EXHIBIT F

5 Year Achievement Gap Analysis in Tucson Unified School District

A longitudinal Study using AzMERIT Scale Scores Broken out by Ethnicity and Free/Reduced Lunch Status with a Matched Student Cohort in Grades 4 – 8: 2014-15 to 2017-18

Purpose of the Study

The purpose of this study is to add to the body of literature that examines the achievement gap between ethnicities while controlling for socio-economic status (SES). Research on the achievement gap typically examines mean performance scores by ethnicity to draw conclusions. This study, conversely examines the highest performers (Upper 25%) and the lowest performers (Lower 25%) by ethnicity as well as by Free/Reduced lunch status (FRL), a proxy measure for poverty.
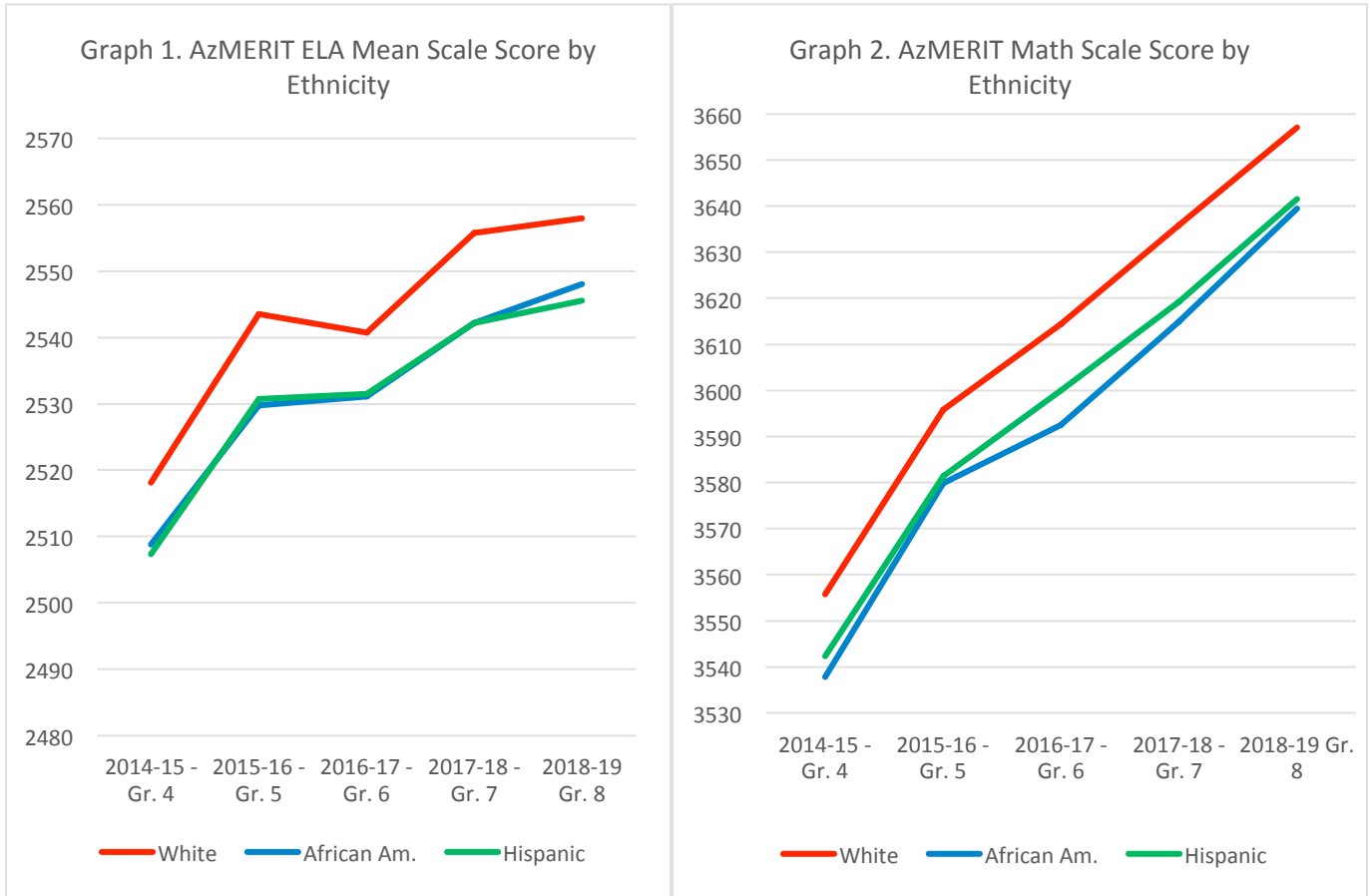
Overview

This study examines the achievement gap among White, African American, and Hispanic students in Tucson Unified School District (TUSD) over five years from 4th grade to 8th grade. This study simulated a study conducted by the Program for international Student Assessment (PISA) in 2019 by examining academic trends over time among the highest and lowest performers. The PISA study concluded that the lowest performers in the United States were losing academic ground over time when compared to other countries. According to the PISA study,

> *U.S. scores for the 90th percentile of student performance increased by a statistically significant margin between 2015 and 2018 while scores for the 10th percentile of student performance saw a statistically significant decrease between 2012 and 2018. (National Center on Education and the Economy, https://mailchi.mp/ncee/us-pisa-reading-scores-good-and-bad-news?e=222ebaad3e)*

The approach of assessing the academic extremes is different from conventional studies where only mean scores are examined. Mean score analyses often demonstrate that an achievement gap exists but cannot differentiate if the gap is consistent within all members for each ethnicity. For example, Graphs 1 and 2 below reveal that an achievement gap exists and appears relatively stable over time for African American and Hispanic students when compared to White students in ELA and Math in TUSD. The unit of measure is the scale score points from the AzMERIT, the standardized assessment for Arizona. The gap is evident in 4th grade and persists to 8th grade.

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- Graph 1: In English Language Arts (ELA), the gap in 4th grade between White students and African American/Hispanic students was about 10 scale score points and in 8th grade, the gap was equivalent with a 10 point scale score gap for African Americans and slightly larger for Hispanic students with a 13 scale score gap when compared to White students.

- Graph 2: In math, the gap in 4th grade between White students and African American and Hispanic students is about 14 scale score points for Hispanic students and 18 points for African American students. By 8th grade, the gap remained equivalent with about a 15 point scale score gap for Hispanic students and a 18 scale score gap for African American students when compared to White students.

Graph 1. AzMERIT ELA Mean Scale Score by Ethnicity

Graph 2. AzMERIT Math Scale Score by Ethnicity

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This study reviewed the 75th percentile (the Upper 25%) and the 25th percentile (Lower 25%) of AzMERIT performance broken out by ethnicity. Additionally, students were grouped according to whether they received FRL or did not receive FRL. Using the performance extremes and breaking students out by socio-economic status (SES) using FRL/Non-FRL was an attempt to refine the achievement gap analysis to identify more accurately where the achievement gap is greatest or least evident.

Free and Reduced Lunch Status

TUSD serves a majority of students who qualify for the Free and Reduced Lunch Program (FRL) under the National School Lunch Program. In order to qualify for free and reduced price meals in 2018-19, a family of four must earn less than $32,630 to be eligible for free meals (130% of the poverty level) or $46,435 to be eligible for reduced meals (185% of the poverty level).

Students who do not participate in the FRL program may not qualify for the program because their family income is too high. Any family of four that makes more than $46,435 annually does not qualify for the program. In TUSD, the largest percent of students receiving FRL services come from the elementary and middle school levels. Please see Table 1 for a breakdown of FRL status by ethnicity for the matched student cohort used in this study.

Table 1. Matched Cohort Free/Reduced Lunch Status		
Ethnicity	Yes FRL	No FRL
White	47%	53%
African American	78%	22%
Hispanic	77%	23%
All Students	**71%**	**29%**

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Methodology

This study compared the highest performers and the lowest performers on Arizona' state standardized test called, the Arizona Measurement of Educational Readiness to Inform Teaching (AzMERIT) over 5 years. Results were broken out by ethnicity and FRL status. Ethnicity and FRL status data were determined during the baseline year of 4th grade level and held constant for the study.   A total of twelve groups were created:

- FRL Status:
    - Whites in English Language Arts
    - Whites in Math
    - African Americans in English Language Arts
    - African Americans in Math
    - Hispanics in English Language Arts
    - Hispanics in Math

- Non-FRL Status:
    - Whites in English Language Arts
    - Whites in Math
    - African Americans in English Language Arts
    - African Americans in Math
    - Hispanics in English Language Arts
    - Hispanics in Math

Achievement gap studies that break student performance out into different groupings to show the extremes, such as in the 10th and the 90th percentile with the before-mentioned PISA study, frequently use a large population to draw from. Conversely, this study had a relatively small sample size, especially among African American students. As a consequence, the grouping criteria for the performance extremes needed to be enlarged to the 75th percentile or the 'Upper 25%' and the 25th percentile or the 'Lower 25%' to produce a large enough sample size for reliable results. All students in 4th grade in 2014-15 were rank ordered according to their AzMERIT scores for ELA and again for Math. All students who scored in the 75th percentile were designated to the 'Upper 25%' and all students who scored in the 25th percentile were designated to the 'Lower 25%' regardless of ethnicity. This approach ensured that all students conformed to the same scale score criterion for the groupings in this analysis. The N sizes for the subgroups are described in Table 2 below.

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Table 2. Matched Cohort Student N Size			
Ethnicity	Free/Reduced Lunch Status		Totals
	Yes	No	
White	168	191	359
African American	124	36	160
Hispanic	1,100	337	1,437
All Students	**1,392**	**564**	**1,956**

A matched cohort was used over five years to assess the academic performance of students in TUSD. This longitudinal approach evaluated TUSD's direct impact on student performance. To be included, students needed five years of AzMERIT achievement data from 4th grade (2014-15) to 8th grade (2018-19) in ELA and Math. Although some students may have moved schools within TUSD during the five-year period, they were still included in the cohort if they had performance scores for all five years.

The total number of students in 4th grade in 2014-15 with a valid AzMERIT test score was N=3,105. TUSD is a mobile district with an influx of both out-migration and in-migration of students. This fluid mobility resulted in student attrition. The attrition rate among the matched cohort (N=3,105) from 4th grade to 8th grade was 37%. In other words, of the 4th grade students in 2014-15 who took the AzMERIT test, 63% (N=1,956) had test scores each year for the following 4 years to 2018-19, whereas 37% of students (N=1,258) did not. This attrition rate was due to the fact that students either did not have a valid test score for one or more of the subsequent 4 years or they left the district altogether. When broken out by ethnicity, the attrition rate from the matched cohort was:

- White = 49%
- African American = 42%
- Hispanic students = 37%

It should also be noted that about 790 new students also entered into the district sometime between 2015-16 and 2018-19 and had a valid AzMERIT test score in 8th grade in 2018-19.

In summary, two methods were used to examine this data. The first method was a simple comparison of scale scores by ethnicity over time. This approach is valuable to illustrate visually the performance trends of the upper 25% and the lower 25% and to see if the academic gap has increased or decreased over time among the designated groups. The second method was a regression analysis to assess if the achievement gaps by ethnicity were significantly different from one another as well as to determine which variables contributed most towards academic performance.

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Scale Scores

AzMERIT scale scores were used to compare change over time between White, African American, and Hispanic students. Scale scores are a more sensitive measure than proficiency levels (Minimally Proficient, Partially Proficient, Proficient, and Highly Proficient). For ELA and Math, a continuous scale score model was used by the state so that scale scores automatically increase from one year to the next with a range of about 60 scale score points from 3rd grade to 8th in ELA and about 200 scale score points from 3rd to 8th grade in Math. The challenge when using scale scores is to understand the magnitude of difference between years and across years. To help clarify if, for example, a change of 10 scale scores points is meaningful over 5 years, the following guidelines can be used:

Table 3. AzMERIT Scale Score Proficiency Cut Ranges											
AzMERIT ELA	Minimally Proficient		MP Point Range	Partially Proficient		PP Point Range	Proficient		P Point Range	Highly Proficient		HP Point Range
Grade 3	2395	2496	101	2497	2508	11	2509	2540	31	2541	2605	64
Grade 4	2400	2509	109	2510	2522	12	2523	2558	35	2559	2610	51
Grade 5	2419	2519	100	2520	2542	22	2543	2577	34	2578	2629	51
Grade 6	2431	2531	100	2532	2552	20	2553	2596	43	2597	2641	44
Grade 7	2438	2542	104	2543	2560	17	2561	2599	38	2600	2648	48
Grade 8	2448	2550	102	2551	2571	20	2572	2603	31	2604	2658	54
Grade 10	2458	2566	108	2567	2580	13	2581	2605	24	2606	2668	62
AzMERIT Math	Minimally Proficient		MP Point Range	Partially Proficient		PP Point Range	Proficient		P Point Range	Highly Proficient		HP Point Range
Grade 3	3395	3494	99	3495	3530	35	3531	3572	41	3573	3605	32
Grade 4	3435	3529	94	3530	3561	31	3562	3605	43	3606	3645	39
Grade 5	3478	3562	84	3563	3594	31	3595	3634	39	3635	3688	53
Grade 6	3512	3601	89	3602	3628	26	3629	3662	33	3663	3722	59
Grade 7	3529	3628	99	3629	3651	22	3652	3679	27	3680	3739	59
Grade 8	3566	3649	83	3650	3672	22	3673	3704	31	3705	3776	71
Grade 10	3609	3672	63	3673	3696	23	3697	3742	45	3743	3819	76
Adopted by the Arizona State Board of Education August 2015											

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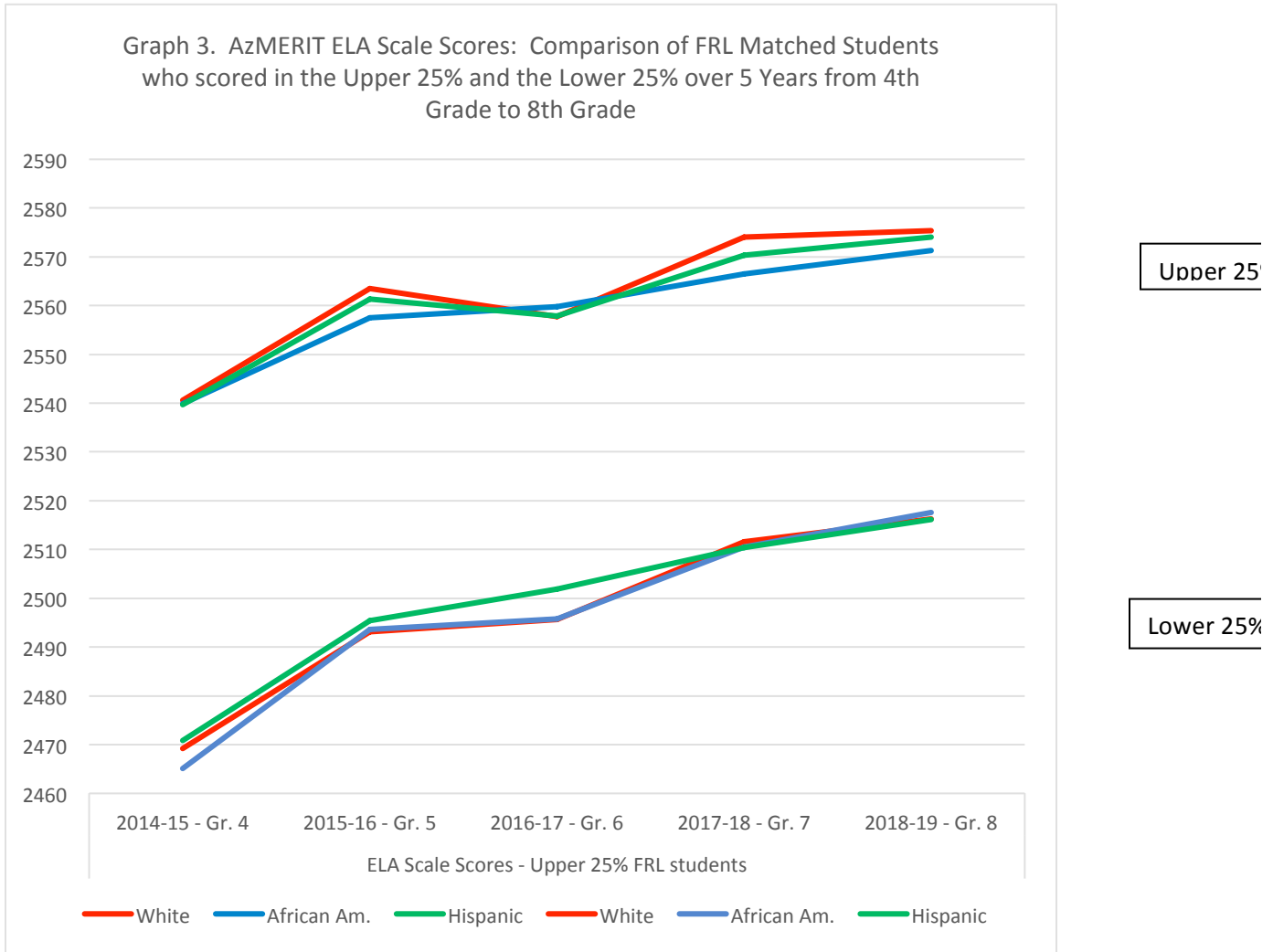
Findings

Scale Score Comparison Analysis

1. **Free and Reduced Lunch Status**
   Students who participate in the Free/Reduced Lunch National Food Program (FRL) scored very similar to one another in ELA and Math regardless of ethnicity over 5 years from 4th grade to 8th grade. Graph 3 illustrates the ELA scale score performance of the Upper 25% of FRL students and the Lower 25% of FRL students and Graph 4 illustrates the Math scale score performance of the Upper 25% of FRL students and the Lower 25% of FRL students.

FRL Students ELA (Graph 3):

- Upper 25%: White, African American, and Hispanic students scale scores were almost the same (around 2540 scale score points) in 4th grade and scored within the 'Proficient' level. The three groups tracked each other time with a maximum spread of about 7 scale score points. By 8th grade, the spread was only about 4 scale score points. These groups all maintained 'Proficiency' over 5 years.

- Lower 25%: White, African American, and Hispanic students were within 6 scale score points of each in 4th grade with a range from 2465 to 2471 and were all 'Minimally Proficient'. The three groups tracked each other time with a maximum spread of about 6 scale score points in 6th grade. By 8th grade, they all scored about the same from 2516 to 2518. These groups all maintained 'Minimal Proficiency' over 5 years.

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Graph 3. AzMERIT ELA Scale Scores: Comparison of FRL Matched Students who scored in the Upper 25% and the Lower 25% over 5 Years from 4th Grade to 8th Grade
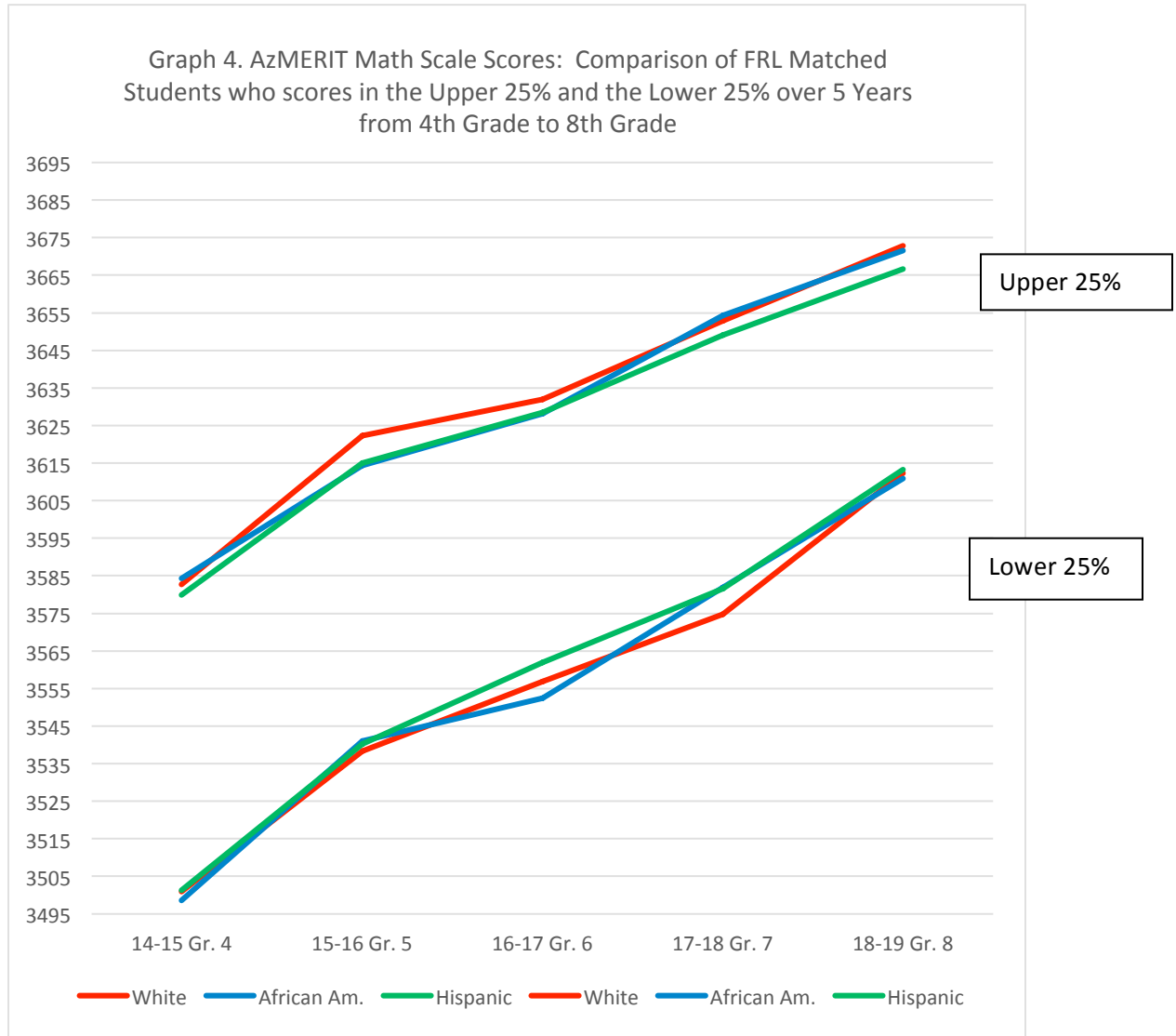
FRL Students Math (Graph 4):

- Upper 25%: White, African American, and Hispanic students scored within 4 scale score points of each other in 4th grade ranging from 3580 to 3584 or within the 'Proficient' level. The three groups tracked each other time with a maximum spread of about 7 scale score points. These groups all maintained 'Proficiency' in grades 4 and 5. In 6th and 7th grade, White and African American students maintained 'Proficiency' and Hispanic students fell just below the cut score into 'Partially Proficient'. By 8th grade, the spread was about 6 scale score points and all three groups scored at the 'Partially Proficient' level. White and African American students were only about 1 or 2 scale score points away from the 'proficiency' cut off or less than a question on the test. The drop in proficiency to partially proficiency can be seen from 7th to 8th grade in the flattening out of the line in Graph 4.

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- Lower 25%: White, African American, and Hispanic students scored about the same around 3500 scale score points and were all Minimally Proficient. The three groups tracked each other time with a maximum spread of about 5 scale score points by 6th grade. By 8th grade, they scored the same at 3616 scale score points. These groups all maintained 'Minimal Proficiency' over 5 years.

Graph 4. AzMERIT Math Scale Scores: Comparison of FRL Matched Students who scores in the Upper 25% and the Lower 25% over 5 Years from 4th Grade to 8th Grade

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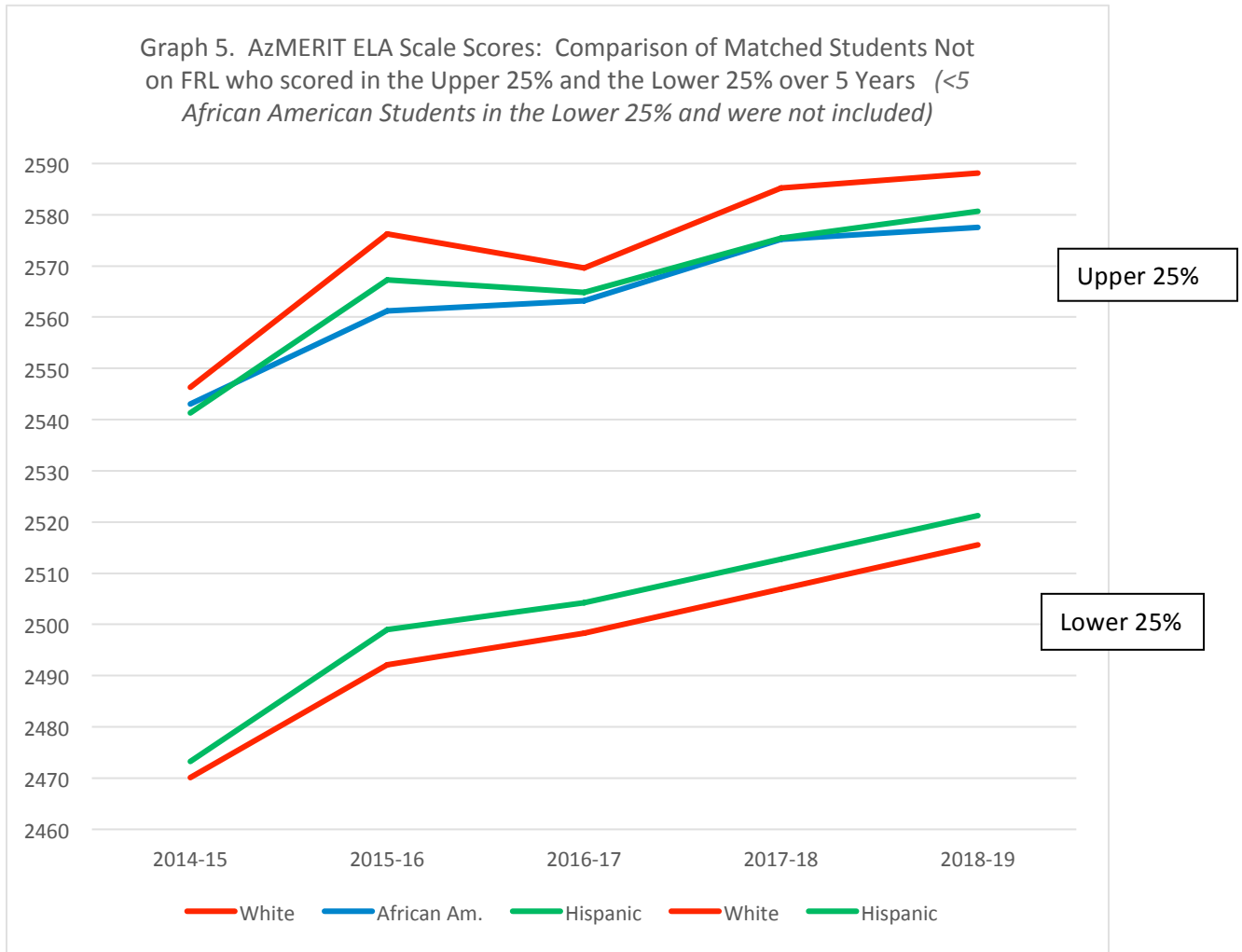## 2.   Non-Free and Reduced Lunch Status

Students who did not participate in the Free/Reduced Lunch National Food Program (FRL) demonstrated a greater spread of scores by ethnicity in ELA and Math over 5 years from 4th grade to 8th grade. The students in the non-FRL grouping came almost exclusively from families that did not qualify for the FRL program with perhaps some additional families opting not to participate even though they would have qualified. Within this grouping, the income disparity can be enormous ranging from lower middle class families to very wealthy upper class families.

Graph 5 illustrates the ELA scale score performance of the Upper 25% of the Non-FRL students and the Lower 25% of Non-FRL students and Graph 6 illustrates the Math scale score performance of the Upper 25% of Non-FRL students and the Lower 25% of Non-FRL students. The number of African Americans in this matched cohort who were Non-FRL was small. Moreover, this study examines only the Upper 25% and the Lower 25%, effectively removing about half of the students who scored between the 25th and the 75th percentile. In the Non-FRL Lower 25% group, less than 5 Non-FRL African American students met this study's criteria in ELA and Math and therefore were not included in that grouping's analysis.

Non-FRL Students ELA (Graph 5):

- Upper 25%: White, African American, and Hispanic students were within 5 scale score points of each in 4th grade from 2541 to 2546 and scored within the 'Proficient' level. The three groups generally tracked each other time with a maximum spread of about 15 scale score points. By 8th grade, the spread was about 10 scale score points. These groups all maintained 'Proficiency' over 5 years. White students consistently scored somewhat higher than both African American and Hispanic students beginning in 4th grade and continuing to 8th grade.

- Lower 25%: African American students were not included in this grouping because of the low N size. White and Hispanic students were within 3 scale score points of each in 4th grade with a range from 2470 to 2473 and all were 'Minimally Proficient'. The two groups tracked each over time with a maximum spread of about 7 scale score points in 5th grade. By 8th grade, the two ethnicities scored within 5 scale score points of one another. The two ethnicities maintained 'Minimal Proficiency' over 5 years. Hispanic students consistently scored somewhat higher than White students from 4th grade to 8th grade.

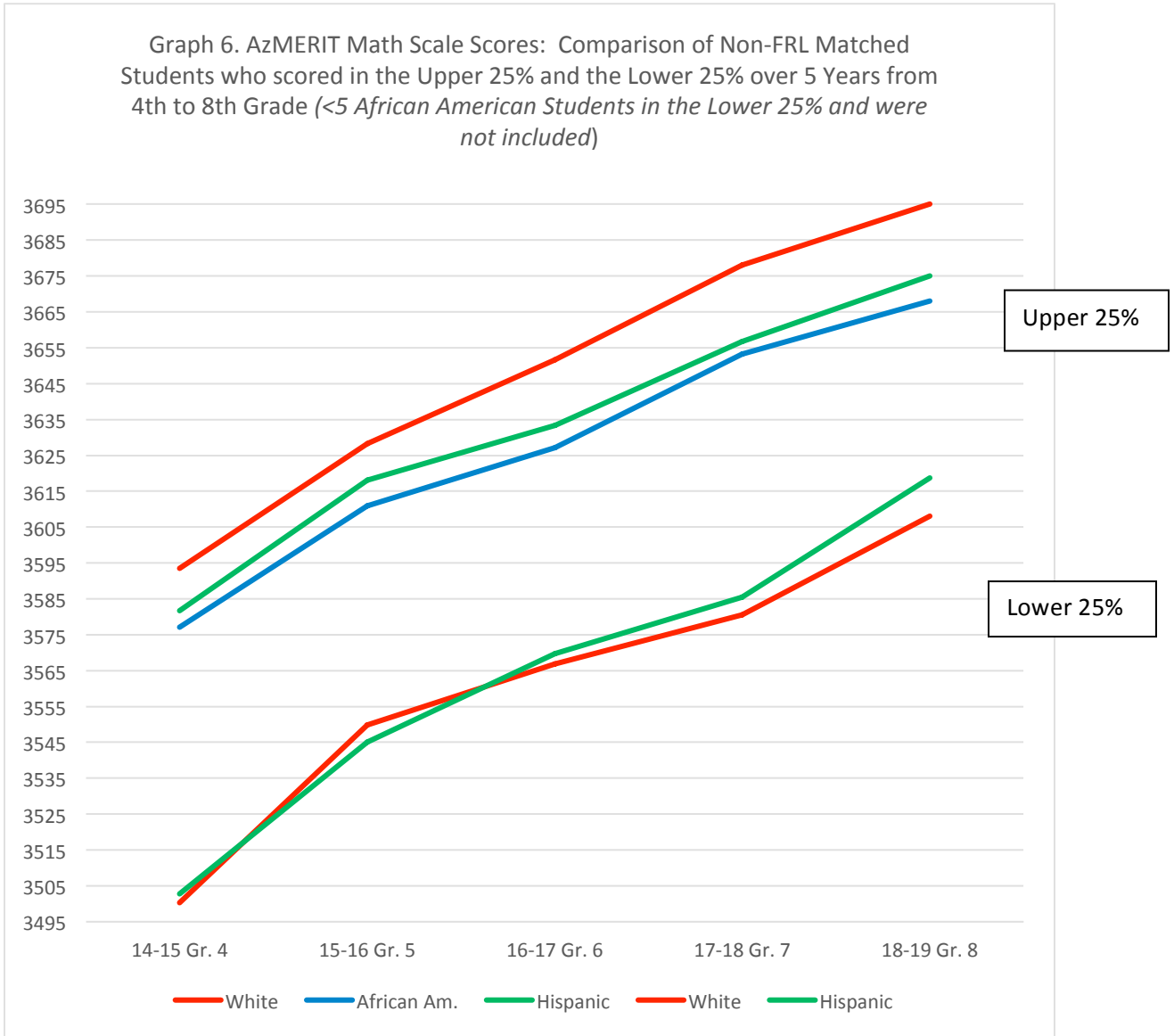## 5 Year Achievement Gap Analysis in Tucson Unified School District

Graph 5. AzMERIT ELA Scale Scores: Comparison of Matched Students Not on FRL who scored in the Upper 25% and the Lower 25% over 5 Years *(<5 African American Students in the Lower 25% and were not included)*

Non-FRL Students Math (Graph 6):

- Underline: Upper 25%: White, African American, and Hispanic Non-FRL students showed the greatest achievement gap than any other group. In 4th grade, the gap between White and Hispanic students was 12 points and between White and African American students was 17 points. African American and Hispanic students tracked each other time with a maximum spread of about 7 scale score points. However, the gap between African American and Hispanic students compared to White students began to widen by 6th grade and continued gradually to increase to 8th grade. By 8th grade, the spread was about 20 scale score points between White and Hispanic students and about 27 scale score points between White and African American students. These groups all maintained 'Proficiency' over 5 years with the exception in 8th grade where African American students fell into the 'Partially Proficient' level.

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- Lower 25%: African American students were not included because of low N size. White and Hispanic students were within 3 scale score point of each in 4th grade with a range from 3500 to 3503 and were all Minimally Proficient. The two groups tracked each other time with a maximum spread of about 11 scale score points at 8th grade. These two groups maintained 'Minimal Proficiency' over 5 years. Hispanic students consistently scored somewhat higher than White students from 6th grade to 8th grade.

Graph 6. AzMERIT Math Scale Scores: Comparison of Non-FRL Matched Students who scored in the Upper 25% and the Lower 25% over 5 Years from 4th to 8th Grade *(<5 African American Students in the Lower 25% and were not included)*

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Multiple Regression Analysis

A Regression analysis was conducted to understand statistically if the AzMERIT performance differences between FRL/Non FRL students and ethnicity was significant. Students who receive FRL services make up the majority of the students in TUSD (about 65%).   In this study, African American and Hispanic students who received FRL services represented the majority of (about 77%) of their ethnicity's total sample size. Conversely, less than half of White students (47%) received FRL services.

Table 4. Regression Analysis of the Matched Cohort using 4th Grade Students AzMERIT Math Scores 2014-15 as the Dependent Variable						
R= .354 R²= .125 Adjusted R²= .122						
		St. Err.		St. Err.		
	BETA	of BETA	B	of B	t(515)	p-level
Intercept			3554.769	3.760685	945.2451	0.000000
White-African Am.	.137155	.043029	**11.154**	3.499415	3.1875	**.001522**
FRL	-.289116	.043029	**-21.895**	3.258648	-6.7191	**.000000**

Table 4 illustrates the results using FRL/Non FRL and Ethnicity (White and African American) as the independent variables with AzMERIT Math being the dependent variable. This equation shows that 3554.769 is the intercept or the grand mean and takes all students in this study (N= 1,956) into account. Students on FRL were coded as '1' to create a dichotomous coding between FRL ('1') and Non-FRL ('0'). The regression coefficient for FRL was -21.9 which can be interpreted as the effect of FRL on the grand average math performance. In other words, students receiving FRL services, on average, scored about -21.9 fewer scale score points when compared to students not receiving FRL services.

Additionally, this dichotomous coding procedure was also used with the ethnicity grouping so that White students were coded as '1' and African American students were coded as '0'. The regression coefficient for ethnicity was 11.15 which can be interpreted as the effect of being White on the grand average math performance. In other words, White students on average, scored about 11.15 more scale score points when compared to African American students.

This regression analysis explains that students who receive FRL services accounted for more of the variance on 4th grade math scores when compared to whether a student was White or African American. The magnitude of the B weights explain in general terms that if a student is on FRL, the Math scale scores will be fewer by 21.9 scale score points on average, while being White only adds 11.2 points to the scale score on average.   This regression analysis was conducted to determine the relative contribution of the two demographic variables on academic performance. Some covariance must be taken into account between FRL/Non FRL and ethnicity results because less than half of the White

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students in this study received FRL services. Both independent variables of FRL/Non-FRL and ethnic break outs were statistically significant. Please refer to Graph 2 to see the mean distribution of scale score points of all students by ethnicity.

Table 5. Regression Analysis of the Matched Cohort using 4th Grade Students AzMERIT ELA Scores 2014-15 as the Dependent Variable						
R= .344 R²= .12 Adjusted R²= .11						
		St. Err.		St. Err.		
	BETA	of BETA	B	of B	t(511)	p-level
Intercept			2524.398	3.100106	814.2941	0.000000
White-African Am.	.047296	.043274	**3.161**	2.892106	1.0930	**.274929**
FRL	-.327661	.043274	**-20.275**	2.677713	-7.5718	**.000000**

Table 5 illustrates the results using FRL/Non FRL and Ethnicity (White and African American) as the independent variables with AzMERIT ELA being the dependent variable. This equation shows that 2524.398 is the intercept or the grand mean and takes all students in this study (N= 1,956) into account. Students on FRL were coded as '1' to create a dichotomous coding between FRL ('1') and Non-FRL ('0'). The regression coefficient for FRL was -20.275 which can be interpreted as the effect of FRL on the grand average math performance. In other words, students on FRL on average, score about -20.3 fewer scale score points when compared to students not on FRL.

The regression coefficient for ethnicity was 3.161 which can be interpreted as the effect of being White on the grand average ELA performance. In other words, White students on average, scored about 3.2 more scale score points when compared to African American students.

This regression analysis explains that FRL accounted for much more of the variance on 4th grade ELA scores compared to whether a student was White or African American. The magnitude of the B weights explained that if a student received FRL services, the ELA scale score was fewer by -20.3 on average, while being White only added 3.2 points to the scale score on average.   This regression analysis was conducted to determine the relative contribution of the two demographic variables on academic performance.   Only the independent variables of FRL/Non-FRL was statistically significant.   The independent variable of White was not significant and, therefore, the difference could be attributed to chance alone. Please refer to Graph 1 to see the mean distribution of scale score points of all students by ethnicity.

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Table 6. Regression Analysis of the Matched Cohort using 4th Grade Students AzMERIT Math Scores 2014-15 as the Dependent Variable						
R= .25 R²= .06049205 Adjusted R²= .060						
		St. Err		St. Err.		
	BETA	of BETA	B	of B	t(1785)	p-level
Intercept			3553.008	1.582081	2245.781	0.000000
White-Hispanic	.111149	.023778	**9.254**	1.979776	4.674	**.000003**
FRL	-.192130	.023778	**-14.048**	1.738614	-8.080	**.000000**

Table 7. Regression Analysis of the Matched Cohort using 4th Grade Students AzMERIT Math Scores 2014-15 as the Dependent Variable						
R= .25 R²= .061 Adjusted R²= .060						
		St. Err.		St. Err.		
	BETA	of BETA	B	of B	t(1785)	p-level
Intercept			2516.378	1.310362	1920.368	0.000000
White-Hispanic	.105518	.023769	**7.286**	1.641354	4.439	**.000010**
FRL	-.196799	.023769	**-11.928**	1.440619	-8.280	**.000000**

The regression results for Math and ELA performance for White students compared to Hispanic students followed the same pattern as those for White students compared to African American students. Tables 6 and 7 illustrate the results using FRL/Non FRL and Ethnicity (White and Hispanic) as the independent variables with AzMERIT Math (Table 6) and AzMERIT ELA (Table 7) being the dependent variables. This equation shows that 3553.008 is the math intercept and 2516.378 is the ELA intercept or the grand means and takes all students in this study (N= 1,956) into account. The regression coefficient for FRL was -14.048 in math and -11.928 in ELA which can be interpreted as the effect of FRL on the grand average math and ELA performance. The regression coefficient for ethnicity was 9.254 in math and 7.286 in ELA which can be interpreted as the effect of being White on the grand average math performance.

In summary, using Math and ELA as the dependent variables produced similar results for African American students and Hispanic students when compared to White students. This analysis confirmed that little or no achievement gap existed among White, African American, and Hispanic students who received FRL services. Thus, FRL status contributed more to student academic performance than ethnicity did in both ELA and Math. Some smaller differences between the ethnicities revealed that African American students receiving FRL services showed a larger scale score difference when compared with White students than Hispanic students did. Additionally, being White contributed more scale score

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points in Math (11.2) than in ELA (3.2) when compared to African American students whereas with Hispanic students, the contribution was more comparable (9.3 in Math and 7.3 in ELA).

This regression analysis was also conducted at the 8th grade (2018-19) for this cohort and a similar pattern was revealed. In other words, the magnitude of the effect of FRL/Non-FRL and ethnicity on AzMERIT performance remained relatively constant over time.

Summary and Recommendations

A longitudinal gap analysis was conducted using AzMERIT scores from the 75th percentile (Upper 25%) and the 25th percentile (Lower 25%) of a matched cohort from 4th grade in 2014-15 to 8th grade in TUSD in 2018-19. This study examined if grouping students into performance extremes by socio-economic status using FRL as a proxy would reveal significant trends. The students were grouped by ethnicity and by FRL/Non FRL status. Two major findings resulted from this study. They were: (1) For FRL students, little to no academic gap existed, regardless of ethnicity among students who met the criteria for the grouping into the Upper 25% and the Lower 25%; and (2) For Non-FRL students, an academic gap was evident by ethnicity in 4th grade and persisted to 8th grade among students who met the criteria for the grouping into the Upper 25% and Lower 25%.

- Finding #1: For FRL students, little to no academic gap exists, regardless of ethnicity among students who met the criteria for the Upper 25% and the Lower 25%. (See: Graphs 3 and 4)

The results of this study suggests that students receiving FRL accounts for more than ethnicity in academic performance of students in TUSD. In other words, poverty is a stronger indicator of academic performance than ethnicity. In 2018-19, about 65% of all students in TUSD participated in the FRL program. Among Hispanic and African American students, the percent is much higher at 70% and 77%, respectively. Also, about 43% of White students participated in the FRL program.   The overall profile of poverty in TUSD is similar to the matched cohort used in this study.

These findings add to a body of literature that has argued that poverty continues to be the primary catalyst for the achievement gap. According to Dr. Sean Reardon's most recent study (2019), he concluded that 'the racial "achievement gap" in standardized-test scores shouldn't be considered a racial   gap   at   all…Instead,   it's   more   accurate   to   call   it   a   "poverty   gap."' (https://www.edweek.org/ew/articles/2019/10/02/poverty-not-race-fuels-the-achievement-gap.html). This TUSD study used a matched cohort of students from 4th grade to 8th grade. Other studies that have researched much younger students found that the achievement gap, starting in kindergarten, is already substantial. These studies have demonstrated that academic achievement gaps at kindergarten entry are established, heavily influenced by SES, and remain stable across schooling. For example, research by Reardon & Portilla (2016) showed that gaps in language and math skills between children from the 90th

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and 10th income percentiles have closed slightly in recent years but still show about one standard deviation difference at the start of kindergarten. Work by von Hippel et al. (2018) has shown that income- and race-based achievement gaps shrink slightly in early elementary school but stay consistent for the most part through elementary school. The effects of poverty affect more than schooling. It also affects the type and amount of opportunities that are available to children. According to a review from a recent study from Brandeis University about the country's 100 largest metropolitan areas that includes TUSD's students,

> *Tucson's children have far fewer opportunities than many other kids in the U.S. for a bright future, in economic mobility as an adult, health and life expectancy, a recent study says. Tucson came in ninth-worst in both overall child opportunity and the proportion of children in low-scoring neighborhoods, according to Brandeis University's Child Opportunity Index, which rates neighborhoods and chances for success within the country's 100 largest metropolitan areas. The study focuses on resources and conditions that affect a child's development, health and ability to reach their potential. Factors include access to good schools, the quality of peer and adult influences, economic resources, environmental quality and resources for healthy living. In Tucson, the study shows, 32% of the children live in low-opportunity neighborhoods…That lack of opportunity not only affects a child as he or she grows, the report shows, it also lowers life expectancy rates, and living in these neighborhoods diminishes a family's chances of improving its economic status.* (https://childcarecompliancecommunity.com/news/news-ethics/02/2020/opportunities-for-a-successful-long-life-lacking-for-many-tucson-kids-study-says/)

A&E Recommendations

Recommendation #1: To level the socio-economic playing field for students to be academically successful, **quality universal preschool** is recommended to provide students who come from financially stressed households the opportunity to experience enriching academically-focused environments. Additionally, partnerships with families and communities are recommended to recognize and integrate their unique cultural resources into student academic learning and to provide opportunities for relevant skills building in STEM, the arts, and sports.

Recommendation #2: Teachers need **increased professional development** about how families in poverty make choices in order to be sensitive to environments that the majority of TUSD students experience on a regular basis.   A body of research indicates that 'implicit' or subconscious bias affects student achievement in how teachers communicate expectations to students. (Brophy & Good, 1984, Weinstein et al., 1987, Rubie-Davies, 2006). This training would also give insight to TUSD teachers on how to keep expectations high for all students rather than basing expectations on outside factors such as a student's home life or what is commonly referred to in TUSD as the 'probrecito syndrome'.

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- Finding #2: For Non-FRL students, an academic gap is evident by ethnicity among students who met the criteria for the Upper 25% and Lower 25% (See: Graphs 5 and 6)

In TUSD, about one-third of students overall do not participate in FRL services. These families do not participate because they do not qualify, based on income. African American and Hispanic students who came from middle or wealthier class families (Non-FRL group) exhibited an achievement gap by 4th grade when compared to White students in the same grouping and the gap persisted to 8th grade. Please note that Non-FRL African American and Hispanic students represented only about 23% their ethnicity's total sample size in this study. Additionally, some caution is advised in the interpretation of the African American scores in the Non-FRL grouping because the sample size is relatively small (N=36). Conversely, Non-FRL White students represented more than half (53%) of their ethnicity's total.

The results from the Non FRL Lower 25% grouping presented a reversal of the typical achievement gap profile where White students outperform other ethnicities. **Within this grouping, Hispanic students consistently outperformed White students in both ELA and Math each year over the 5 years.** Additionally, among the Non-FRL Lower 25% grouping, the sample size of African American students was too small to meet the study's criteria for inclusion. **Of those African American students who met the criteria for the Non-FRL grouping, the vast majority (95%) performed above the 25th percentile.**

The results for Non FRL Upper 25% showed that African American and Hispanic student performance essentially tracked one another and consistently performed as 'proficient' over time. When White students were included, they showed higher performance in both ELA and Math when compared to Hispanic and African American students in 4th and 5th grade. Subsequently, when this Non-FRL Upper 25% grouping reached middle school in grades 6 - 8, this gap widened slightly in both subjects. **However, all African American, Hispanic, and White students still scored, on average, as 'proficient' over five years**. The only exception was with African American students who just missed the 'proficient' cut off in 8th grade math and scored as 'partially proficient'.

This data revealed that our minority middle/wealthier class students scored somewhat lower than White students in math and, to a lesser degree in ELA, in the transition to middle school. For example, Hispanic students when compared to White students, doubled the gap from a 10 point scale score gap in 5th grade to a 19 point scale score gap in math in 6th grade. The gap also increased for African Americans when compared to White students in this transition from 5th to 6th grade from a 17 point gap in 5th grade to a 25 point scale score gap in 6th grade. More research is needed to understand what combined conditions have cumulated in a widening of the achievement gap during the transition to middle school.

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A&E Recommendations

Recommendation #3: Increased expectations and student engagement activities are needed to challenge all students academically with established data accountability structures to ensure success in middle school. This study showed that minority students who performed at grade level or higher during elementary school and who came from families in the middle to wealthy socio-economic class need to be challenged along with increased support/supervision in middle school. Moreover, the transition from 5th to 6th grade may be difficult for these higher performing minority students academically. To encourage a more successful transition, **smaller learning environments** such as pods or teams could be created at 6th grade. This structure can help students develop built-in peer networks and develop relationships with a limited number of core teachers. Inherent to this structure would be **a greater emphasis on culturally responsive practices** from school staff with a focus on those students new to the departmentalized school culture with rotating classrooms that is typical in 6th grade. Additionally, increased opportunities for **individual leadership roles** and **positive team projects** are recommended for all 6th grade students.