RELATIONS BETWEEN SOCIO-ECONOMIC STATUS AND SKILLS IN PIAAC

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MAKING RESEARCH RELEVANT

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Socio-economic Status (SES) Definition
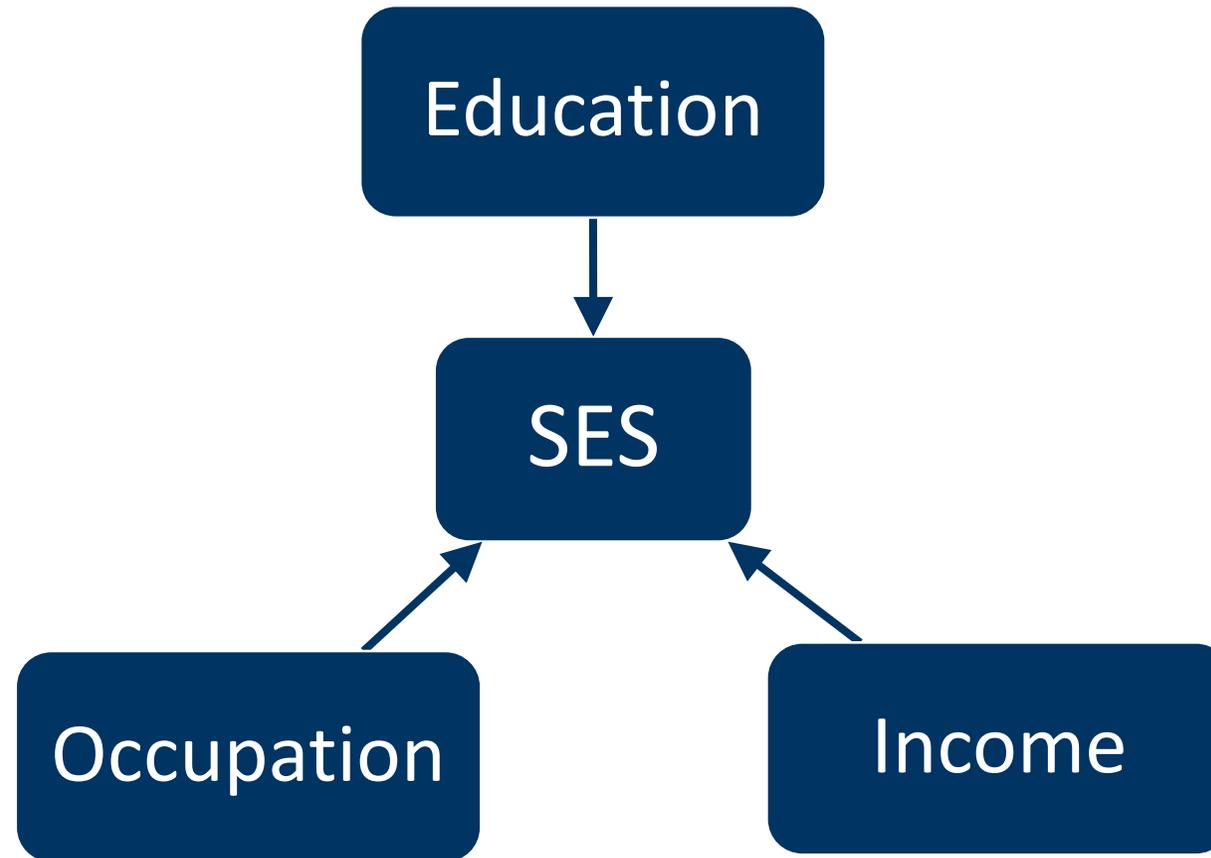
Access to…

Financial

Social

Cultural

Human

Capital Resources

(Cowan et al., 2012)

"Big 3" SES Components

Importance of SES

- Low SES has been associated with worse educational and health outcomes
- Intersection between SES with other sociodemographic characteristics
  - Gender
  - Native language
  - Age
  - Race/ethnicity
- Important… yet hard to measure

"SES is a **consistent** and **reliable predictor** of a vast array of outcomes across the life span, including physical and psychological health. Thus, SES is **relevant** to all realms of behavioral and social science, including research, practice, education and advocacy." (APA)

Introduction

- How can we account for socio-economic status (SES) when analyzing results from large scale assessments such as PIAAC?
  - Traditionally, PIAAC uses parental education as a proxy for SES
  - However, we'd like to propose a better measure… a new proxy SES index variable
- The new proxy SES index variable:
  - Uses a methodology that has previously been demonstrated with NAEP and TIMSS data (Broer et al., 2017; Bai & Broer, 2017)
  - Uses PIAAC data from the U.S 2012/14 Household RUF [Population ages 16-74]
    - » Numeracy & Literacy

Objectives for the PIAAC SES Index

✓ ## Useful
- Researchers
- Policy Makers

✓ ## Comprehensible
- General Public

Today, we will demonstrate a **proof of concept** using the **U.S. dataset**

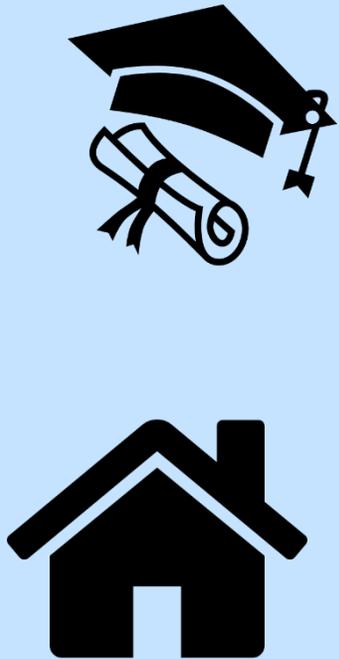# Methodology for constructing the SES index

The PIAAC SES Index

CHILDHOOD SUBINDEX

+

ADULTHOOD SUBINDEX

=

SES INDEX

❶ Mother's Education Level

❷ Father's Education Level

❸ Respondent's Books in Home (Age 16)

❹ Respondent's Highest Education Level

❺ Respondent's Observed SES Status

Index Components

CHILDHOOD SUBINDEX

Component and Level	INDEX Value
❶ Mother's Education Level	
Less than high school diploma	0
High school diploma/some college	1
College degree or higher	2
❷ Father's Education Level	
Less than high school diploma	0
High school diploma/some college	1
College degree or higher	2
❸ Books in Home (When at Age 16)	
10 books or less	0
11 to 25 books	1
26 to 100 books	2
101 to 200 books	3
More than 200 books	4

ADULTHOOD SUBINDEX

Component and Level	INDEX Value
❹ Respondent's Highest Education Level	
Below high school	0
High school credential	1
Associate's degree	2
Bachelor's degree	3
Graduate or professional degree	4
❺ Respondent's Observed SES Status	
Poor	0
Working class	1
Middle-middle class	2
Affluent or upper middle class	3

Index Range 0-15 points

Results

Comparison Statistics (NAEP, PISA, & PIAAC)

| PIAAC (2012/14)	PIAAC (2012/14) R^2 Values			
Domain	PARED	CHILDHOOD$_{SESIndex}$	ADULTHOOD$_{SESIndex}$	SESINDEX
Numeracy	0.135	0.214	0.272	0.339
Literacy	0.150	0.218	0.254	0.332

NOTE: based on complete case sample

Weighted Percentage Distribution of SES Index Points
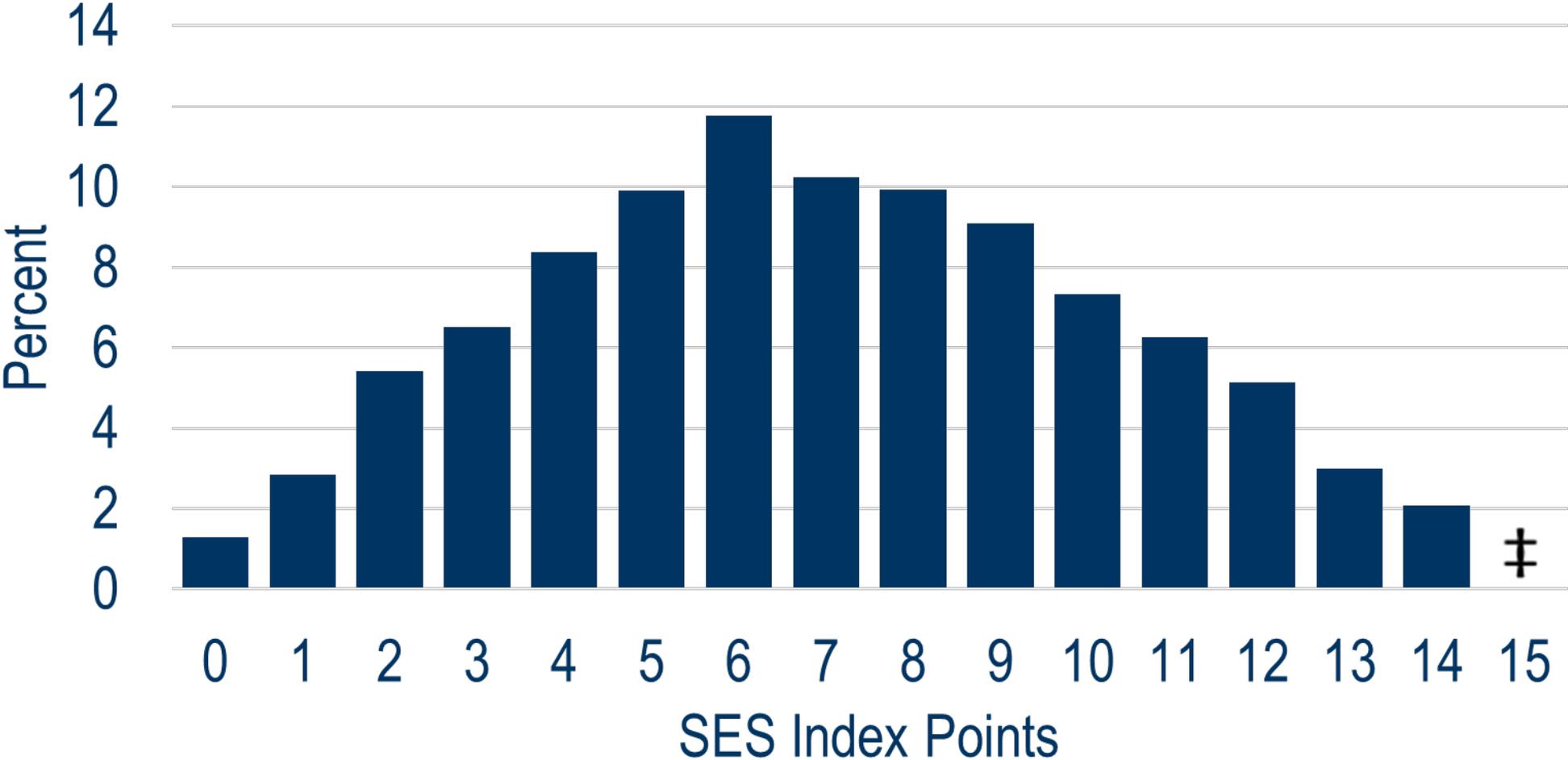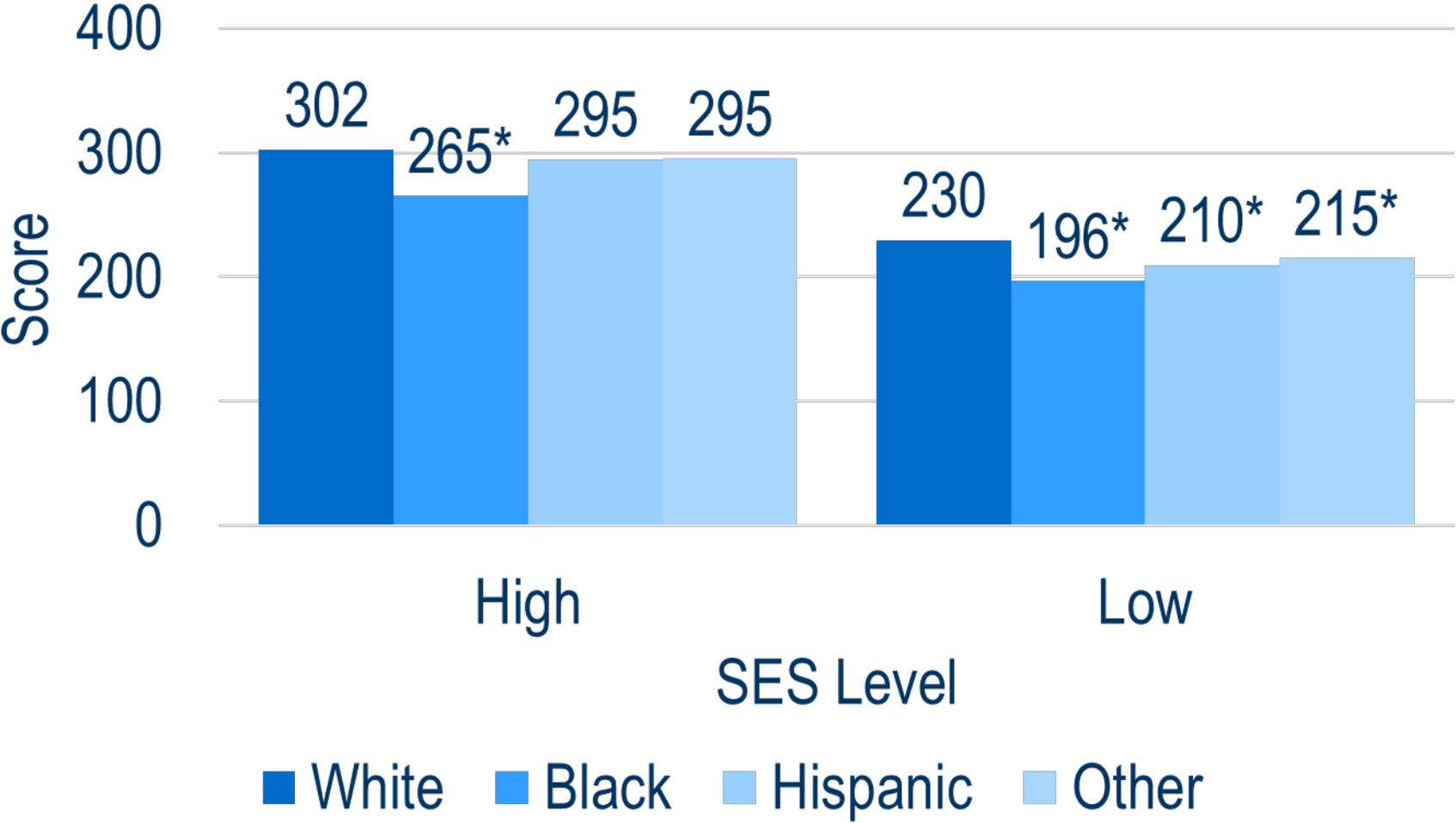

‡ Reporting standards not met (too few cases for a reliable estimate).

Mean Numeracy Scores by SES Index Points and Proficiency Levels
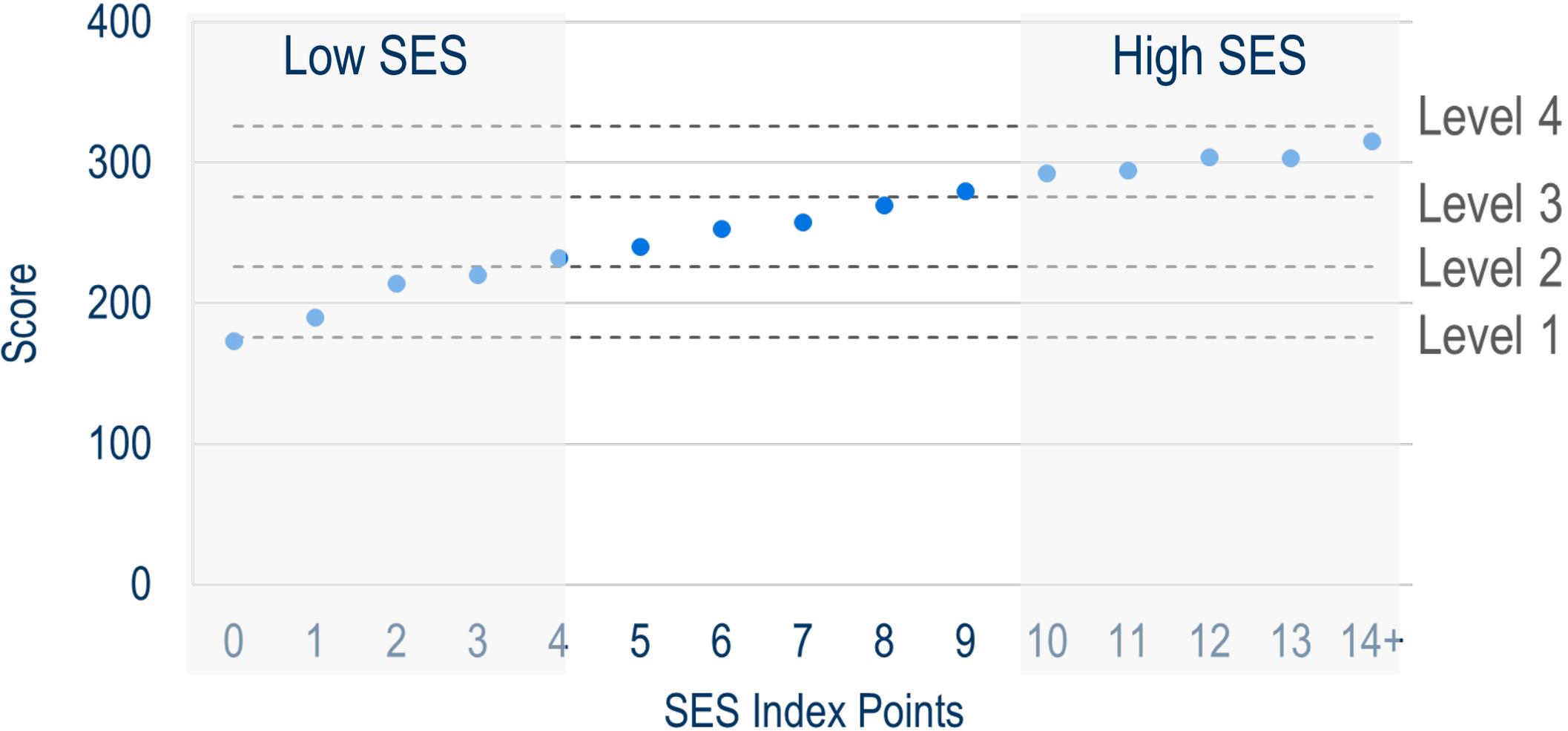
NOTE: Mean scores for 14 and 15 points in the SES Index were collapsed to meet data reporting standards.
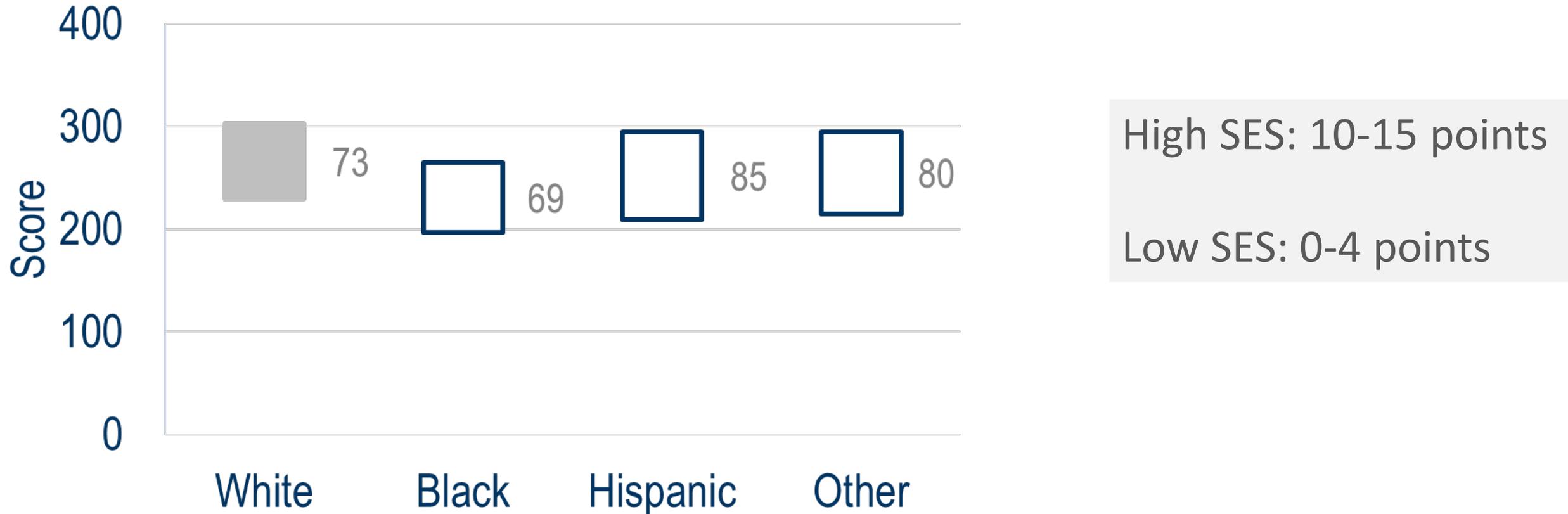
Mean Numeracy Scores by SES Level and Race

High SES: 10-15 points

Low SES: 0-4 points

*Statistically significant from white.

Numeracy Score Gaps for high vs low SES by race/ethnicity

High SES: 10-15 points

Low SES: 0-4 points

NOTE: A bar without shading denotes that the score gap was not statistically significant than the score gap for whites.

Linear Regression Model

Score	Base Model	+ PARED	+ CHILDHOOD	+ ADULTHOOD	+ Full
			SES Index		
Gender Race/Ethnicity Native English Language Speaker	✓	✓	✓	✓	✓
PARED		✓			
CHILDHOOD			✓		
ADULTHOOD				✓	
Full SES Index					✓

Numeracy Regression Results

Variables	Base Model coef	se	Base Model + PARED coef	se	Base Model + CHILDHOOD coef	se	Base Model + ADULTHOOD coef	se	Base Model + SES Index coef	se
Constant	279.2***	(1.39)	226.0***	(3.05)	238.3***	(1.86)	231.1***	(1.79)	214.6***	(2.01)
Female	-15.1***	(1.27)	-13.8***	(1.29)	-14.2***	(1.21)	-15.4***	(1.22)	-14.5***	(1.18)
Black	**-50.8***	(2.95)	-47.0***	(2.63)	-42.1***	(2.58)	-36.6***	(2.63)	**-34.8***	(2.42)
Hispanic	**-39.4***	(3.18)	-30.6***	(3.04)	-24.9***	(2.76)	-19.9***	(2.70)	**-15.1***	(2.61)
Other	-9.1**	(3.86)	-12.1***	(3.56)	-10.2***	(3.54)	-10.9***	(3.19)	-11.2***	(3.36)
Nonnative	-5.4	(3.34)	-0.2	(2.93)	1.3	(2.79)	-9.3***	(2.57)	-1.8	(2.44)
Pared			23.1***	(1.19)						
Childhood					9.5***	(0.34)				
Adulthood							14.1***	(0.47)		
SES Index									8.4***	(0.24)
R^2	0.158		0.248		0.302		0.355		0.402	

*** p<0.01, ** p<0.05, * p<0.1   NOTE: N=7,650. Counts were rounded to the nearest 10.

Numeracy Regression Results: Race/ethnicity Coefficient, by model
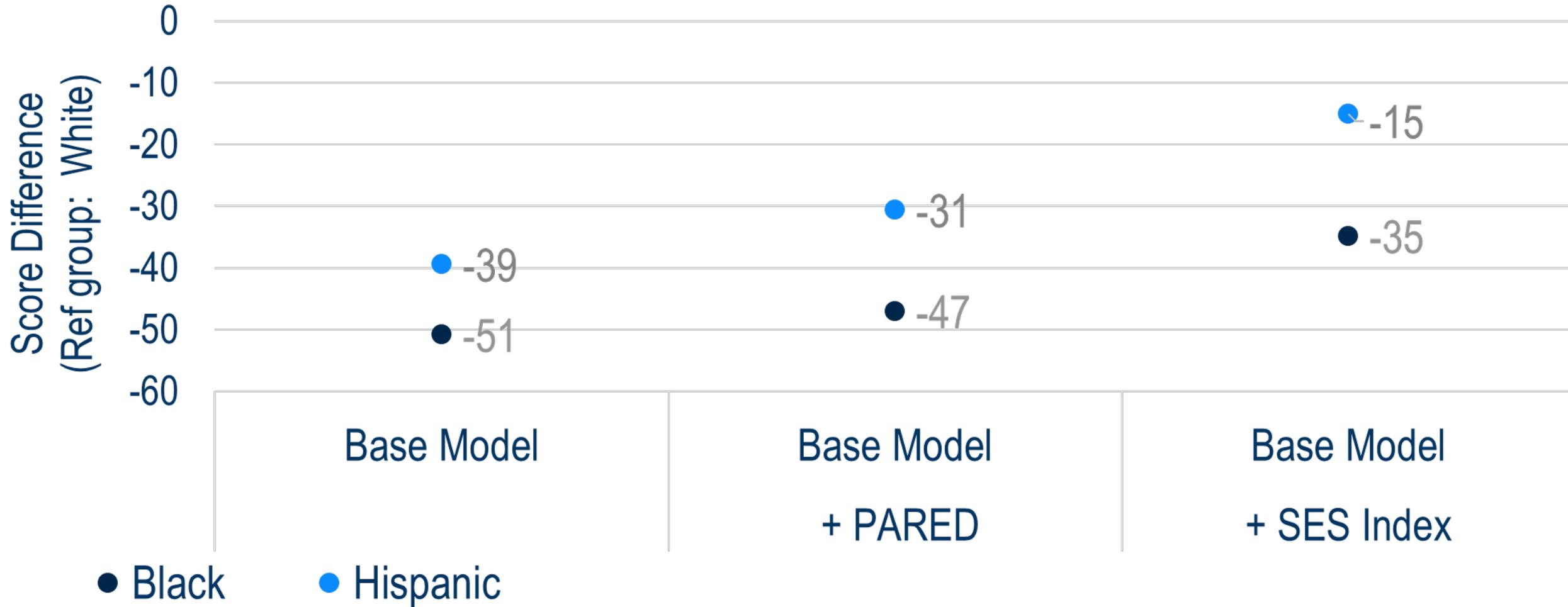
NOTE: A shaded circle denotes statistical significance.

Conclusion

Conclusion

- The SES Proxy Index
  - Is a proof of concept for the U.S. PIAAC dataset.
  - Is a more effective control variable than parental education alone in explaining the variation in numeracy (and literacy) skills.
- Analyses without a more nuanced indicator of SES may overestimate the potential effect of predictors on the outcome.
- We encourage researchers to use a more comprehensive SES indicator as control variable to increase the likelihood of identifying malleable factors for policy initiatives or rigorous testing.

References

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