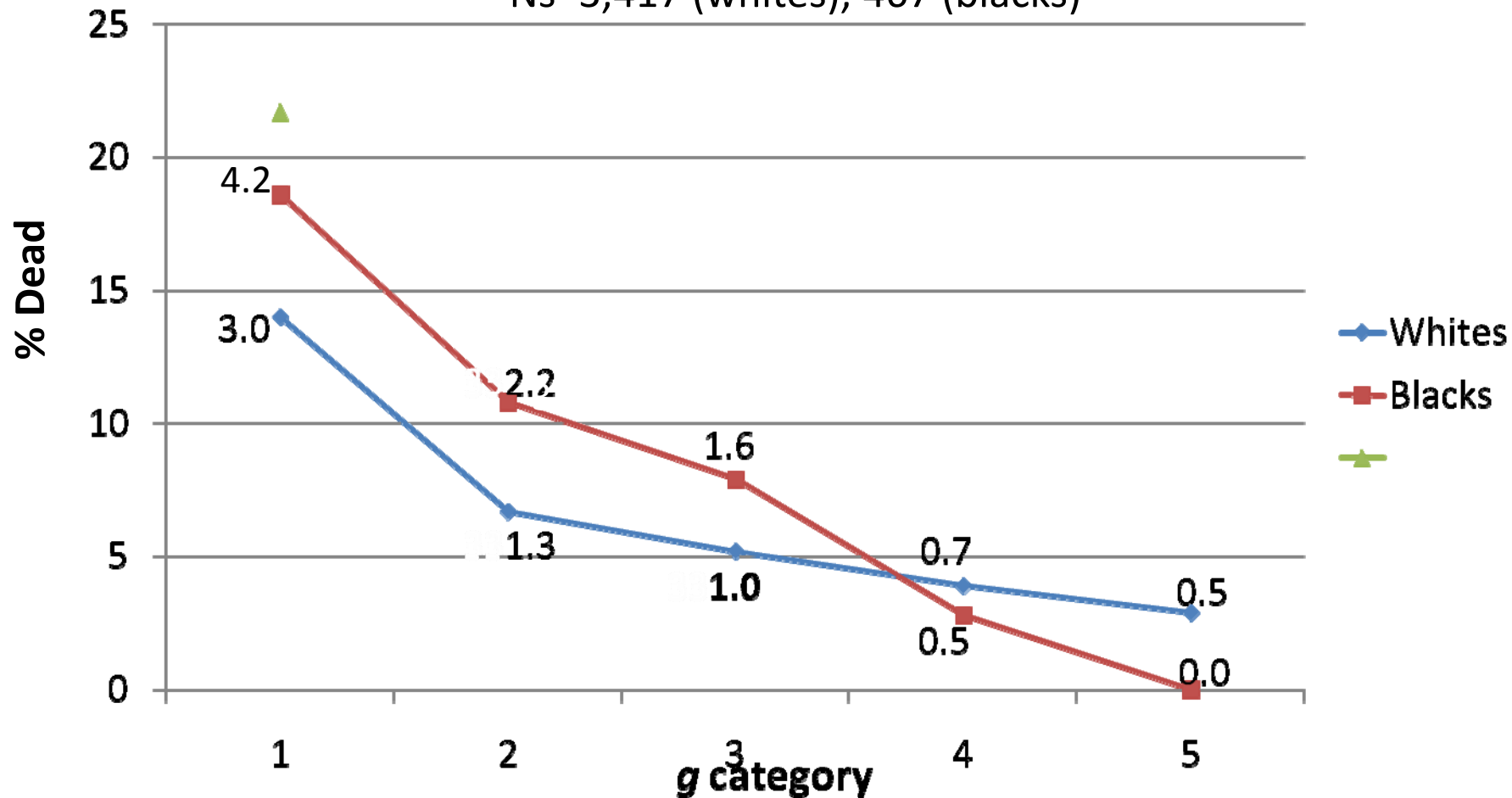
Potential confound:
Mortality 1985-2000, by Income Level and Race (% and Odds Ratios)
Ns=3,417 (whites), 467 (blacks)
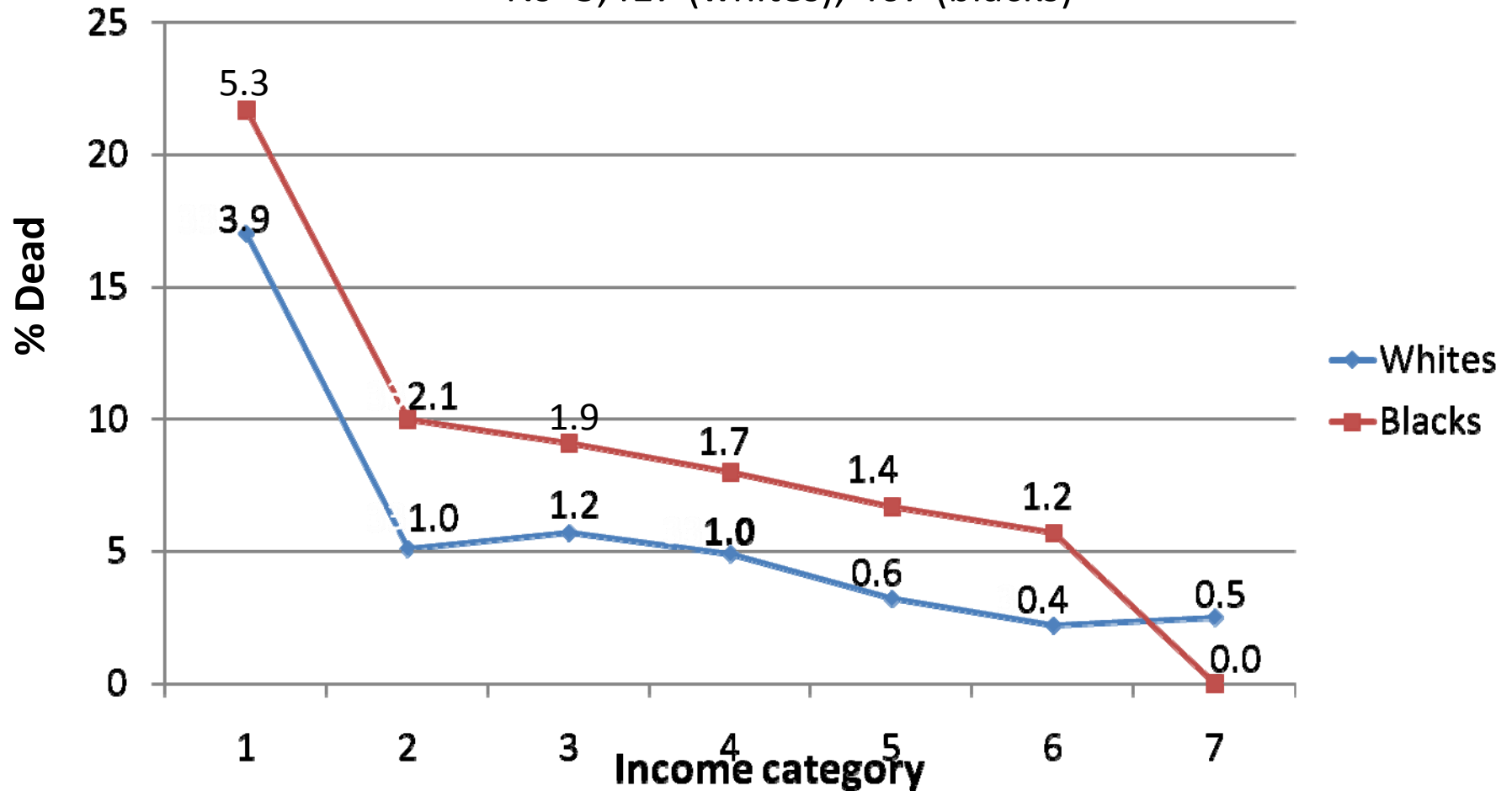
Test Case: Peripheral Nerve Conduction Studies
(N ~ 4,500)

- ## 3 sensory amplitude (μV)
  - Median (arm); ulnar (arm); sural (leg)

- ## 4 sensory velocity (m/sec)
  - Median-distal,(arm); median proximal (arm), ulnar (arm), sural (leg)

Added z scores to create SENSORY-7 scale

- ## 2 motor amplitude (μV)
  - Median (arm), peroneal (leg)

- ## 2 motor velocity (m/sec)
  - Median (arm), peroneal (leg)

Added z scores to create MOTOR-4 scale

Same Results for Whites & Blacks

Zero-Order Correlations (concurrent)					
		Whites			
Blacks[b]	Sensory-7	Motor-4	*g*	Income	
Sensory-7		.46	.16	.10	
Motor-4	.47		.06	.08	
g	.16	.06		.35	
Income	.11	.03	.34		

Regressions (concurrent)				
Predicting _g_[a]				
	Sensory-7 (β)	**Motor-4 (β)**	**Multiple R**	**(N)**
Whites	.16	-.02	.15	(3,417)
Blacks	.14	-.01	.14	(457)
Total	.21	-.07	.19	(3,874)
Prediction carried by Sensory; Motor acts like a slight suppressor				
Predicting Sensory-7				
	_g_ (β)	**Income (β)**	**Multiple R**	**(N)**
Whites	.157		.16	(3347)
	.141	.045	.16	(3347)
Blacks	.159		.16	(457)
	.158	ns	.16	(457)
Prediction carried by _g_; Income adds virtually nothing				

[a]Results same for _g_ (General Technical) score at induction.

Sensory Nerve Conduction, by *g* Level: Mean Standardized Velocity and Amplitude (7 tests)
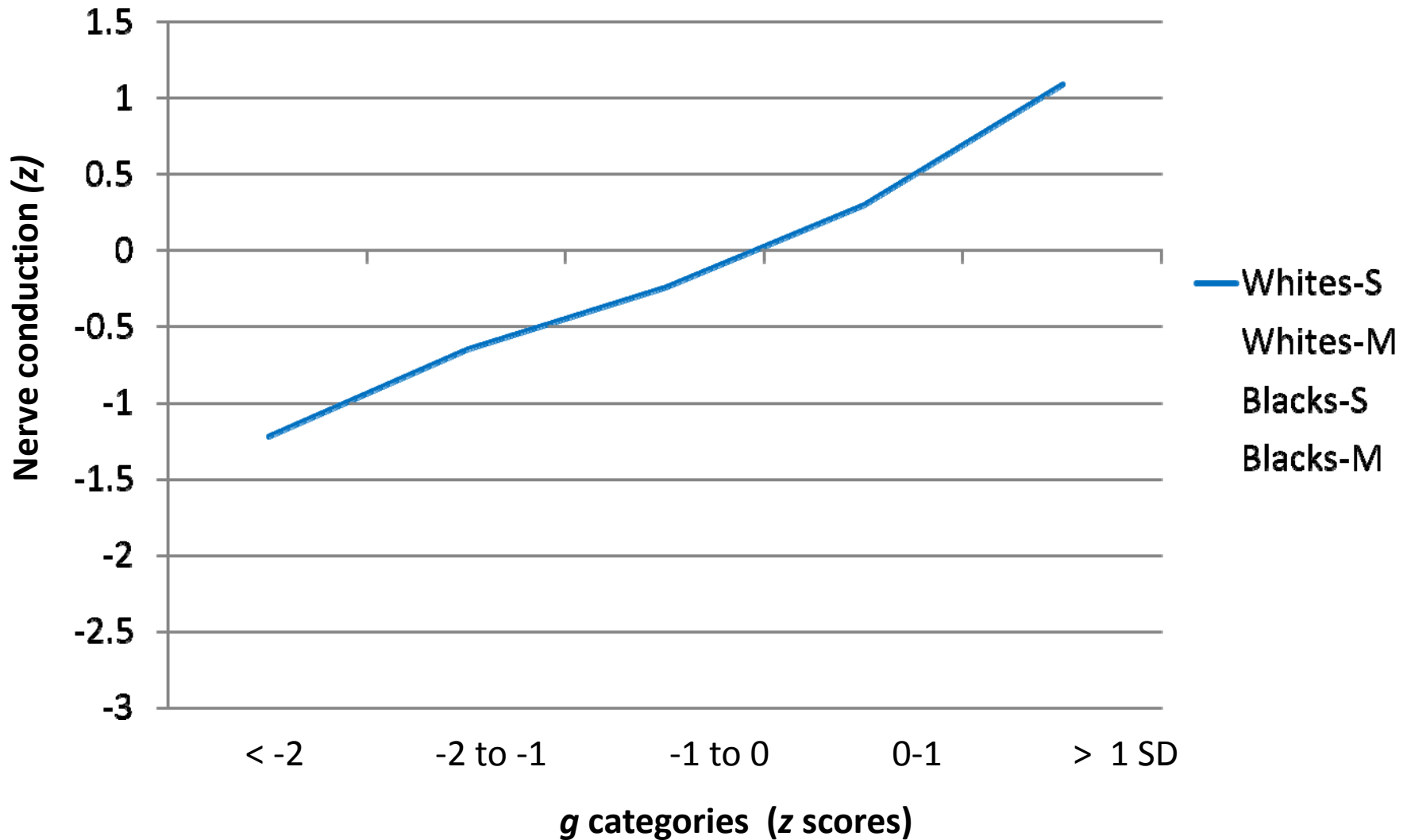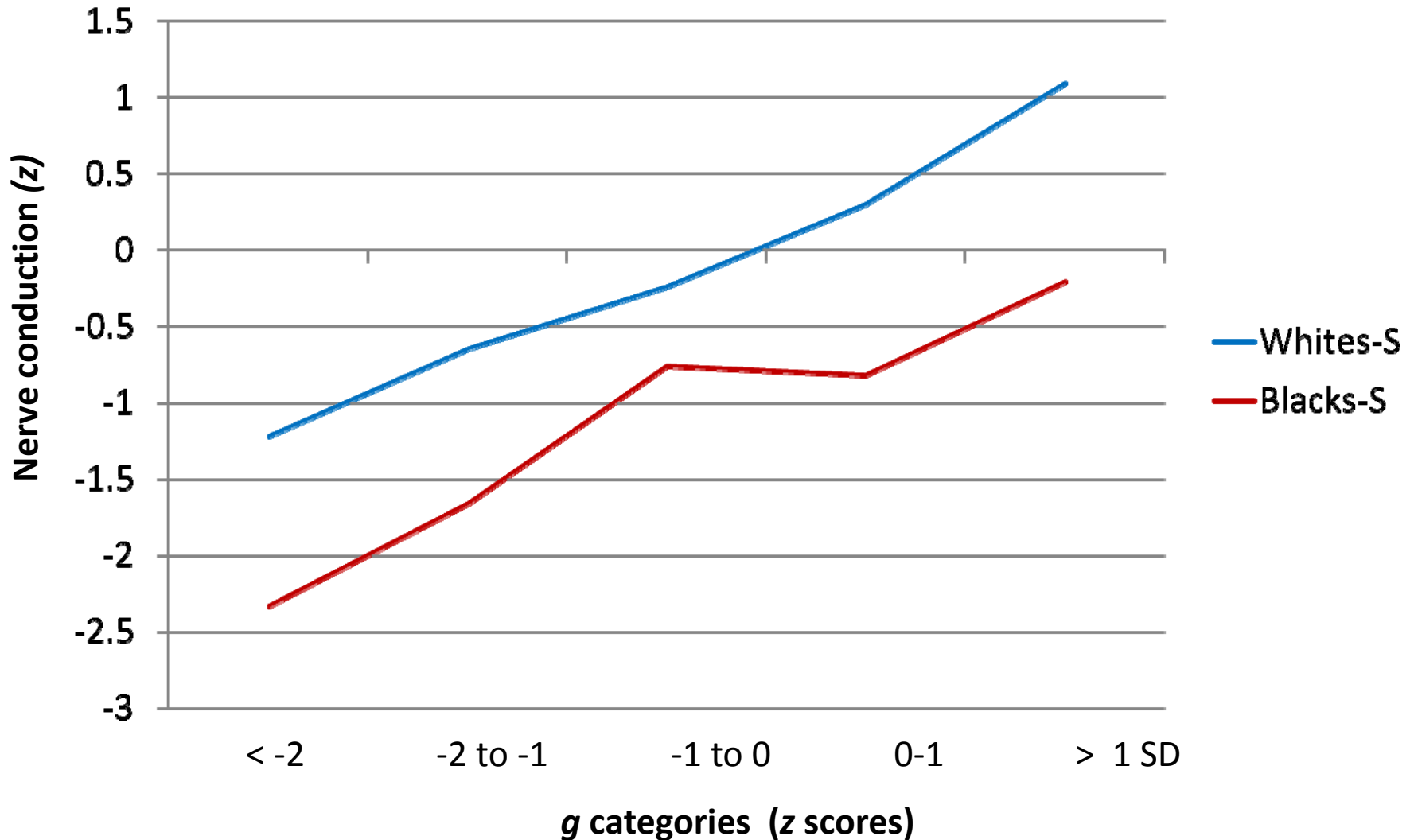
Ns = 3,417 (whites)

Sensory and Motor Nerve Conduction, by *g* Level: Mean Standardized Velocity and Amplitude (7 & 4 tests)
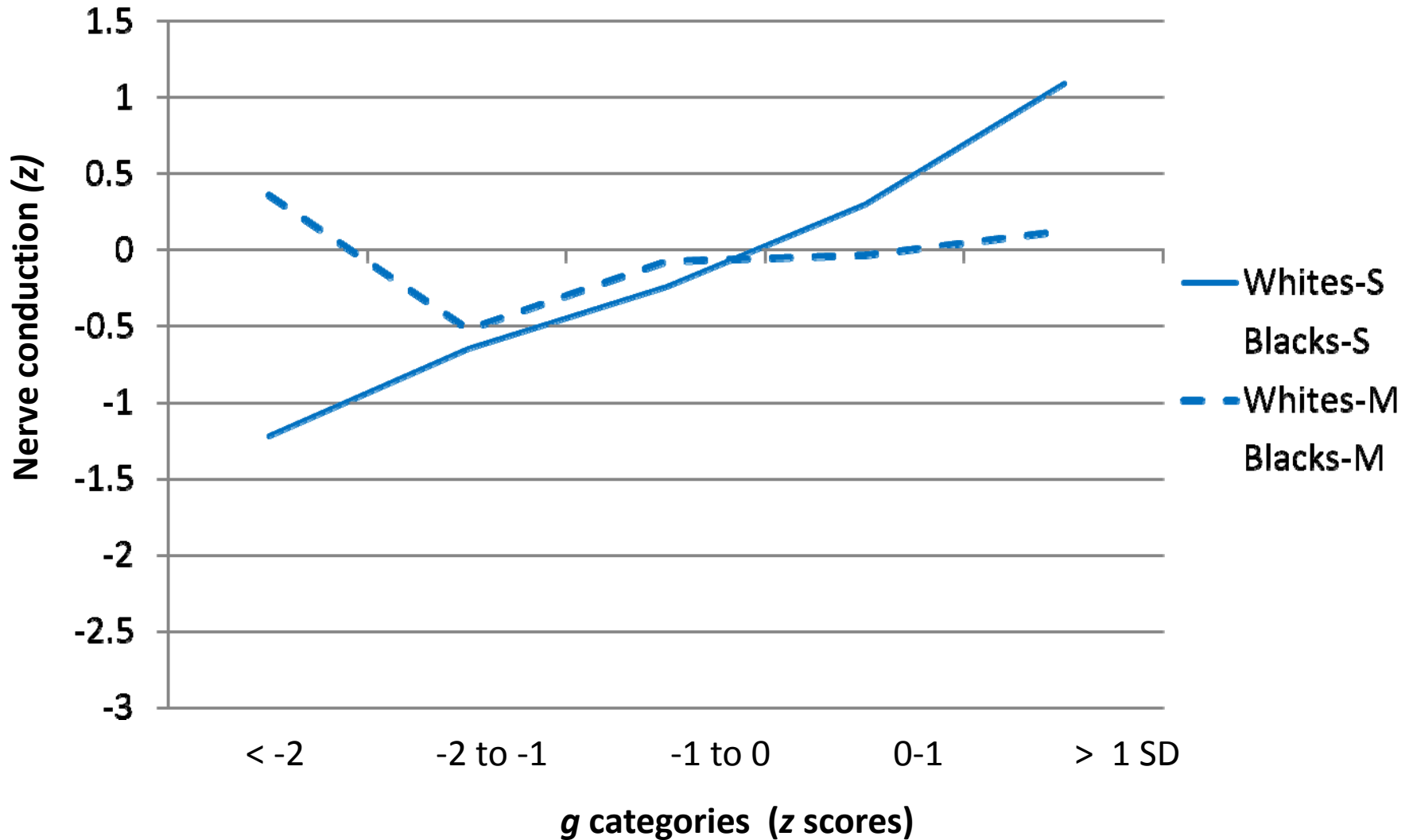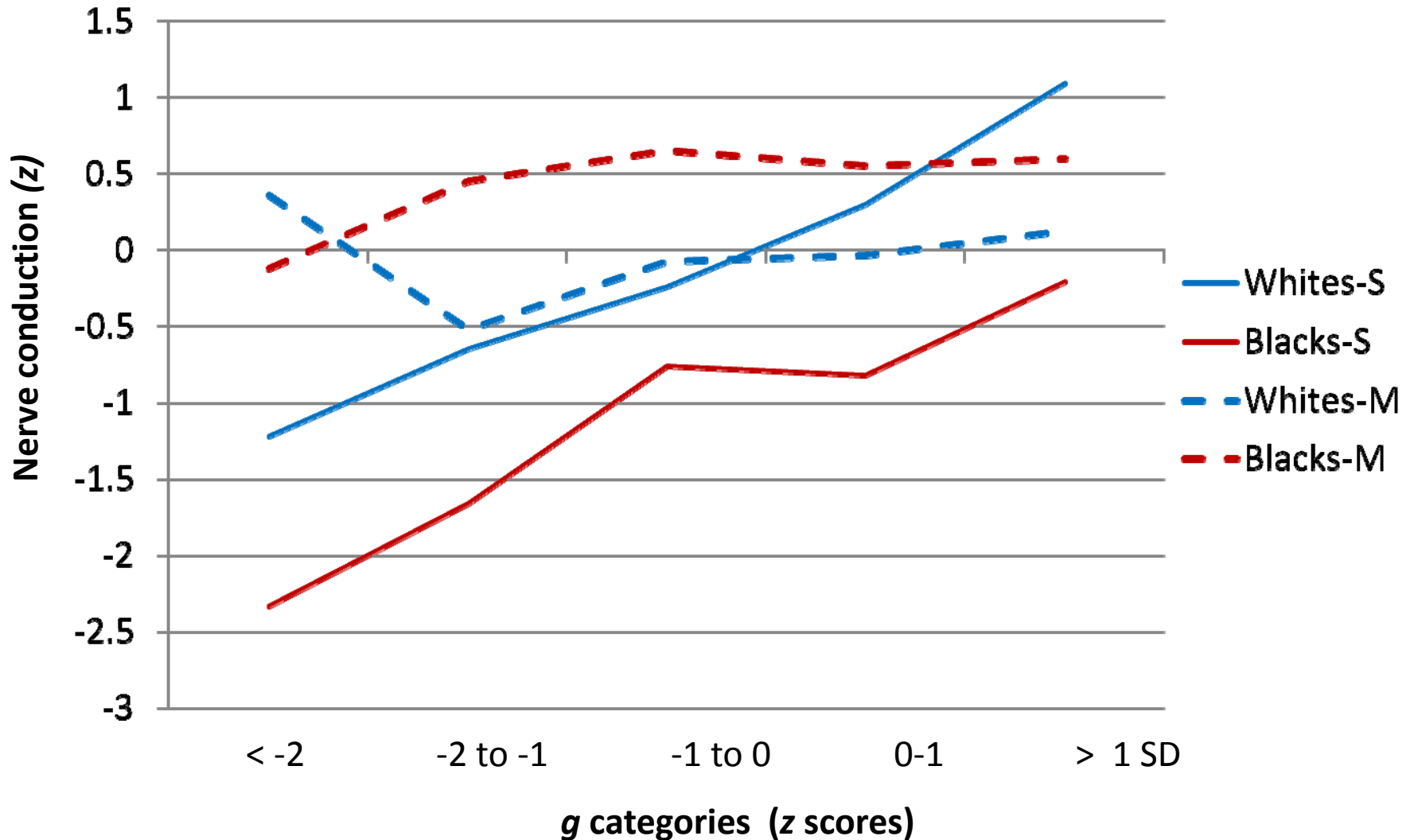
Ns = 3,417 (whites)

Sensory Nerve Conduction, by Race and *g* Level: Mean Standardized Velocity and Amplitude (7 tests)

Ns = 3,417 (whites), 467 (blacks)

Sensory and Motor Nerve Conduction, by Race and *g* Level:
Mean Standardized Velocity and Amplitude (7 & 4 tests)
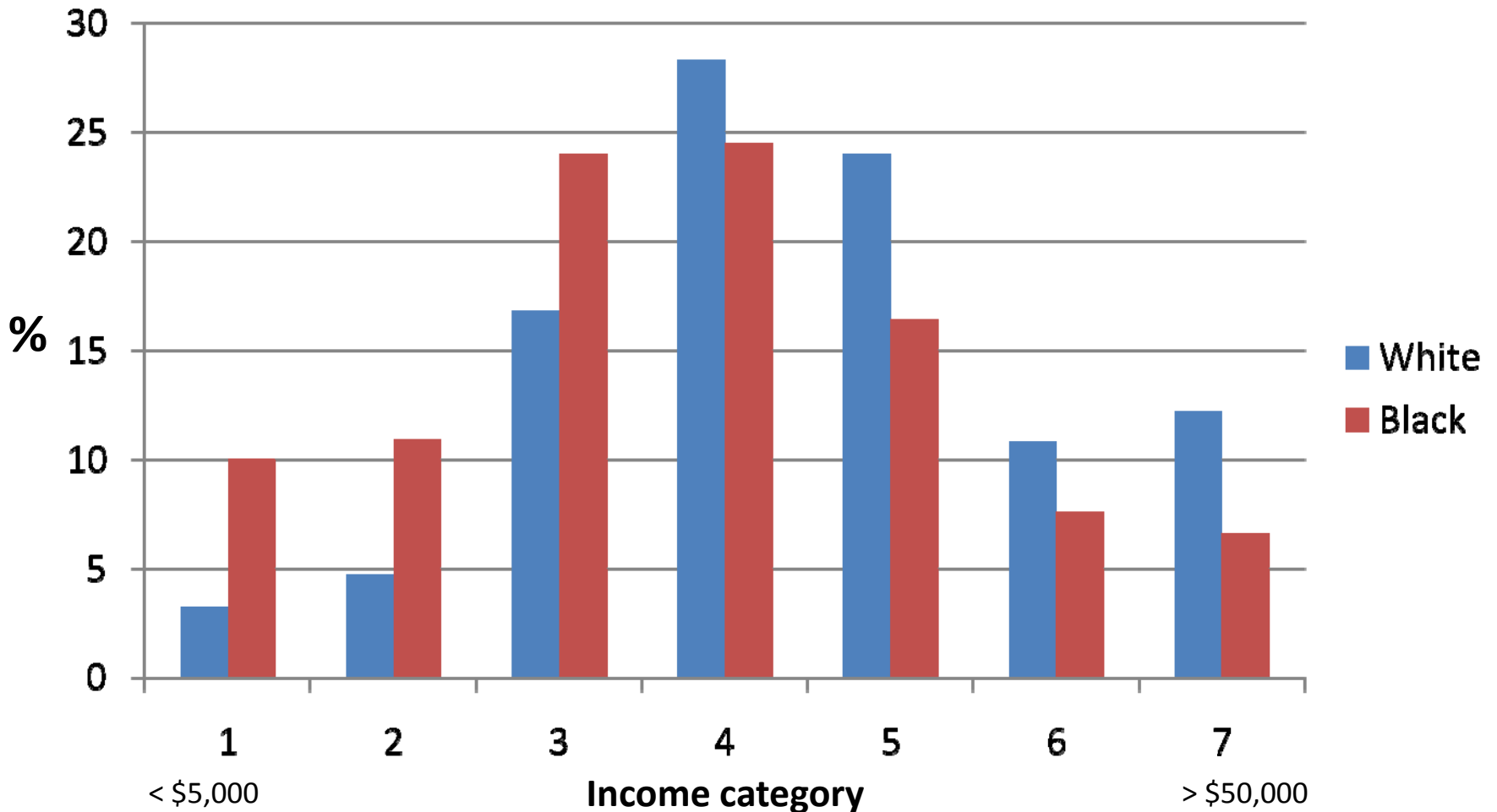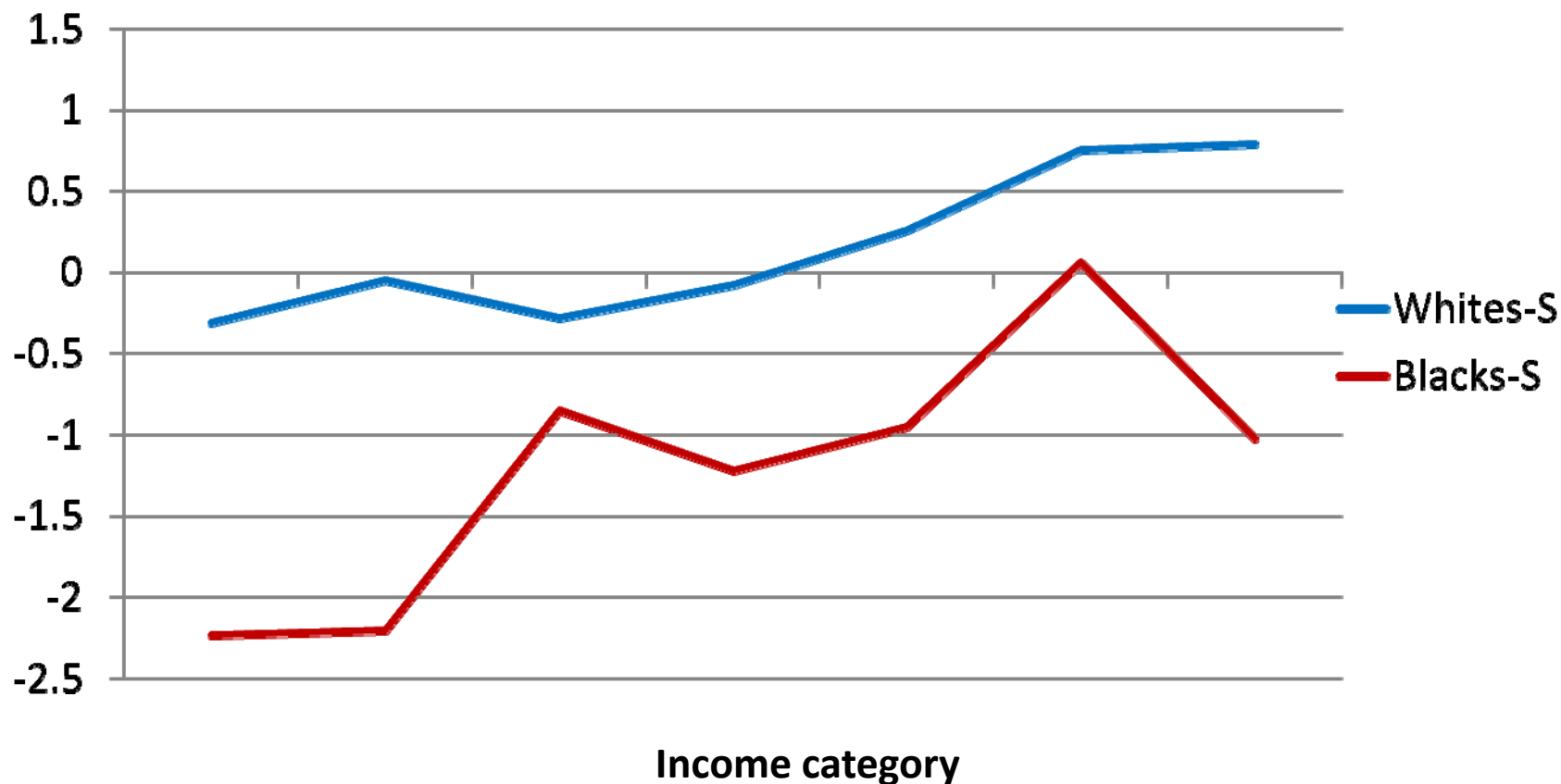
Ns = 3,417 (whites), 467 (blacks)

Different Means for Whites & Blacks

Zero-Order Correlations (concurrent)					
		Whites			
Blacks[b]	Sensory-7	Motor-4	*g*	Income	**W-B (*z*)**
Sensory-7		.46	.16	.10	**1.32**
Motor-4	.47		.06	.08	**-.60**
g	.16	.06		.35	**1.02**
Income	.11	.03	.34		

% of Whites and Blacks by Income Level
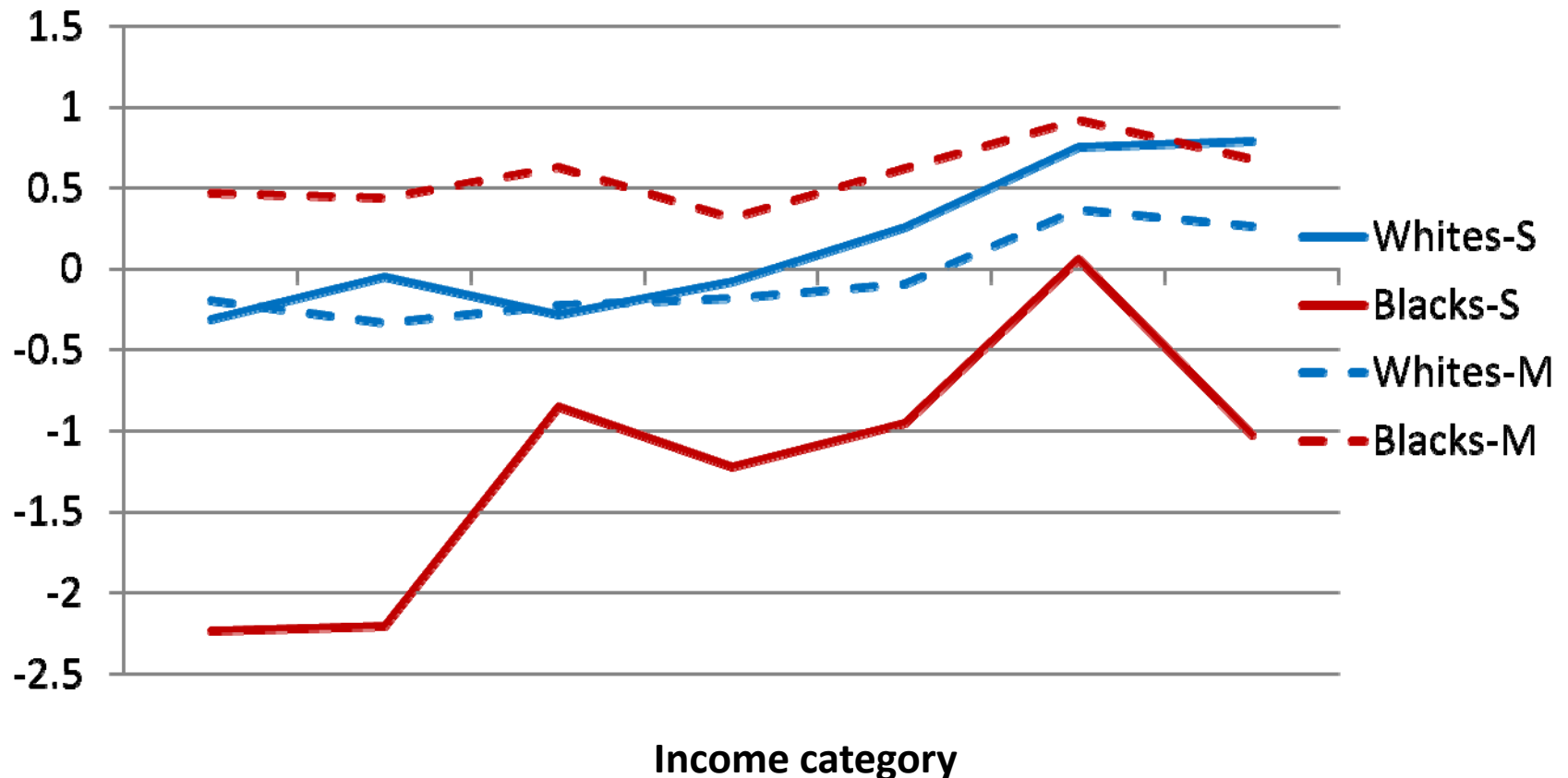Ns = 3,348 (whites), 458 (blacks)

Sensory Nerve Conduction, by Race & Income: Mean Standardized Velocity and Amplitude (7 tests)
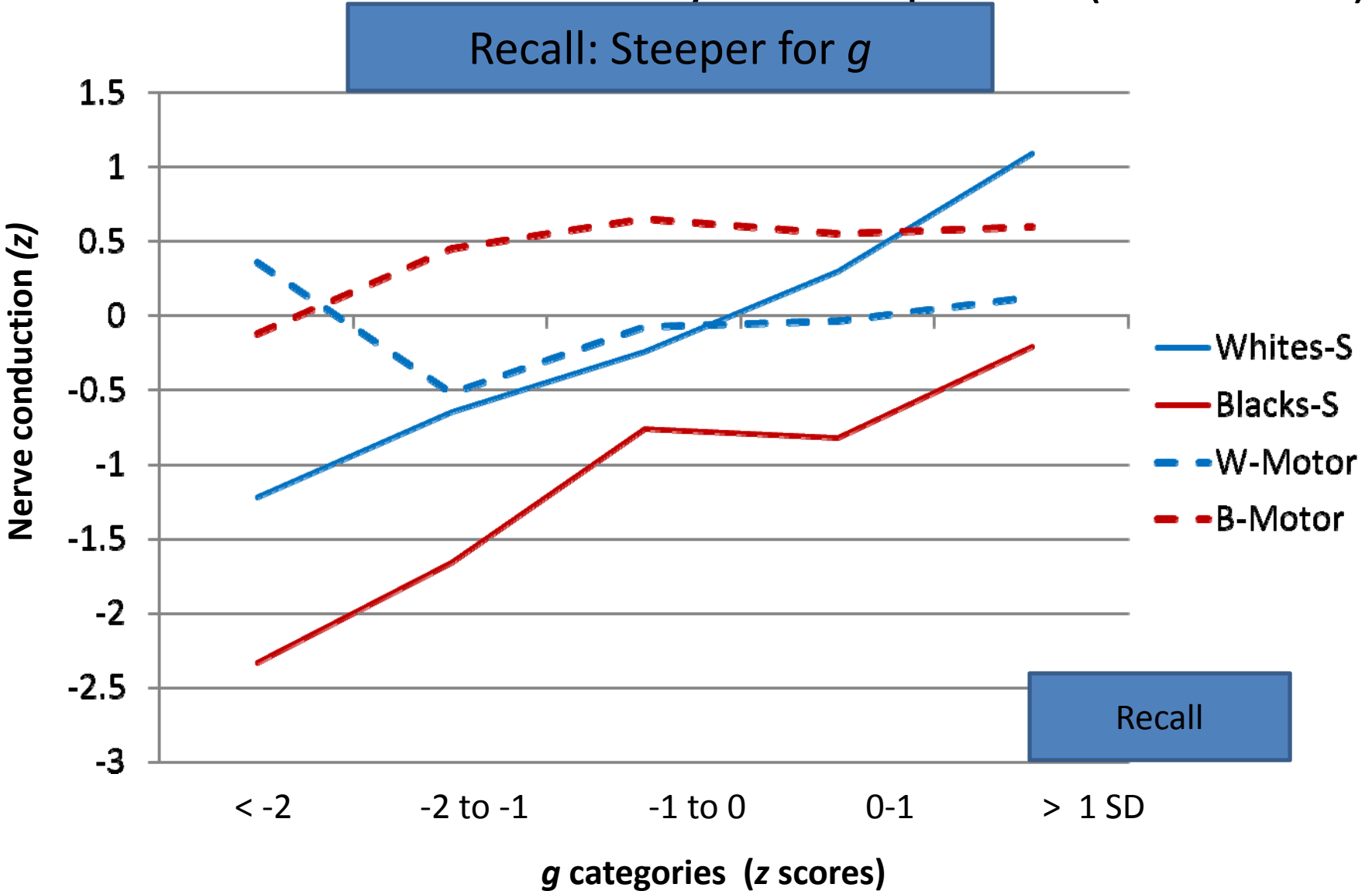## Ns = 3,417 (whites), 467 (blacks)

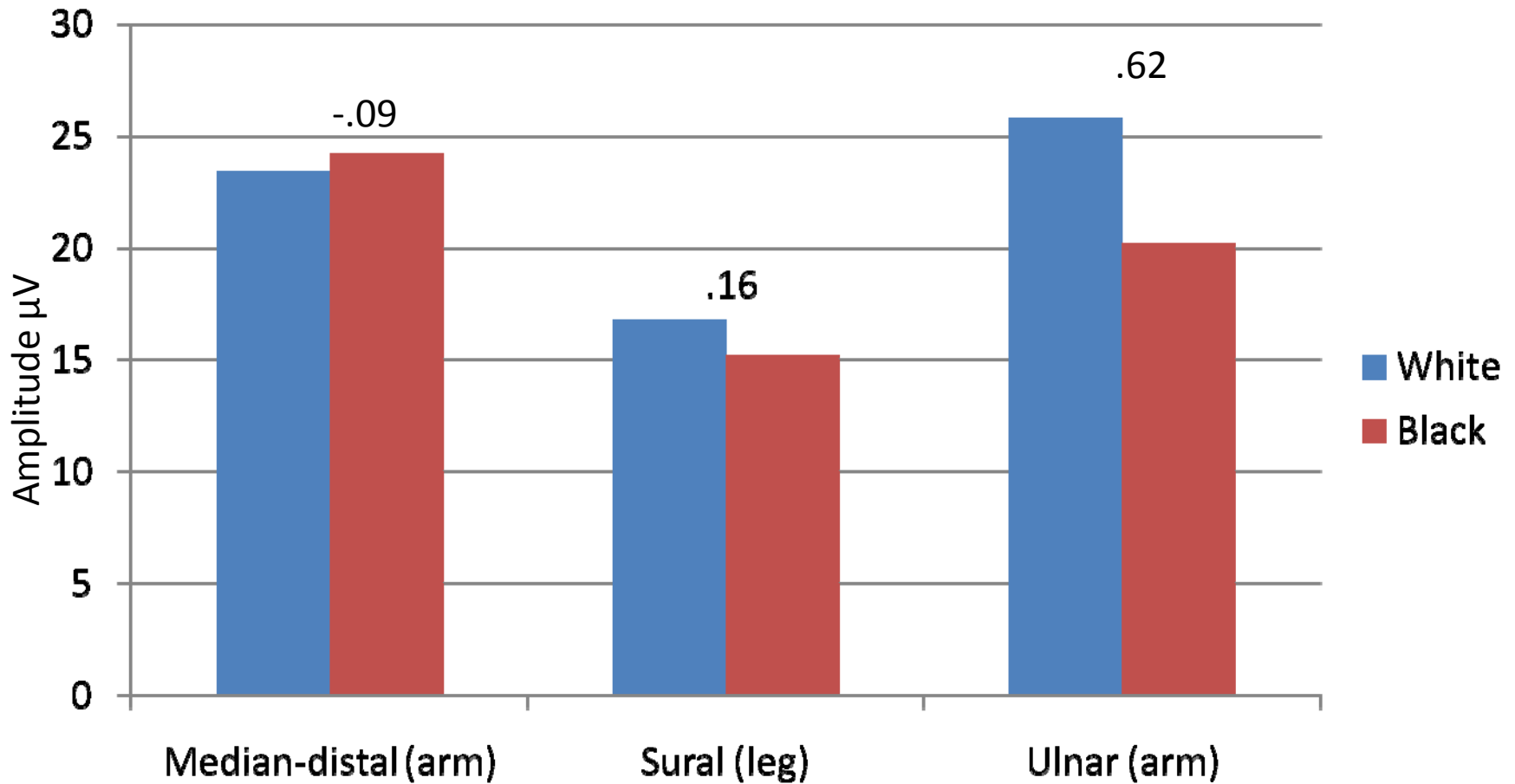# Sensory and Motor Nerve Conduction, by Race & Income: Mean Standardized Velocity and Amplitude (7 & 4 tests)
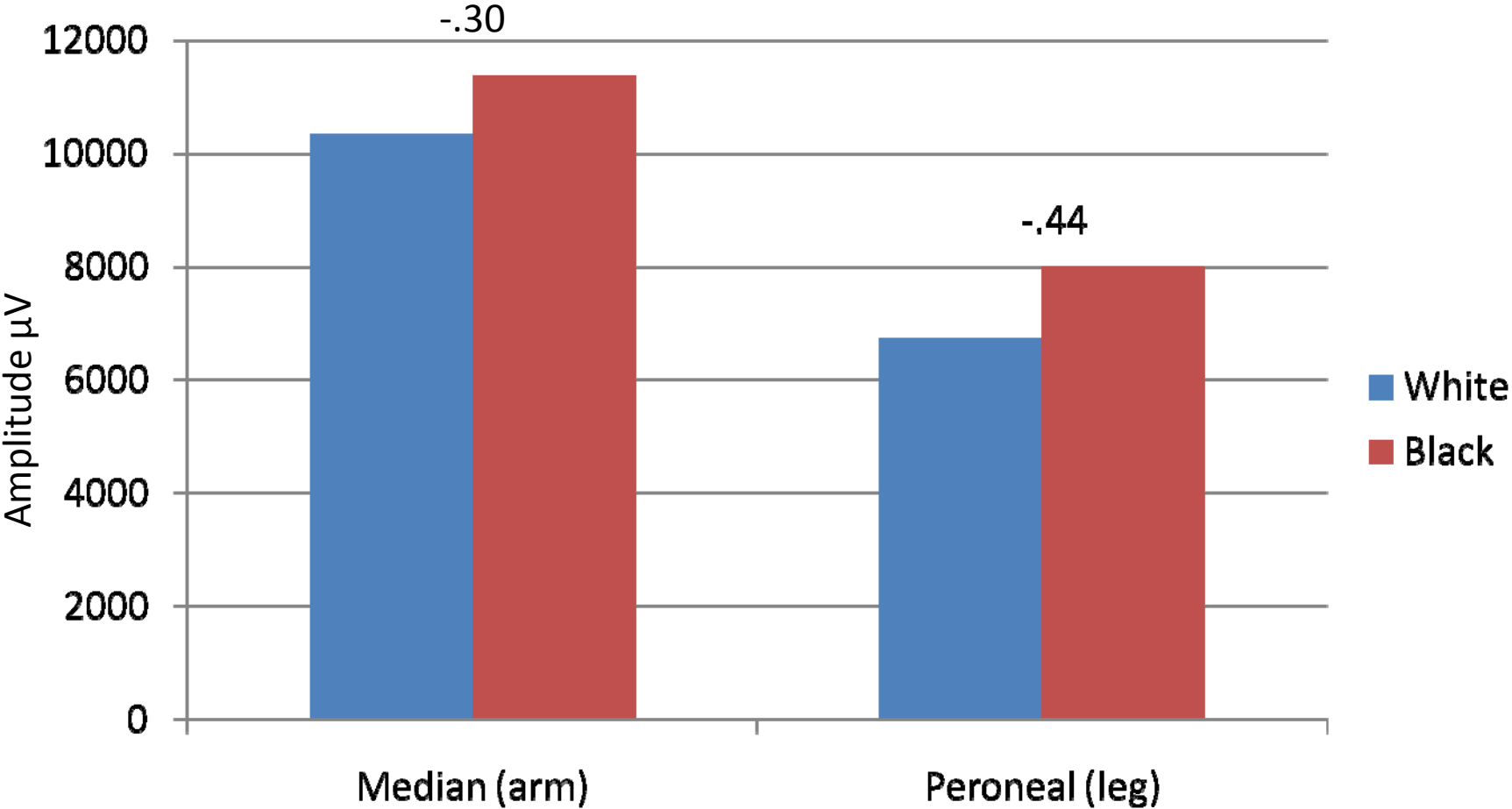
Ns = 3,417 (whites), 467 (blacks)

Income category

Sensory and Motor Nerve Conduction, by Race and *g* Level:
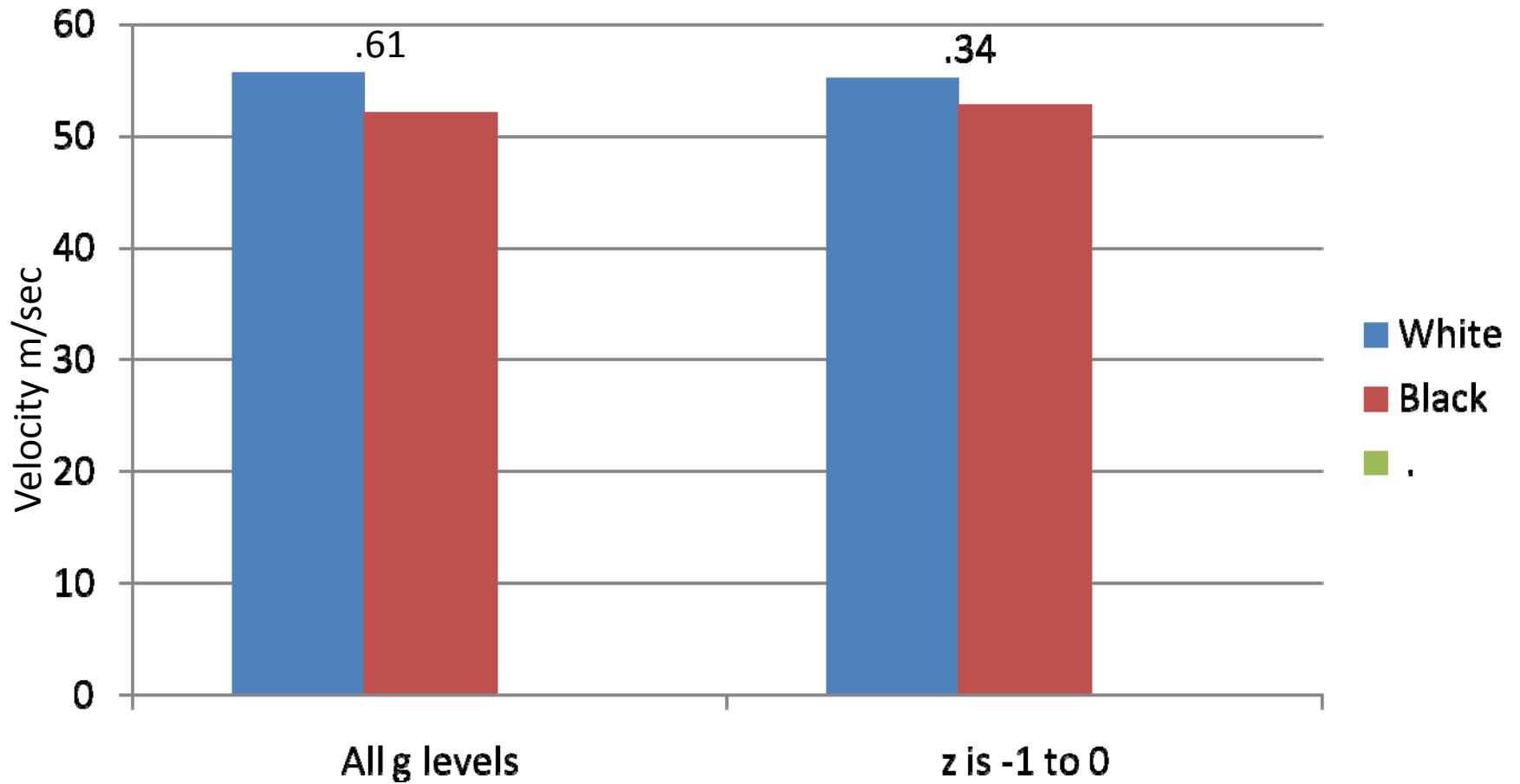Mean Standardized Velocity and Amplitude (7 & 4 tests)

Effect Sizes for 3 Sensory Nerve Amplitudes

Effect Sizes for 2 Motor Nerve Amplitudes

Effect Sizes for Ulnar Sensory Nerve Velocity

Tentative Conclusions: Overall "Fitness"

- Peripheral nerve conduction correlated with g (~.20)
  - Body is vast information processing system
- g relates mostly to sensory, not motor conduction
  - Bodily input, not output
- Races differ in sensory-motor profiles
  - Whites higher in sensory, lower in motor (at all g levels)
  - Same known for reaction time: decision vs. movement time
  - Major race difference here was in <u>ulnar</u> conduction (wrist-hand)
- Evolutionary tradeoff between sensory and motor?
  - More consistent with Genetic-Fitness than System-Integrity theory of g as signal of physiological fitness

Thank you.