

The Native Hawaiian Student Achievement Gap: Different Methods, Different Estimates

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Better Outcomes for All Kids



Improve outcomes
for disadvantaged
groups



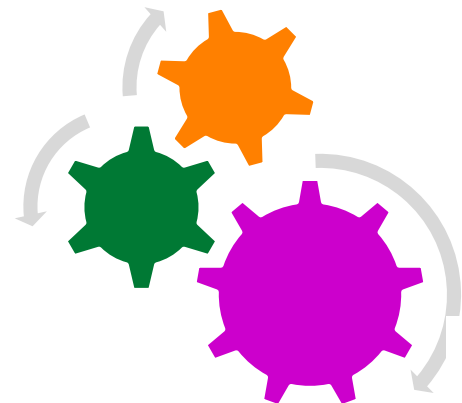
Close the achievement gaps



Key Findings

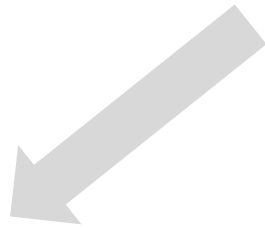
NCLB-type reporting masks:

- Diversity *within* Hawai'i's Asian Pacific Islander population
- Lower performance of this population *even with the same* early academic foundation, SES and ELL status
- Nested structure of the data



Research Questions

What is the estimate of the disadvantage Native Hawaiian students face in comparison with their white counterparts at grades 3 through 8 and 10, as calculated through



The traditional effect size d based on mean differences?



A multilevel approach that takes confounding factors into account?





Model Variables: Reading

Outcomes:

2011 Reading HSA
in grades

- 3 – 8
- 10

Predictors

- Ethnicity
(Hawaiian/white)
- SES (FRPL)
- SPED



Multilevel Model

Level 1

$$Y_{ij} = \beta_{0j} + \beta_{1j}(\text{Hawaiian})_i + \beta_{2jk}(\text{SES})_i + \beta_{3jk}(\text{SPED})_i$$

Level 2

$$\beta_{0j} = \gamma_{00} + \mu_{0j}$$

$$\beta_{mj} = \gamma_{m0} \quad m = 1..3$$

$$Y_{ij} = \gamma_{00} + \gamma_{10}(\text{Hawaiian})_i + \gamma_{20}(\text{SES})_i + \gamma_{30}(\text{SPED})_i + \mu_{0j} + \mathbf{r}_{i(jk)}$$

Where $i = i^{\text{th}}$ student, $j = j^{\text{th}}$ school, $Y_{i(jk)}$ = HSA score of the i^{th} student from the j^{th} school



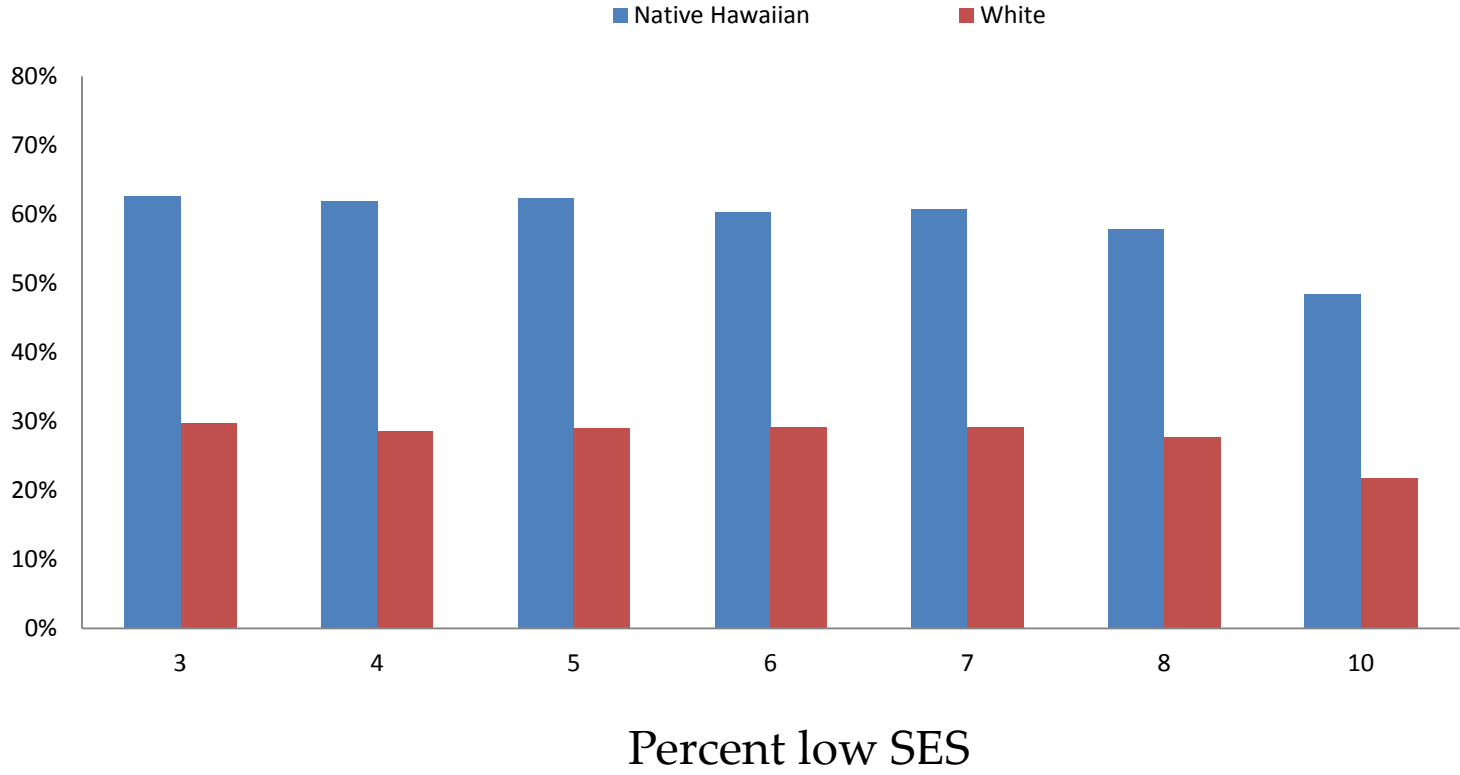
Reading HSA

Grade	Native Hawaiian			White			Total			2011 Cohort		
	N	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD
3	4,125	304.59	32.15	2,210	325.85	37.22	6,335	312.01	35.48	14,360	312.69	35.04
4	3,716	307.47	31.64	2,033	330.17	36.58	5,749	315.49	35.18	13,530	315.23	35.02
5	4,038	304.91	30.82	2,100	328.51	34.78	6,138	312.98	34.11	14,440	313.01	34.20
6	3,845	305.46	28.88	1,876	327.58	30.88	5,721	312.71	31.32	13,467	312.41	32.06
7	3,583	302.25	30.23	1,655	328.27	34.36	5,238	310.47	33.83	13,137	311.55	34.26
8	3,308	303.63	27.26	1,700	326.43	31.62	5,008	311.37	30.77	12,708	312.55	31.71
10	3,367	300.09	26.32	1,779	322.61	28.66	5,146	307.88	29.18	12,930	308.71	28.72



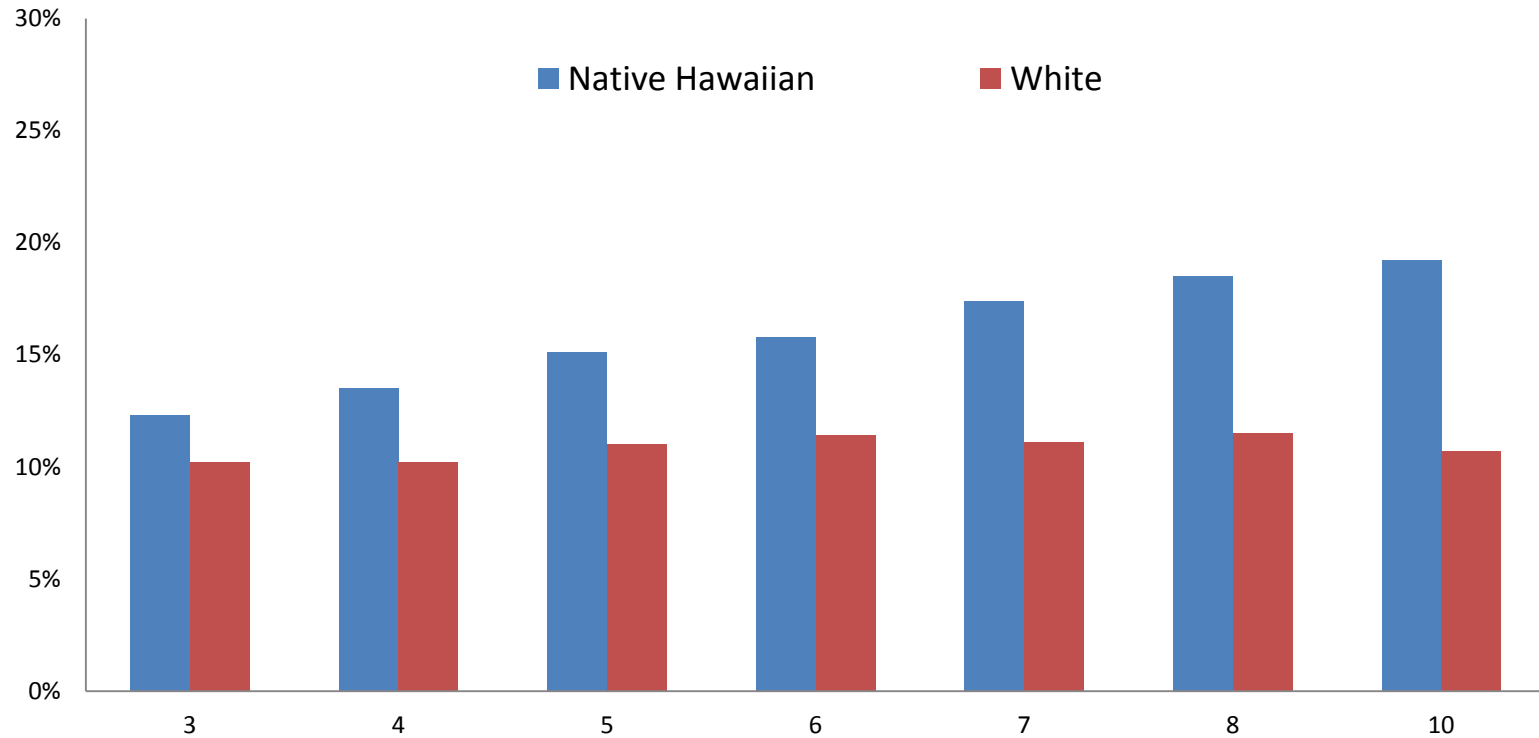


Achievement Mirrors Differences in Poverty Across Subgroups





Distribution in Special Education





HLM Estimates for Reading				
Grade	3	5	8	10
N	6,335	6,138	5,008	5,146
Fixed Effect	Coefficients	Coefficients	Coefficients	Coefficient
Intercept	334.42***	335.46***	331.31***	326.65***
Hawaiian	-15.51***	-17.86***	-17.85***	-17.00***
SES	-11.32***	-8.57***	-5.57***	-5.58***
SPED	-40.79***	-40.36***	-34.46***	-29.75***
Random Effect	Variance Components	Variance Components	Variance Components	Variance Components
μ_{0j}	97.43***	58.20***	27.61***	16.16***
Residual	821.44***	771.54***	647.85***	592.70***
R ²	0.35	0.35	0.32	0.31
ICC	0.12	0.10	0.10	0.09

* $p \leq 0.05$, ** $p \leq 0.01$, *** $p \leq 0.001$, n.s. not significant, N.A. not applicable. Numbers in parentheses are standard errors.





Predictor	Reading			
	Standardized coefficients			
	Grade 3	Grade 5	Grade 8	Grade 10
Hawaiian	-0.43	-0.44	-0.57	-0.58
SES	-0.31	-0.23	-0.17	-0.19
SPED	-1.13	-1.16	-1.06	-1.00



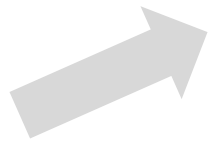
Overestimation of Hawaiian/White Gap

Grade	Reading			Math		
	Effect size (d)	Standardized weights (Z)	Ratio	Effect size (d)	Standardized weights (Z)	Ratio
3	-0.61	-0.43	1.42	-0.51	-0.35	1.46
4	-0.66	-0.44	1.50	-0.49	-0.33	1.48
5	-0.72	-0.44	1.64	-0.54	-0.36	1.50
6	-0.74	-0.49	1.51	-0.49	-0.33	1.48
7	-0.80	-0.59	1.36	-0.58	-0.41	1.41
8	-0.78	-0.57	1.37	-0.56	-0.36	1.56
10	-0.82	-0.58	1.41	-0.53	-0.31	1.71

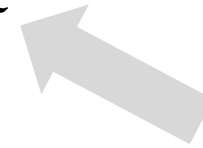


Conclusion

1. NCLB-type method overestimates the Hawaiian-white contrast



Unequal proportions
of low SES/SPED



Between-school
differences

2. Role of previous grade
HSA score



Low R-squared



Considerations

1. Take action based on the correct gap.
2. Leverage "academic readiness" to increase fairness.

Singh 2011, 2012, & 2013 and Singh et al., 2014.





Limitations

1. Dichotomous coding of SES is consistent with NCLB, but imprecise.
2. Low socioeconomic status numbers may be underrepresented at the later years.



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