Have inequities in BMI widened in a nationally represented cohort of kindergarteners?

Alicia Yang

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Committee:

Jessica Jones-Smith

Shirley A. A. Beresford

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Abstract

Have inequities in BMI widened in a nationally represented cohort of kindergarteners?

Alicia Yang

Chair of the Supervisory Committee:

Jessica Jones-Smith

Health Services, Epidemiology

Objective: The primary objective of this study was to determine if inequities in growth trajectories measured by BMI between white and non-white groups have widened in school-aged children.

Methods: Data from the 1998 and 2010 kindergarten cohorts of the Early Longitudinal Childhood Study were analyzed for differences in growth rates by race/ethnicity. Sex-stratified, linear regression models that included a three-way interaction term between race/ethnicity, age, and cohort and controlled for age and socioeconomic status to determined whether inequities have changed significantly over time.

Results: Black/African American boys had an overall higher change in BMI per year of 1.04 kg/m^2 compared to their white peers (CI:0.08,2.0;$p<0.05$) in the 2010 cohort. This higher slope in BMI per year was also the case for boys of two or more race/ethnicities [2.9 kg/m^2 (CI:1.2,4.6;$p<0.001$)], Hispanic girls [0.95 kg/m^2 (CI:0.3,1.6;$p<0.01$)], and Native Hawaiian/Pacific Islander girls [5.17 kg/m^2 (CI:0.6,9.8;$p<0.05$)].

Conclusion: Inequities in BMI have widened in multiple non-white race/ethnicity groups of children compared to white children, specifically black/African American boys, boys of two or more race/ethnicities, Hispanic girls and Native Hawaiian/Pacific Islander girls. For other non-white groups, inequities have persisted from the 1998 to the 2010 cohort. Overall, we find that these differences in BMI between white and non-white groups should be cause for public health concern.

Introduction

Childhood overweight has become an increasing public health concern due to its increased risk of obesity and co-morbidities later on in adulthood.[1,2] In the United States, one in three children or adolescent has overweight or obesity. The CDC reports that 18.4% of school-aged children (6-11 years) are of an obese weight.[3] Further, rates of overweight and obesity have been higher in non-white children compared to their white counterparts.[4–7] Black/African American children ages 6 to 17 have experienced significantly greater increases in BMI and prevalence of overweight compared to their white peers since the 1970s to early 2000s.[7] Rates of obesity for Hispanic and black/African American children were significantly higher than white children, 26%, 22% and 14%, respectively, based on 2016 NHANES data.[8]

While some research has indicated no significant linear trend in prevalence of childhood obesity or severe obesity (ages 2-19)[8] and other analysis of NHANES has also shown a plateauing of obesity rates[9–11], some research has also suggested otherwise.[5,12] A 2019 study found a positive linear trend for overweight and all three classes of obesity for both sexes, with all ages combined using NHANES data from 1999-2016.[4] Specifically, the increasing linear trend was most apparent for Hispanic females and males.[4]

While racial/ethnic inequities in childhood overweight and obesity have been established, a clearer understanding of these overall trends and trends within subgroups is needed. Determining if differences in growth trajectory of non-white race/ethnic groups have narrowed, widened or stabilized are important in understanding impact of public health efforts to reduce childhood overweight and obesity and systemic inequities in childhood growth trajectories. “Disparities” is a term referring to differences, often in incidence, prevalence, morbidity or mortality, between population groups that are defined by characteristics such as socioeconomic status, sex, residence and most often, race or ethnicity.[13,14] In this paper, we purposefully use “inequities” in recognition that these disparities are avoidable and unjust due to systemic differences that promote social advantage and privilege.[14,15] Further, we focus our analysis on white versus non-white race/ethnic groups in light of how the social position and advantages of white populations shape health outcomes.[16]

The Early Childhood Longitudinal Program (ECLS), administered by the National Center for Education Statistics, includes nationally-representative longitudinal studies of one birth cohort and two

kindergarten cohorts (ECLS-K).[17] The studies tracked child development, school readiness, and early school experiences. Multiple studies have analyzed the birth and 1998 kindergarten cohorts, of which several have concluded that race/ethnic inequities exist in prevalence of overweight or obesity or growth trajectories.[8,18–20] To date, there are no studies to our knowledge comparing the rate of BMI change between these two cohorts by race/ethnicity. The objective of this study is to determine if inequities in BMI exist by race/ethnicity and if these inequities have widened over time in the ECLS-K cohorts.

Methods

Study population

The data for this study was obtained from the National Center for Education Statistics. We used the public-use data files of the ECLS kindergarten cohorts.[21] ECLS-K used a multistage probability sample design to select kindergarteners. Geographic areas, composed of counties or groups of counties, were primary sampling units (PSUs). School and kindergarten programs sampled within PSUs were second-stage units, followed by students within the schools as third-stage units. The 1998 cohort (n=21,356) was followed from kindergarten (K) to 8th grade (K,1st, 3rd, 5th, 8th grades) and the 2010 cohort (n=18,174) was followed from kindergarten to 5th grade (K,1st,2nd,3rd, 4th, 5th grades). Subsample data was also collected in fall of 1st grade during the 1998 cohort and 1st and 2nd grades in the 2010 cohort.

For the purposes of this study, excluded fall subsample data, used spring waves of K, 1st, 3rd or 5th grade of the 1998 cohort and spring waves of K, 1st, 2nd and 4th grades for the 2010 cohort and excluded any children from our analysis that had missing BMI data from these specified waves. After all exclusions, our sample size was 12,332 for the 1998 cohort and 10,961 for the 2010 cohort. ECLS provided weights to account for the probability of selection at each sampling stage and to adjust for nonresponse that were used in all analysis. Taylor series linearized standard errors were also used. Data were analyzed using Stata 15.1 (Stata Corp LLC).

Primary Outcome: Body Mass Index (BMI)[22,23]

Our primary outcome of interest was change in body mass index (BMI) per year of age. BMI was calculated by ECLS staff using measured height and weight. Height (in inches to the nearest quarter inch) and weight (in pounds to one decimal place) were collected by field staff using a Shorr board and digital

scale, respectively. Both were measured twice to ensure reliable measurement. If the two height values obtained were less than two inches apart, the average was computed. Otherwise, the value that was closest to the median height developed by the National Center for Health Statistics (NCHS) for the respective age for grade was used. Similarly, if the two measured weight values were less than five pounds apart, an average was computed. Otherwise, the value closest to the median weight developed by NCHS for the respective age for grade was used.

In this analysis, BMI was also standardized to BMI z-score and age in years were used to create a variable indicating if a child was classified as overweight or obese, z-score>1.036433 (>85th percentile), based on CDC Growth Charts.[24]

Independent Variable: Race/Ethnicity

Race/ethnicity information was obtained from parent interview responses about the child's biological parents. If race/ethnicity data of the child was unavailable, data from the Field Management System (from school administrative records or existing data sources or from data collection staff and school staff) was used. Six race dichotomous variables and Hispanic ethnicity variables were combined to create 8 possible categories for the composite variable. We combined Hispanic ethnicity specified and not-specified to create a 7-category race/ethnicity variable: Hispanic or Latino, race specified or not specified; white, non-Hispanic; Black/African American, non-Hispanic; Asian, non-Hispanic; Native Hawaiian/Pacific Islander, non-Hispanic; Native American/Alaska Native, non-Hispanic.

Covariates

Age

ECLS-K provided composite age in months at each wave, which was calculated by first determining the number of days between birth and the date of data collection. Number of days was then divided by 30 to determine age in months. For this analysis, age in months was divided by 12 to generate age in years for ease of interpretation in the regression model. Unrounded age was used in generating BMI z-scores.

Socioeconomic Status

A socioeconomic status (SES) composite score was generated by ECLS using occupation prestige scores, income and education of the child's parents or guardians. Occupational prestige scores were coded based on 1989 General Social Survey prestige scores for both cohorts. SES scores were

generated in spring of K, 3rd, 5th and 8th grades and in fall of 1st grade for a subsample in the 1998 cohort. An SES score was computed for spring of K and 2nd grades in the 2010 cohort. For consistency, the SES variable from kindergarten in both cohorts were used for this analysis. The kindergarten SES scores were divided into tertiles for both cohorts.

Poverty

Poverty was used for descriptive purposes because household income was incorporated in the ECLS-K SES score that was included in the regression models. Reported income and household size collected from parent interviews were used to create a composite poverty level variable. U.S. Census Bureau poverty thresholds from 2003 were used to determine if the child's family was above or below 100% poverty in the 1998 cohort. The 2010 cohort used three categories specified by poverty thresholds from 2014: <100% of poverty threshold, ≥100% but <200% of the poverty threshold, or ≥200% of the poverty threshold. We created a new variable for the 1998 cohort that applied the same three levels of poverty using detailed income information from kindergarten parent interviews and 2003 Census poverty thresholds.

Statistical Analysis

Key characteristics were analyzed in each cohort for children who had BMI data available for spring K, 1st, 3rd and 5th grades (1998 cohort) and K,1st, 2nd and 4th grades (2010 cohort). We also calculated the mean BMI and proportion of children classified as overweight or obese based on BMI z-score at each wave for kindergarten poverty thresholds, kindergarten SES tertiles and race/ethnicity categories.

Prior studies have indicated differences by sex in SES and BMI associations.[18,25,26] Accordingly, we used sex-stratified, linear regression models to compare growth rates of each race/ethnic group of children in both cohorts. We first ran separate models for the 1998 and 2010 cohorts and tested the interaction between race/ethnicity and age, while controlling for the ECLS-K SES score and age. Because collection of data occurred at differing end points, 5th grade and 4th grade for the 1998 and 2010 cohorts, respectively, we tested differences in BMI at age 6, the approximate age at spring of kindergarten, and age 10, the approximate age at spring of 4th grade.

We compared all race/ethnic groups and found that in non-white comparisons, significant differences were predominantly between Asian and non-Asian children. Those of Asian race/ethnicity have been

shown have higher body fat and lower BM.[15] Further, because our primary interest is continued understanding of inequities between least advantaged to the most advantaged group[14], we subsequently limited our testing of statistical differences to those between white and non-white groups.

To determine if differences in BMI by race/ethnicity have changed significantly over time, we used sex-stratified linear regression while controlling for age and SES tertile and included a three-way interaction between race/ethnicity, age and cohort. We tested the difference between slopes of change in BMI per year of white and non-white groups between the 1998 and 2010 cohorts.

We additionally ran all linear regression without controlling for SES tertile to determine potential mediation effects of SES on BMI. All linear regression models utilized sampling weights to account for study design and non-response and Taylor series linearized standard errors to account for sample design. Stata 15 was used to perform all analyses.

Results

Key Characteristics

Table 1 presents key characteristics of the cohorts. The 1998 cohort had a higher mean age and BMI (8.4±0.01 years, 18.1±0.06 kg/m^2) than the 2010 cohort (8.1±0.01 years, 17.9±0.07 kg/m^2); the former included data until 5th graders, whereas the later cohort included data until 4th grade. Both cohorts had a higher proportion of males than females. The proportion of each race/ethnic groups differed by cohort. The 2010 cohort had a lower percentage of children who were white (1998: 59%; 2010: 49%) and higher percentage of Hispanic children (1998: 17%; 2010: 27%), as well as Asia children and children of two or more races.. The 1998 cohort had a higher proportion Native Hawaiian/Pacific Islander and Native American/ Alaska Native children. The proportion of children with overweight or obese weight increased from 26% to 34% in the 1998 cohort and from 30% to 38% in the 2010 cohort.

Table 1. Key Characteristics of ECLS Kindergarten Cohorts

Characteristic	1998 Cohort (n=12,332)[a]	2010 Cohort (n=10,961)[a]
	Mean (SE)[b]	
Age (years)	8.4 (0.009)	8.1 (0.01)
BMI (kg/m2)[c]	18.1 (0.06)	17.9 (0.07)
	% Percent (n)[a]	
Sex		
Male	50.7 (6,248)	51.1 (5,591)
Female	49.3 (6,084)	48.9 (5,355)
Poverty threshold[d]		
<100% PT	24.3 (2,824)	23.5 (2,073)
≥100% PT <200% PT	26.1 (3,033)	21.5 (1,890)
≥200% PT	49.6 (5,753)	55.0 (4,847)
SES Score[e]		
Tertile 1	30.7 (3,652)	32.1 (3,189)
Tertile 2	34.6 (4,122)	32.2 (3,202)
Tertile 3	34.7(4,122)	35.7 (3,547)
Race/Ethnicity		
White, non-Hispanic	58.6 (7,224)	48.6 (5,318)
Black/African American, non-Hispanic	12.3 (1,512)	10.2 (1,115)
Hispanic	17.2 (2,115)	27.4 (2,998)
Asian, non-Hispanic	6.3 (718)	8.4 (920)
Native Hawaiian/ Pacific Islander, non-Hispanic	1.3 (157)	0.56 (61)
Native American/ Alaska Native, non-Hispanic	1.8 (218)	0.86 (94)
Two or more races, non-Hispanic	2.5 (312)	4.1 (447)
Overweight or obese		
Kindergarten spring	26.3 (3,235)	29.6 (3,240)
1st grade spring	27.3 (3,355)	29.9 (3,277)
2nd grade spring	–	32.1 (3,523)
3rd grade spring	34.6 (4,265)	35.7 (3,909)
4th grade spring	–	37.6 4,126)
5th grade spring	38.7 (3,723)	–

[a] Unweighted values
[b] Weighted estimates and Taylor series linearized standard errors
[c] Height and weight collected by ECLS-K staff
[d] Based on 2003 and 2014 U.S. Census Bureau poverty thresholds
[e] Lower tertile indicates lower ECLS-generated SES score

Figures 1 and **2** illustrate the proportion of children who were overweight or obese (≥85% z-score) in each wave of data collection by cohort. These proportions and mean BMI at each wave, categorized by race/ethnic group, poverty level and SES tertile, are specified in Supplementary Tables 1 and 2. In general, the proportion of children classified as overweight or obese increased over time. These point estimates were higher in non-white race/ethnic groups except for Asian children.

In white children, proportions of overweight or obesity increased from 23% in kindergarten to 36% in 5th grade in the 1998 cohort and from 26% in kindergarten to 33% in 4th grade in the 2010 cohort. In 1998, 28% of black/African American children, 34% of Hispanic children, and 30% of Native American/Alaska Native and were overweight or obese in kindergarten and 41%, 49%, and 42% of children were in 5th grade, respectively. In 2010, 25% of black/African American, 35% of Hispanic, and 34% of Native American/Alaska Native children were overweight or obese. By 4th grade, 44% of black/African American, 46% of Hispanic, and 53% of Native American/Alaska Native children were overweight or obese. Highest poverty level and higher SES tertile, which indicated a higher socioeconomic status, also had lower proportions of children who were overweight or obese in all grades of both cohorts.

Figures 3 and **4** shows BMI from age 6 to 10 by race/ethnic group in each cohort, stratified by sex and controlled for SES and age. Supplementary Table 3 includes raw output of differences in BMI between white and non-white race/ethnic groups from the regression models. No significant differences were found between white and non-white girls at age 6 in the 1998 cohort. By age 10, black/African American and Hispanic girls had a significantly higher BMI than their white counterparts, 1.31 kg/m^2 (CI:0.37,2.26; p<0.01) and 0.69 kg/m^2 (CI:0.17,1.21; p=0.01), respectively, whereas Asian girls has a lower BMI by 0.85 kg/m^2 (CI:0.2,1.5; p=0.01). In the 2010 cohort, at age 6, black/African American girls had a higher BMI of 0.51 kg/m^2 (CI:0.02,0.99; p<0.05) and Asian girls had a lower BMI of 0.58 kg/m^2 (CI:0.32,0.82; p<0.001). At age 10, these differences increased to 2.1 kg/m^2 for black/African American and Native American/Alaska Native females (B/AA CI: 1.17,3.04; p<0.001 | NA/AN CI:0.17,4.05; p<0.05). Asian females had a lower BMI of 0.99 kg/m^2 than their white counterparts (CI: 0.41,1.58; p=0.001) and Hispanic girls showed a significantly higher by 0.58 kg/m^2 (CI:0.12,1.06; p<0.05).

In the 1998 cohort, Hispanic boys had a notably different BMI than their white counterparts at age 6, 0.55 kg/m^2 higher (CI:0.15,0.95;p<0.01), that widened to 1.11 kg/m^2 (CI:0.55,1.68; p<0.001) by age 10. The 2010 cohort showed similar differences; Hispanic boys had a 0.36 kg/m^2 higher BMI (CI:0.08,0.63; p=0.01) than their white counterparts that increased to 1.78 kg/m^2 (CI:0.66,1.69; p<0.001). Additionally, Native American/Alaska Native boys had a borderline statistically significantly higher BMI by 0.97 kg/m^2 (CI:0.017,1.95; p=0.055) that increased to 2.32 kg/m^2 at age 10 (CI:0.76,3.89; p<0.01).

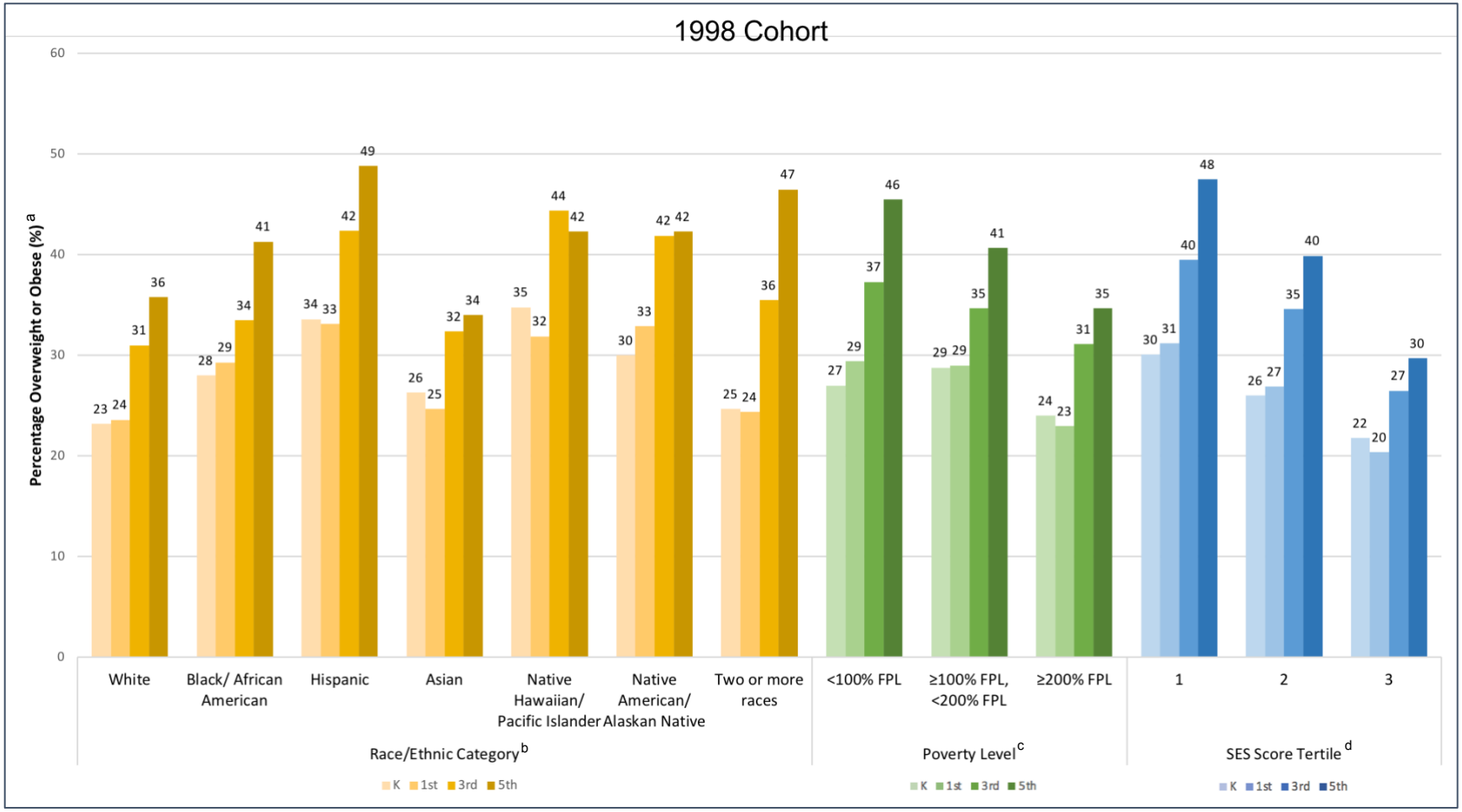
In the regression models that included the 3-way interaction, we found that inequities widened over time from the 1998 to the 2010 cohort for certain groups (**Table 3)**. Mean change in BMI per year, or slopes, were higher in non-white groups except for Asians. There was an overall increase in slope by 1.04 kg/m^2 from 1998 to 2010 between black/African American boys and their white counterparts (CI:0.077,2.0; p<0.05). Additionally, the slope between boys identified as two or more races and their white peers increased by 2.91 kg/m^2 (CI:1.20,4.62; p<0.001). Change in BMI per year between Hispanic and Native Hawaiian/Pacific Islander girls compared to their white peers widened by 0.95 kg/m^2 (CI:0.33,1.58; p<0.01) and 5.17 kg/m^2 (CI:0.57,9.77; p<0.05), respectively, from the 1998 to the 2010 cohort.

Raw output from regression models without controlling for SES compared to regression models with controlling for SES are available in Supplementary Tables 4 and 5. We found that adding SES to the regression model attenuated differences we found between white and non-white groups. For males in the 1998 cohort, adding SES to the model decreased the difference in BMI between white and non-white children. In the 2010 cohort, significant differences that we found for black/African American boys without controlling for SES were no longer significant when we added SES to the model at age 6 and 10. Hispanic boys in the 2010 cohort had a significantly higher BMI at age 6 in the models without controlling for SES and with controlling for SES tertiles.

When comparing the two cohorts with the 3-way interaction regression model, in the models without SES, only males of two or more races saw a significant increase in slope from the 1998 to the 2010 cohort. In the models that did control for SES, both Black/AA and children of two or more races saw significant changes in the differences of slopes.

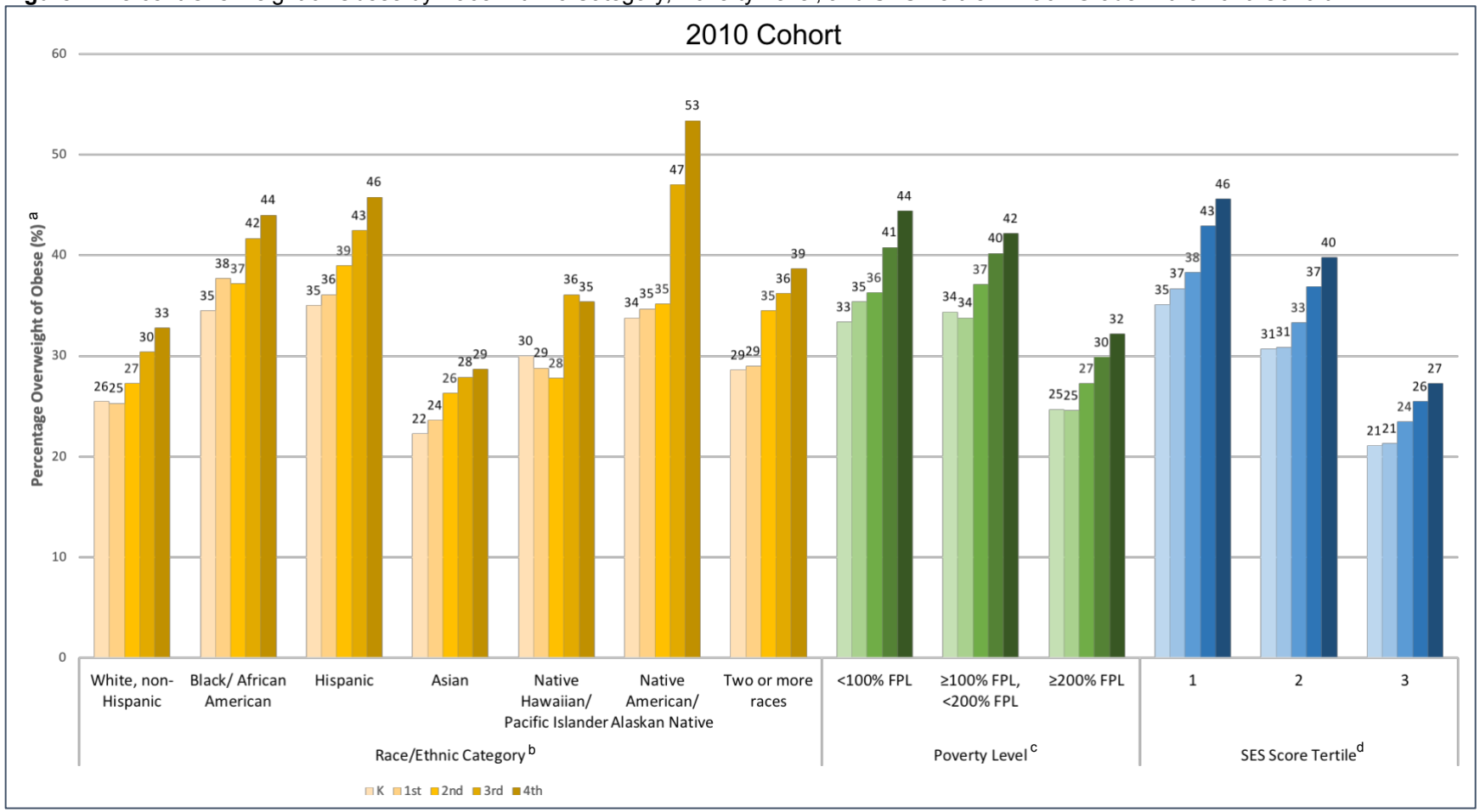
Controlling for SES also attenuated differences for females. Differences in the 1998 cohort at age 6 between Black/African American and white girls, Hispanic and white girls, and Native American/Alaska Native and white girls were no longer significant after controlling for SES. This was also the case for Hispanic and white females in the 2010 cohort at age 6. Otherwise, all other significant differences between white and non-white girls were lower when controlling for SES.

Figure 1. Percent Overweight or Obese by Race/ Ethnic Category, Poverty Level, and SES Tertile in Each Grade in the 1998 Cohort.



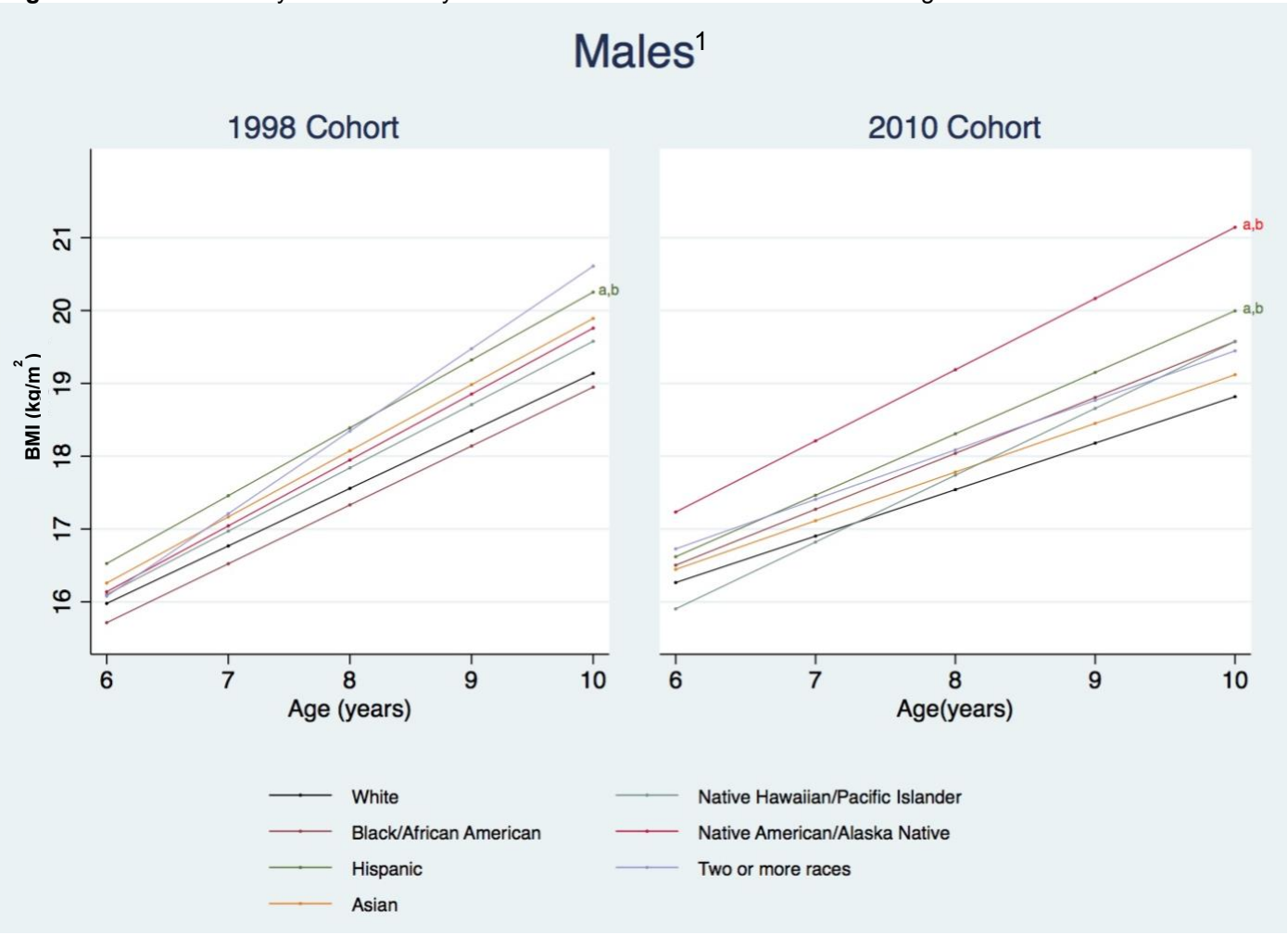
[a] Weighted estimate
[b] Non-Hispanic, unless otherwise specified
[c] Based on 2003 U.S. Census Bureau Thresholds
[d] ECLS SES Score based on parent/guardian occupation prestige scores, income and education

Figure 2. Percent Overweight or Obese by Race/ Ethnic Category, Poverty Level, and SES Tertile in Each Grade in the 2010 Cohort.



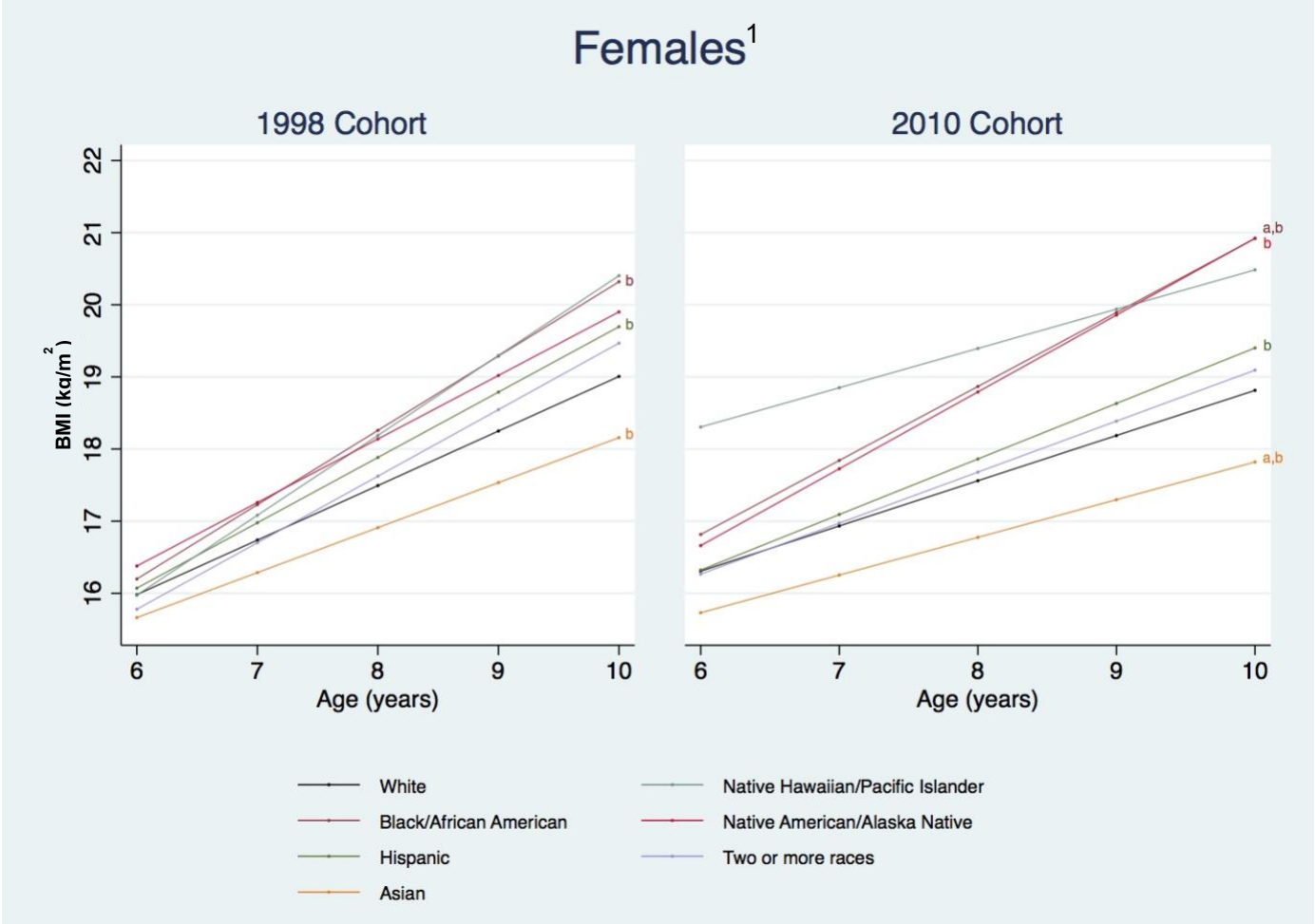
[a] Weighted estimate
[b] Non-Hispanic, unless otherwise specified
[c] Based on 2014 U.S. Census Bureau Thresholds
[d] ECLS SES Score based on parent/guardian occupation prestige scores, income and education

Figure 3. BMI in Males by Race/Ethnicity in 1998 and 2010 ECLS-K Cohorts from Ages 6 to 10



[1] Linear regression controlled for age and SES tertile
[a] Significantly different from white males at age 6
[b] Significantly different from white males at age 10

Figure 4. BMI in Females by Race/Ethnicity in 1998 and 2010 ECLS-K Cohorts from Ages 6 to 10



[1] Linear regression controlled for age and SES tertile
[a] Significantly different from white females at age 6
[b] Significantly different from white females at age 10

Table 3. Three-Way Interaction: Comparison of 1998 and 2010 Cohorts

	Difference in Slope (BMI change per year) Between 1998 and 2010 Cohorts	
Race/Ethnicity[1]	Males	Females
Black/African American, non-Hispanic	1.04** (0.08,2.0)	0.67 (-0.8,2.2)
Hispanic	0.53* (-0.02,1.1)	0.95*** (0.3,1.6)
Asian, non-Hispanic	1.35* (-0.02,2.7)	0.53 (-0.2,1.3)
Native Hawaiian/ Pacific Islander, non-Hispanic	-0.38 (-4.2,3.4)	5.17** (0.6,9.8)
Native American/ Alaskan Native, non-Hispanic	0.69* (-0.1,1.5)	-0.61 (-3.9,2.7)
Two or more races, non-Hispanic	2.91*** (1.2,4.6)	1.55* (-0.07,3.2)

[1] Compared to white, non-Hispanic
[2] White subtracted from non-white
*p<0.1
**p<0.05
***p<0.01

Discussion

The findings from these analyses indicate that some non-white groups of children are experiencing inequitable differences in BMI compared to their white peers at age 6 and 10, most notably for Black/African American and Asian girls, and Hispanic and Native American/Alaska Native children. Additionally, in comparing the two cohorts, we found that inequities have widened between Black/African American and white males, between Hispanic and white females, and finally, between Native Hawaiian/Pacific Islander and white females. This suggests that some differences in growth measured by BMI between white and some non-white groups have persisted over time, either remaining stable or increasing.

Though not our primary objective, we found that point estimates of percentage of children who were overweight or obese were remarkably higher in non-white groups compared to white groups, except for Asian children. We did not test for significant differences between white and non-white groups, However, most notably, approximately 45-50% of Hispanic, black/African American and Native American/Alaska

Native children had overweight or obese weight by endline of both cohorts, whereas white children saw an increase from 23% to 36% and 26% to 33% in the 1998 and 2010 cohorts, respectively.

Hispanic Children

Hispanic boys were the only group of children who had a notably different BMI at all four time points we tested, ages 6 and 10 in each cohort. Though the two cohorts showed no difference in this rate of growth in our 3-way interaction, this finding suggests that this inequity between Hispanic and white boys is persisting. Hispanic girls had inequitable BMI at age 10 in both cohorts, though this was not the case at age 6. Further, this difference widened from the 1998 to the 2010 cohort. Findings from a longitudinal study of the 2005 kindergarten class to 5th grade in a southeast Texas school district parallel our conclusions, though the study did not examine inequities in growth rates over time. In this Texas study, based on group-based trajectory modeling, Hispanic children were more likely to be obese and become obese between kindergarten and 5th grade and least likely to remain in the non-overweight/obese group.[27] Similarly, Mareno-Black and colleagues found distinct growth trajectories for Hispanic children compared to non-Hispanic children in the Community and Schools Together Act, which followed kindergarteners in 2008 until 5th grade.[28] After controlling for sex, age, school, grade, race/ethnicity, Hispanic students were in obese categories earlier and more consistently from year to year than their non-Hispanic, white peers.[28]

Black/ African American Children

Non-Hispanic Black/African Americans children of the southeast Texas region were also more likely to follow an overweight and obese weight trajectory compared to their white peers.[27] Though these group-based trajectory clustering models did not control for sex within each race/ethnic category, other studies point to inequities in BMI for black/African American boys and girls. A 2006 analysis of NHANES I and NHANES II tracked childhood BMI into adulthood and found the annual rate of BMI change were significantly different between black and white girls ages 6- to 17-year-olds; BMI levels examined in the 1970s were similar between black/African American and white girls.[7] However, annual BMI increases were 30-40% larger among black females in childhood and adulthood.[7] For black/African American boys, inequitable weight gain occurred for those who were already overweight.[7] In comparison, our results showed a notable widening between black/African American and white males and increasing differences

between age 6 and 10 in separate cohort analysis for black/African American females.[7] The varying age ranges and cross-sectional design of NHANES may explain these divergent results. Ultimately, while it has been repeatedly shown white children have lower risk of overweight/obese and lower gains in body mass than Hispanic and Black/African American children, determining the critical time points in which these non-white groups begin to experience remarkable gains in BMI and if these time points are changing is important. Our findings suggest this occurs between ages 6 and 10 for black/African American females.

Native American/ Alaska Native Children

In our study, Native American/Alaska Native children had a higher BMI at in the 2010 cohort, specifically at age 6 and 10 for boys and only age 10 for girls. Several studies parallel our findings and indicate that inequities in BMI between white and Native populations have persisted for decades. Previous studies of Sioux Native American children as early as 1911 show weight increased disproportionately to height; as such, BMI gains were significantly higher in Sioux compared to white children.[29] Navajo children between 1955 to 1989 also had alarming gains in BMI.[30] More recently, larger surveys of Native Indian children of a South Dakota reservation[31], Northern plain Native children, and American Indian youth in urban areas of the Great Plains all indicated remarkable, increasing rates of overweight and obese when compared to non-Native or white children. The Navajo Health and Nutrition Survey that studies children ages 6 to 12 found secular increases in BMI between 1989 and 1997 that was comparable to the one in 1955 to 1989, noted above.[32] Girls ages 6 to 9 had a consistently higher prevalence of overweight and obesity.[32] The inequities we discovered suggests a continuation of disproportionate body mass gain in Native children that has historically existed.[33]

Native Hawaiian/ Pacific Islander Children

We found that the difference in body mass gain between Native Hawaiian/ Pacific Islander and white girls increased from the 1998 to the 2010 kindergarten cohorts. Challenges arise in comparing these results due to the historic grouping of Native Hawaiian/Pacific Islander and Asian racial groups, referred to as “Asians and Pacific Islanders”. Until 2000, Asian and Pacific Islander were clustered into the same race category in the US Census. NHANES does not report overweight and obesity rates in Native Hawaiian/ Pacific Islanders. The Children’s Heathy Living Program estimates prevalence of overweight or

obesity in Hawaii and the US-Affiliated Pacific Region to be 21% at age 2 and 39% at age 8, with a marked increase in 5th grade. These estimates, however, may not accurately represent Native Hawaiian/ Pacific Islander children across the United States as represented in ECLS. This estimate was extrapolated from ten peer-reviewed literature and government agency data.[34] A different 2006-2007 study of 5th, 7th and 9th graders in Los Angeles County estimated prevalence of obesity to be 35.6% in Pacific Islanders and 12.1% in Asian students.[35] Our analysis indicated a general increase in prevalence of overweight/obesity from 30% in kindergarten to 42% in fifth grade (1998 cohort) and 30% in kindergarten to 35% in fourth grade (2010 cohort). As noted in the Children's Healthy Living Program study[34], there could be a similar increase of overweight/obesity prevalence in 5th grade, though further analysis that includes 5th grade from the 2010 cohort is needed.

Asian Children

While we found a general increasing trend in proportion of overweight/obese in Asian children like all other race/ethnic groups, Asian females still had a markedly lower BMI at age 10 in the early cohort and ages 6 and 10 in the late cohort. Several sources of national level data have indicated lower BMI and prevalence of overweight and obesity in the Asian population[4,8,18,20,35–37] some researchers argue that lower BMI cut points should be used that might better indicate risk of type 2 diabetes and cardiovascular disease for this particular group, likely attributed to higher body fat percentage despite lower BMI.[38]

Limitations

Our study compared the ECLS kindergarten cohorts to explore differences in growth trajectories in grade-school children. As a nationally representative longitudinal study, ECLS data allowed us to analyze within-child growth in subgroups. We used kindergarten ECLS socioeconomic scores, aggregates of several SES factors: household income, parental education and parental occupation. Though SES has shown to be a determinant of BMI[39–41], other factors have been suggested as impactors of growth that we did not include in our model, including whether or not grade schoolers were children of immigrants[42], maternal parenting style and maternal depression.[43] Analysis of children prior to kindergarten, as early as birth, into school-age has suggested that pregnancy weight gain, higher birth weight, and the weight of mother influences risk of early onset of overweight.[44] Neighborhood environment[45,46] and television viewing time[26,39] and have also been shown to be associated with body mass in children.

Misclassification of race/ethnicity is a potential source of bias and a limitation in this study. A Hispanic race/ethnicity category was created, where any study participant who was identified as Hispanic, regardless of race, was placed into this category. Another limitation of our study is the use of raw BMI in our model, which may limit comparability of our findings to several growth trajectory studies that used BMI z-scores and group-based trajectory modeling. While results of our descriptive analyses indicated a general increase in the percentage of children who were overweight and obese in all race/ethnic groups using BMI z-scores, we did not conduct tests to determine significant differences in these proportions between white and non-white groups. Lastly, though the focus of ECLS-K is grade-school children, the narrow age range of our analysis, from age 6 to 10, may have limited our findings.

Furthermore, we recognize the constraints inherent in socially-constructed, nominal race categories. Internal variations and complexities exist within race/ethnic categories and the day-to-day experience of racism can have a marked impact on health[47], which we did not capture using this secondary dataset. Additionally, the aggregation of race/ethnic groups is a limiting factor in understanding growth trends. Native American/Alaska Native populations across the United States are extremely diverse; growth patterns have varied significantly among Native children and youth by region in the North America.[48] Further, using pan-Asian and pan-Hispanic racial groups also erases the diverse array of ethnicities that comprise these race groups, with respect to country of origin, genetic ancestry, immigration history and geographic distribution.[36] We recognize that in this study, our use of race/ethnic comparisons may contribute to the reification of racial categories that are fundamental to the production of racial inequalities.[49]

Conclusion

Our findings that inequities have persisted and even worsened lends to the body of work that is exploring trends in childhood growth to better inform policies aiming to achieve optimum and equitable health for children, particularly for Hispanic, black/African American, Native American/Alaska Native and Native Hawaiian/ Pacific Islander groups. Future research should continue to explore how race and other social determinants interact to affect inequities in growth trajectories with careful consideration of the limitations in using nominal race/ethnicity categorization.

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Supplementary Table 1. Mean BMI and Proportion of Overweight and Obese in Each Grade in 1998 Cohort

1998 Cohort	Kindergarten Spring		1st Grade Spring		3rd Grade Spring		5th Grade Spring	
	Mean BMI (95% CI)[a]	% Overweight or obese (95% CI)[a]	Mean BMI (95% CI)[a]	% Overweight or obese (95% CI)[a]	Mean BMI (95% CI)[a]	% Overweight or obese (95% CI)[a]	Mean BMI (95% CI)[a]	% Overweight or obese (95% CI)[a]
Race/Ethnicity[b]								
White	16.2 (16.1,16.4)	23 (21,25)	16.7 (16.6,16.9)	24 (22,26)	18.3 (18.1,18.4)	31 (29,33)	20.1 (19.9,20.3)	36 (33,38)
Black/African American	16.5 (16.3,16.7)	28 (23,33)	17.2 (16.9,17.5)	29 (25,34)	18.9 (18.4,19.4)	34 (28,39)	21.2 (20.6,21.8)	41 (36,46)
Hispanic	16.8 (16.6,17.1)	34 (30,37)	17.3 (17.1,17.6)	33 (29,37)	19.4 (19.0,19.7)	42 (38,47)	21.4 (21,22)	49 (44,54)
Asian	16.1 (15.8,16.4)	26 (20,33)	16.5 (16.0,17.0)	25 (19,31)	18.2 (17.7,18.8)	32 (24,41)	19.7 (18.9,20.4)	34 (26,42)
Native Hawaiian/ Pacific Islander	16.6 (15.7,17.4)	35 (20,50)	16.9 (15.2,18.5)	32 (9,55)	19.3 (17.5,21.1)	44 (30,59)	21.2 (19.2,23.3)	42 (21,63)
Native American/ Alaska Native	17.1 (16.7,17.4)	30 (21,39)	17.3 (16.9,17.8)	33 (24,42)	19.5 (18.3,20.8)	42 (25,59)	21.4 (20.0,22.7)	42 (26,58)
Two or more races	16.6 (15.8,17.4)	25 (15,35)	17.1 (16.0,18.2)	24 (15,34)	19.2 (17.9,20.4)	36 (24, 47)	21.5 (20.1,22.9)	47 (35,58)
Poverty Threshold[c]								
<100% PT	16.5 (16.4,16.7)	27 (24,31)	17.16 (16.9,17.4)	29 (25,34)	19.0 (18.7,19.2)	37 (33,42)	21.2 (20.9,21.6)	46 (41,50)
≥100% PT, <200% PT	16.6 (16.4,16.8)	29 (26,32)	17.08 (16.9,17.3)	29 (26,32)	18.9 (18.6,19.2)	35 (31,38)	20.9 (20.5,21.3)	41 (37,44)
≥200% PT	16.2 (16.1,16.4)	24 (21,26)	16.6 (16.5,16.8)	23 (21,25)	18.2 (18.0,18.4)	31 (29,34)	19.9 (19.7,20.1)	35 (32,38)
SES Score[d]								
Tertile 1	16.7 (16.6,16.8)	30 (27,33)	17.3 (17.1,17.5)	31 (28,34)	19.2 (19.0,19.4)	40 (36,43)	21.4 (21.2,21.7)	48 (44,51)
Tertile 2	16.4 (16.3,16.6)	26 (24,29)	16.9 (16.7,17.2)	27 (24,30)	18.7 (18.4,19.0)	35 (32,38)	20.6 (20.3,20.9)	40 (37,43)
Tertile 3	16.1 (16.0,16.2)	22 (19,24)	16.4 (16.3,16.6)	20 (18,23)	17.9 (17.7,18.0)	27 (24,30)	19.5 (19.2,19.7)	30 (26,33)

[a] Weighted estimates
[b] Non-Hispanic unless specified
[c] Based on 2003 U.S. Census Bureau poverty thresholds
[d] Lower tertile indicates lower ECLS-generated SES score

Supplementary Table 2. Mean BMI and Proportion of Overweight and Obese in Each Grade in 2010 Cohort

2010 Cohort	Kindergarten Spring		1st Grade Spring		2nd Grade Spring		3rd Grade Spring		4th Grade Spring	
	Mean BMI (95% CI)[a]	% Overwt or obese (95% CI)[a]	Mean BMI (95% CI)[a]	% Overwt or obese (95% CI)[a]	Mean BMI (95% CI)[a]	% Overwt or obese (95% CI)[a]	Mean BMI (95% CI)[a]	% Overwt or obese (95% CI)[a]	Mean BMI (95% CI)[a]	% Overwt or obese (95% CI)[a]
Race/ Ethnicity[b]										
White	16.4 (16.3,16.6)	26 (23,28)	16.7 (16.6,16.9)	25 (23,27)	17.4 (17.2,17.6)	27 (25,30)	18.2 (17.9,18.4)	30 (28,33)	18.9 (18.7,19.2)	33 (30,35)
Black/ African American	17.1 (16.8,17.4)	35 (30,39)	17.7 (17.4,18.1)	38 (33,42)	18.4 (18.0,18.9)	37 (32,42)	19.5 (19.0,20.0)	42 (35,48)	20.5 (20.0,21.1)	44 (39,50)
Hispanic	16.9 (16.8,17.1)	35 (32,38)	17.4 (17.2,17.6)	36 (34,39)	18.2 (17.9,18.4)	39 (37,42)	19.1 (18.9,19.4)	43 (40,45)	20.1 (19.8,20.4)	46 (43,49)
Asian	16.03 (15.7,16.3)	22 (17,28)	16.5 (16.1,16.9)	24 (18,29)	16.9 (16.5,17.4)	26 (20,32)	17.6 (17.2,18.0)	28 (22,34)	18.4 (17.9,18.8)	29 (23,35)
Native Hawaiian/ Pacific Islander	17.4 (15.1,19.7)	30 (7,53)	17.5 (14.7,20.3)	29 (5,52)	19.2 (16.2,22.2)	28 (4,52)	19.9 (16.7,23.1)	36 (10,62)	20.9 (17.7,24.1)	35 (10,61)
Native American/ Alaska Native	17.0 (16.5,17.5)	34 (27,41)	18.5 (17.7,19.3)	35 (26,44)	19.4 (18.4,20.4)	35 (26,44)	20.3 (19.3,21.3)	47 (37,58)	21.4 (19.9,22.9)	53 (46,61)
Two or more races	16.5 (16.2,16.8)	29 (23,35)	16.9 (16.5,17.3)	29 (22,36)	17.7 (17.2,18.2)	35 (29,40)	18.5 (18.0,19.1)	36 (31,42)	19.4 (18.8,20.0)	39 (33,44)
Poverty Threshold[c]										
<100% PT	16.9 (16.7,17.1)	33 (30,36)	17.4 (17.2,17.6)	35 (32,39)	18.1 (17.9,18.4)	36 (33,40)	19.1 (18.8,19.3)	41 (38,44)	20.1 (19.7,20.4)	44 (41,48)
≥100%, <200% PT	16.9 (16.7,17.1)	34 (32,37)	17.4 (17.1,17.6)	34 (31,37)	18.1 (17.9,18.4)	37 (34,40)	19.1 (18.8,19.4)	40 (37,43)	19.9 (19.6,20.2)	42 (40,45)
≥200% PT	16.3 (16.2,16.4)	25 (23,27)	16.7 (16.6,16.8)	25 (23,27)	17.4 (17.2,17.5)	27 (25,29)	18.1 (17.9,18.3)	30 (28,32)	18.9 (18.7,19.1)	32 (30,34)

2010 Cohort	Kindergarten Spring		1st Grade Spring		2nd Grade Spring		3rd Grade Spring		4th Grade Spring	
	Mean BMI (95% CI)[a]	% Overwt or obese (95% CI)[a]	Mean BMI (95% CI)[a]	% Overwt or obese (95% CI)[a]	Mean BMI (95% CI)[a]	% Overwt or obese (95% CI)[a]	Mean BMI (95% CI)[a]	% Overwt or obese (95% CI)[a]	Mean BMI (95% CI)[a]	% Overwt or obese (95% CI)[a]
SES Score[d]										
Tertile 1	17.0 (16.8,17.2)	35 (33,38)	17.5 (17.4,17.7)	37 (34,39)	18.3 (18.1,18.5)	38 (36,41)	19.3 (19.1,19.5)	43 (40,45)	20.3 (20.1,20.6)	46 (43,48)
Tertile 2	16.7 (16.6,16.9)	31 (28,33)	17.1 (17.0,17.3)	31 (28,34)	17.9 (17.7,18.1)	33 (31,36)	18.8 (18.5,19.0)	37 (34,39)	19.7 (19.4,19.9)	40 (37,42)
Tertile 3	16.1 (16.0,16.2)	21 (19,23)	16.4 (16.3,16.6)	21 (19,23)	17.0 (16.9,17.2)	24 (21,26)	17.7 (17.5,17.9)	26 (24,27)	18.3 (18.1,18.6)	27 (25,29)

[a] Weighted estimates
[b] Non-Hispanic unless specified
[c] Based on 2014 U.S. Census Bureau poverty thresholds
[d] Lower tertile indicates lower ECLS-generated SES score

Supplementary Table 3. Sex-Stratified Regression Output at Ages 6 and 10 for 1998 and 2010 Cohorts

	Females			
	1998		2010	
	Age 6	Age 10	Age 6	Age 10
Race/Ethnicity[1]	Difference in BMI[2] (95% CI)	Difference in BMI[2] (95% CI)	Difference in BMI[2] (95% CI)	Difference in BMI[2] (95% CI)
Black/African American, non-Hispanic	0.22 (-0.20,0.64)	1.31*** (0.37,2.26)	0.51** (0.02,1.00)	2.10*** (1.17,3.04)
Hispanic	0.090 (-0.28,0.46)	0.69*** (0.17,1.21)	0.014 (-0.35,0.38)	0.59** (0.12,1.06)
Asian, non-Hispanic	-0.32 (-0.75,0.11)	-0.85** (-1.50,0.20)	-0.58*** (-0.83,-0.33)	-0.99** (-1.58,0.41)
Native Hawaiian/ Pacific Islander, non-Hispanic	-0.0072 (-1.43,1.42)	1.40 (-1.67,4.46)	2.00 (-2.33,6.33)	1.67 (-2.75,6.09)
Native American/ Alaskan Native, non-Hispanic	0.40* (-0.07,0.87)	0.90 (-0.41,2.20)	0.35 (-0.38,1.09)	2.11** (0.17,4.05)
Two or more races, non-Hispanic	-0.20 (-0.93,0.53)	0.46 (-0.51,1.44)	-0.041 (-0.40,0.32)	0.28 (-0.43,1.00)
	Males			
	1998		2010	
	Age 6	Age 10	Age 6	Age 10
Race/Ethnicity[1]	Difference in BMI[2] (95% CI)	Difference in BMI[2] (95% CI)	Difference in BMI[2] (95% CI)	Difference in BMI[2] (95% CI)
Black/African American, non-Hispanic	-0.26 (-0.61,0.08)	-0.19 (-0.71,0.33)	0.24 (-0.24,0.72)	0.76 (-0.060,1.57)
Hispanic	0.55*** (0.15,0.95)	1.11*** (0.55,1.68)	0.36** (0.08,0.63)	1.18*** (0.66,1.69)
Asian, non-Hispanic	0.28 (-0.24,0.80)	0.75 (-0.10,1.61)	0.18 (-0.31,0.67)	0.30 (-0.47,1.07)
Native Hawaiian/ Pacific Islander, non-Hispanic	0.12 (-0.43,0.68)	0.44 (-0.33,1.20)	-0.36 (-1.91,1.19)	0.76 (-1.72,3.24)
Native American/ Alaskan Native, non-Hispanic	0.16 (-0.48,0.80)	0.62 (-0.42,1.66)	0.97* (-0.017,1.95)	2.32*** (0.76,3.89)
Two or more races, non-Hispanic	0.1 (-0.79,0.99)	1.47 (-0.73,3.67)	0.46 (-0.23,1.16)	0.63 (-0.31,1.57)

[1] Compared to white, non-Hispanic
[2] White subtracted from non-white
*p<0.1
**p<0.05
***p<0.01

Supplementary Table 4. Linear Regression Output With and Without Controlling for SES **in Males**

	White Compared to Non-White (linear combination of "white" minus "non-white")											
	1998 Males											
	Age 6											
	Regression with SES Tertiles						Regression without SES					
Race/Ethnic Category	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**
Diff in BMI	0.26	-0.55	-0.28	-0.12	-0.16	-0.10	0.00	-0.81	-0.23	-0.30	-0.41	-0.17
P-val	0.14	0.01	0.29	0.66	0.63	0.83	0.99	0.00	0.39	0.35	0.23	0.71
CI_low	-0.08	-0.95	-0.80	-0.68	-0.80	-0.99	-0.33	-1.17	-0.76	-0.91	-1.07	-1.05
CI_high	0.61	-0.15	0.24	0.43	0.48	0.79	0.33	-0.46	0.30	0.32	0.25	0.71
	Age 10											
	Regression with SES Tertiles						Regression without SES					
Race/Ethnic Category	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**
Diff in BMI	0.19	-1.11	-0.75	-0.44	-0.62	-1.47	-0.09	-1.35	-0.71	-0.59	-0.84	-1.53
P-val	0.48	0.00	0.09	0.26	0.24	0.19	0.74	0.00	0.11	0.20	0.12	0.17
CI_low	-0.33	-1.68	-1.61	-1.20	-1.66	-3.67	-0.58	-1.85	-1.57	-1.49	-1.91	-3.74
CI_high	0.71	-0.55	0.10	0.33	0.42	0.73	0.41	-0.84	0.16	0.31	0.22	0.68
	2010 Males											
	Age 6											
	Regression with SES Tertiles						Regression without SES					
Race/Ethnic Category	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**
Diff in BMI	-0.24	-0.36	-0.18	0.36	-0.97	-0.46	-0.46	-0.64	-0.17	-0.03	-1.22	-0.39
P-val	0.33	0.01	0.47	0.65	0.06	0.19	0.03	0.00	0.54	0.97	0.01	0.28
CI_low	-0.72	-0.63	-0.67	-1.19	-1.95	-1.16	-0.88	-0.90	-0.70	-1.56	-2.14	-1.09
CI_high	0.24	-0.08	0.31	1.91	0.02	0.23	-0.04	-0.38	0.37	1.50	-0.31	0.31

	Age 10											
	Regression with SES Tertiles						Regression without SES					
Race/Ethnic Category	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**
Diff in BMI	-0.76	-1.18	-0.30	-0.76	-2.32	-0.63	-0.99	-1.45	-0.30	-1.41	-2.60	-0.60
P-val	0.07	0.00	0.44	0.55	0.00	0.19	0.02	0.00	0.44	0.27	0.00	0.23
CI_low	-1.57	-1.69	-1.07	-3.24	-3.89	-1.57	-1.79	-1.93	-1.07	-3.88	-4.12	-1.56
CI_high	0.06	-0.66	0.47	1.72	-0.76	0.31	-0.19	-0.97	0.47	1.07	-1.09	0.37

	Difference in Slope (linear combinations--"2010" minus "1998") 3 Way Interaction											
	Males											
	Regression with SES Tertiles						Regression without SES					
Race/Ethnic Category	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**
Diff in slope (BMI/yr)	1.04	0.53	1.35	-0.38	0.69	2.91	0.91	0.48	1.36	-0.61	0.65	2.67
P-val	0.03	0.06	0.05	0.85	0.10	0.00	0.07	0.08	0.05	0.74	0.10	0.00
CI_low	0.08	-0.02	-0.02	-4.15	-0.12	1.20	-0.06	-0.05	0.00	-4.29	-0.13	0.97
CI_high	2.00	1.08	2.73	3.40	1.50	4.62	1.87	1.02	2.73	3.07	1.42	4.37

red text = Differences found in "no SES" analysis that were NOT in "with SES" analysis'

yellow box = p<0.05'

Black/AA = Black/ African American

NH/PI = Native Hawaiian/Pacific Islander

NA/AN = Native American/Alaska Native

Supplementary Table 5. Linear Regression Output With and Without Controlling for SES **in Females**

	White Compared to Non-White (linear combination of "white" minus "non-white")											
	1998 Females											
	Age 6											
	Regression with SES Tertiles						Regression without SES					
Race/Ethnic Category	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**
Diff in BMI	-0.22	-0.09	0.32	0.01	-0.40	0.20	-0.50	-0.41	0.35	-0.24	-0.78	0.12
P-val	0.31	0.63	0.15	0.99	0.10	0.59	0.01	0.02	0.08	0.74	0.00	0.73
CI_low	-0.64	-0.46	-0.11	-1.42	-0.87	-0.53	-0.88	-0.75	-0.04	-1.61	-1.21	-0.55
CI_high	0.20	0.28	0.75	1.43	0.07	0.93	-0.12	-0.06	0.74	1.14	-0.35	0.79
	Age 10											
	Regression with SES Tertiles						Regression without SES					
Race/Ethnic Category	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**
Diff in BMI	-1.31	-0.69	0.85	-1.40	-0.89	-0.46	-1.58	-1.00	0.88	-1.62	-1.26	-0.53
P-val	0.01	0.01	0.01	0.37	0.18	0.35	0.00	0.00	0.01	0.29	0.08	0.28
CI_low	-2.26	-1.21	0.20	-4.46	-2.20	-1.44	-2.51	-1.49	0.24	-4.63	-2.66	-1.51
CI_high	-0.37	-0.17	1.50	1.67	0.41	0.51	-0.64	-0.50	1.52	1.40	0.14	0.44
	2010 Females											
	Age 6											
	Regression with SES Tertiles						Regression without SES					
Race/Ethnic Category	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**
Diff in BMI	-0.51	-0.01	0.58	-2.00	-0.35	0.04	-0.76	-0.41	0.66	-2.20	-0.55	0.06
P-val	0.04	0.94	0.00	0.37	0.35	0.82	0.00	0.01	0.00	0.32	0.13	0.74
CI_low	-1.00	-0.38	0.33	-6.33	-1.09	-0.32	-1.22	-0.69	0.37	-6.50	-1.24	-0.28
CI_high	-0.02	0.35	0.83	2.33	0.38	0.40	-0.30	-0.12	0.95	2.09	0.15	0.40

	Age 10											
	Regression with SES Tertiles						Regression without SES					
Race/Ethnic Category	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**
Diff in BMI	-2.10	-0.59	0.99	-1.67	-2.11	-0.28	-2.39	-0.95	1.05	-1.84	-2.29	-0.22
P-val	0.00	0.02	0.00	0.46	0.03	0.44	0.00	0.00	0.00	0.41	0.03	0.56
CI_low	-3.04	-1.06	0.41	-6.09	-4.05	-0.99	-3.31	-1.37	0.45	-6.24	-4.30	-0.94
CI_high	-1.17	-0.12	1.58	2.75	-0.17	0.43	-1.46	-0.52	1.65	2.56	-0.27	0.51
	Difference in Slope (linear combinations--"2010" minus "1998") 3 Way Interaction											
	Females											
	Regression with SES Tertiles						Regression without SES					
Race/Ethnic Category	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**	**Black/AA**	**Hispanic**	**Asian**	**NH/PI**	**NA/AN**	**Two + races**
Diff in slope (BMI/yr)	0.67	0.95	0.53	5.17	-0.61	1.55	0.51	0.99	0.46	5.09	-0.87	1.47
P-val	0.38	0.00	0.17	0.03	0.72	0.06	0.51	0.00	0.23	0.03	0.58	0.06
CI_low	-0.83	0.33	-0.23	0.57	-3.92	-0.07	-1.00	0.38	-0.29	0.49	-3.95	-0.07
CI_high	2.17	1.58	1.30	9.77	2.70	3.16	2.01	1.61	1.21	9.68	2.21	3.01

red text = Differences found in "no SES" analysis that were NOT in "with SES" analysis'

yellow box = p<0.05'

Black/AA = Black/ African American

NH/PI = Native Hawaiian/Pacific Islander

NA/AN = Native American/Alaska Native