Follow Up Report: Analysis of Dallas City of Learning Student Outcomes

NOTE: This spring 2022 brief report serves as a follow-up to the January 2020 report analyzing associations between participation in DCOL-affiliated summer programs over multiple summers, and observed achievement for students during the school year.

Summary

The current analyses described in this report focus on four academic years of student outcome data starting from 2018-19 through 2021-22. Analyses conditioned outcomes based on program data for the summer preceding each academic year as follows:

- Summer 2018: AY 18-19
- Summer 2019: AY 19-20
- Summer 2020: AY 20-21
- Summer 2021: AY 21-22

The overarching question guiding these analyses is how students that participate in summer programs affiliated with DCOL achieve academically in school. Specifically, analyses explore the influence of multiple summers of programming from summer 2018 through summer 2021, and compare outcomes for DCOL students to other Dallas ISD peers that did not have any documented programming. Statistical matching procedures are used to better estimate the effect of summer programming by controlling for prior achievement and establishing a best-fit comparison group of non-DCOL students.

For the summer 2020 only group, DCOL students of all grade bands were found to be more likely to pass STAAR. And the largest advantage was found in passing Algebra 1 among high school graders. For summer 2019 & 2020 group, DCOL students of all grade bands were found to be more likely to pass STAAR, except for Algebra 1 for which the result was not statistically significant. For students in programs in summers 2018, 2019, and 2020, only the results for middle-grade Reading were found to be statistically significant. The effect size of 1.9 for this analysis indicates that the odds of passing STAAR Reading among middle grades is 1.9 times larger for DCOL students compared to their matched DISD peers. It is important to imply that the non-significant results observed for this group of DCOL students might be a result of low sample sizes per analysis.

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Sample

The current four years of data had a total of 35,781 unique students served by summer programs. The tables below describe the demographic variables for these students, including race, sex, and grade level. Note that totals may differ among tables due to some missing values in some variables.

There was a notable reduction in number of identified Dallas ISD students following summer 2019. This is reflective of reduced programming due to the COVID-19 pandemic and also to unavailability of program data from Dallas ISD-lead programs in summer 2021. Analyses are split by grade level for each school year, so grade is presented year-by-year rather than overall for all years combined. CORE merged grade levels into grand "type" for ease of interpretation (i.e., elementary, middle, high).

Table One. *DCOL students per summer with valid Dallas ISD ID numbers*

Summer	# Students
Summer 2018	14,924
Summer 2019	22,026
Summer 2020	3,264
Summer 2021	1,991

Table Two. *Ethnicity of students overall*

race	n	percent
Black	9,156	25.6%
Hispanic	24,098	67.4%
Other	1,172	3.3%
White	1,351	3.8%
Total	35,777	100.0%

Table Three. *Sex of students overall*

sex	n	percent
Female	16,771	46.9%
Male	19,010	53.1%
Total	35,781	100.0%

Table Four. *Grade type of students overall by school year*

AY	Elem	Middle	High	Total
2018-19	7,264 (35.4%)	4,719 (23.0%)	8,562 (41.7%)	20,545 (100.0%)
2019-20	9,777 (35.7%)	7,356 (26.9%)	10,222 (37.4%)	27,355 (100.0%)
2020-21	7,686 (31.6%)	7,954 (32.7%)	8,711 (35.8%)	24,351 (100.0%)
2021-22	5,770 (26.9%)	8,135 (38.0%)	7,507 (35.1%)	21,412 (100.0%)

Note: many students are included in the counts for multiple years, so the total across all years will include duplicates and thus be larger than the sample of unique students.

Summer Program Participation Description

Table Five and Figures One – Three summarize program participation data. Table One summarizes the average and median student-level dosage of DCOL summer programs (total programs attended, total days, total hours). Note that the median values are expected to better reflect the entire data since there can be some students with quite high dosage values that can inflate mean values.

Table Five. *Summary of program participation data*

Summer	Dosage Type	Average	Median
Summer 18	program count	1.2	1
Summer 19	program count	1.3	1
Summer 20	program count	1.2	1
Summer 21	program count	1.1	1
Summer 18	days	12.7	9
Summer 19	days	16.0	9
Summer 20	days	49.0	43
Summer 21	days	24.9	15
Summer 18	hours	51.0	36
Summer 19	hours	78.4	32
Summer 20	hours	149.5	118
Summer 21	hours	49.7	36

Figure One. *Total programs enrolled per student by each summer*
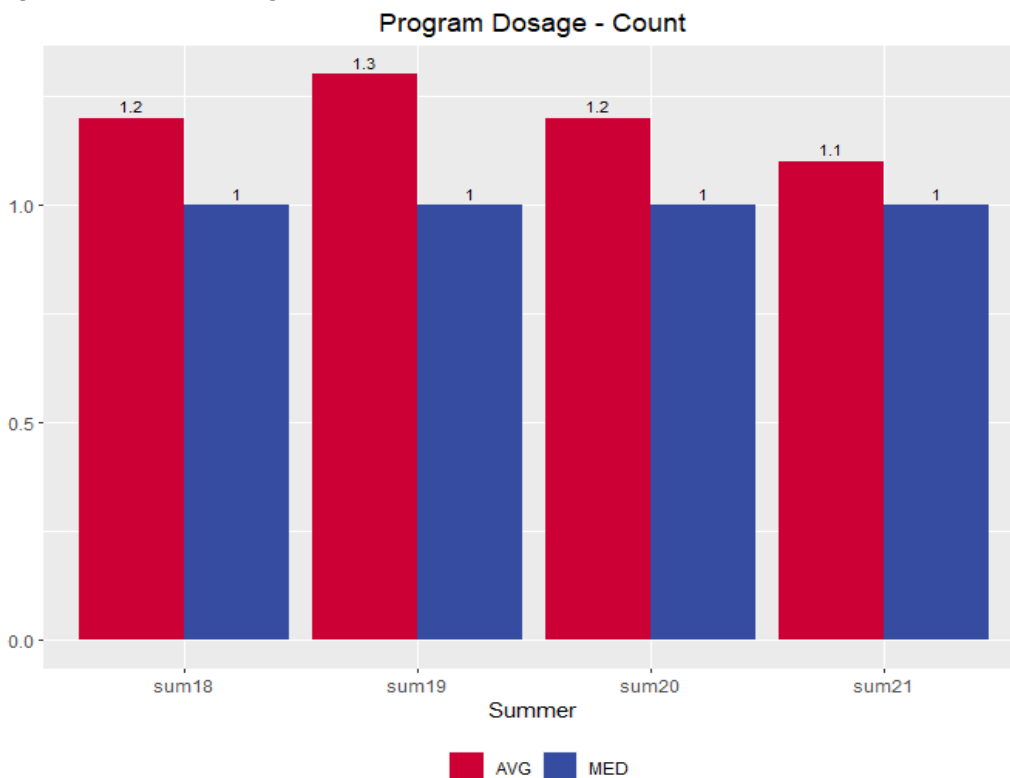
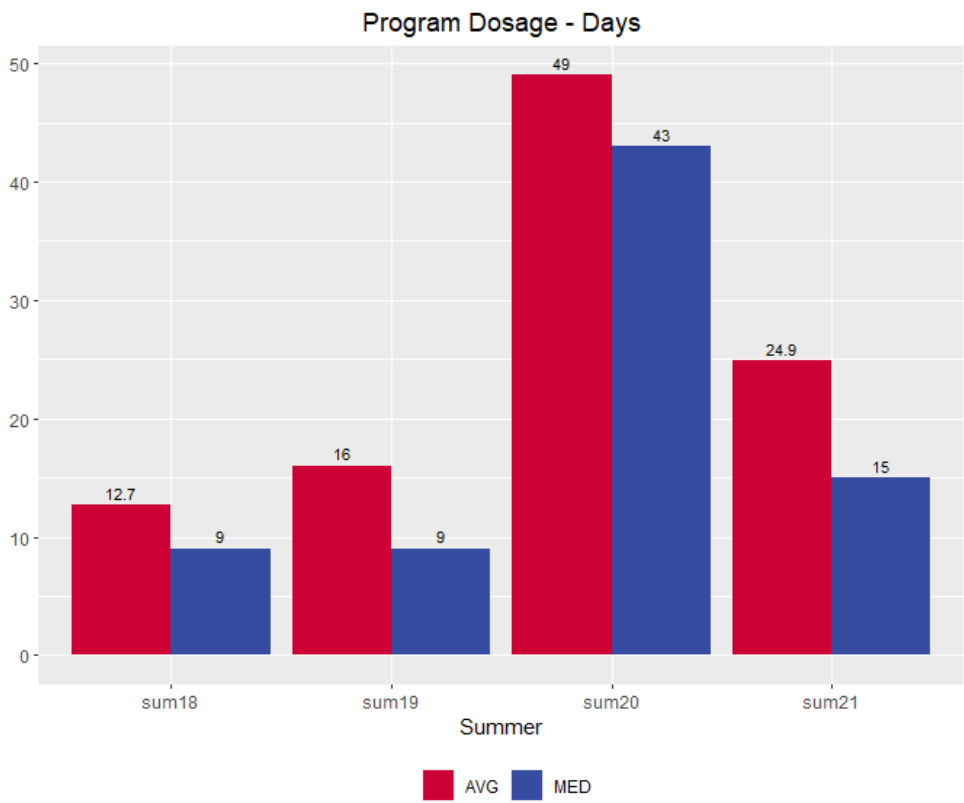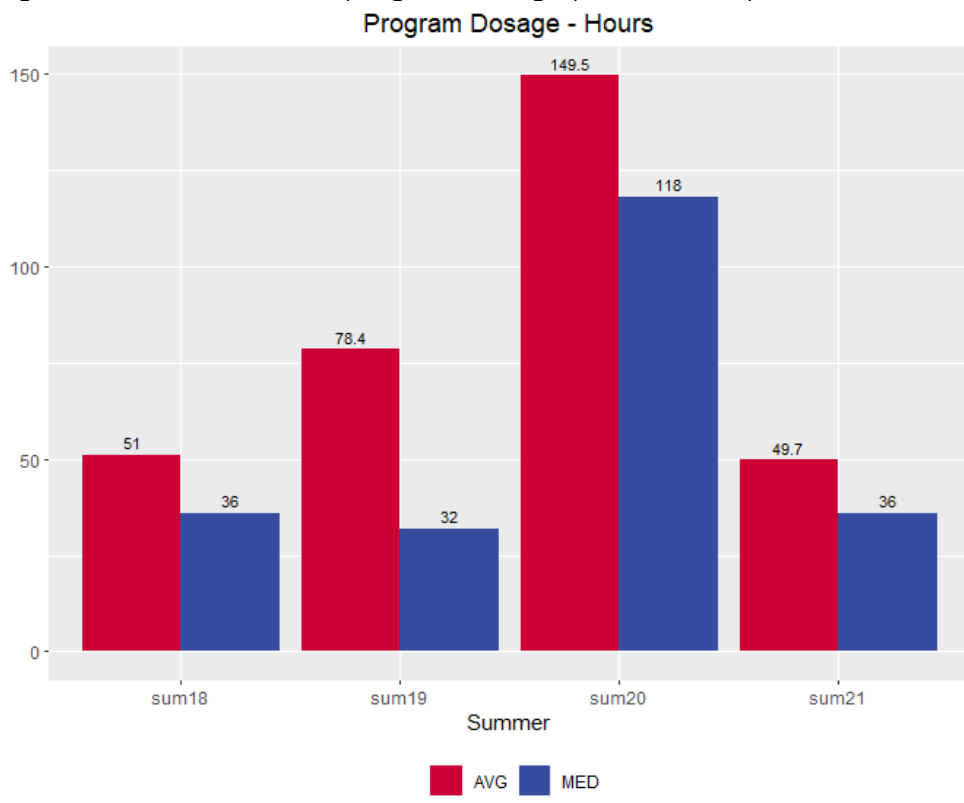***Figure Two***. *Total days of program dosage per student by each summer*

Program Dosage - Days

Figure Three. *Total hours of program dosage per student by each summer*

Program Dosage - Hours

Description of Student Outcomes

CORE used two outcomes, (1.) beginning of the year (BOY) average of all course grades (labelled as GPA), and (2.) STAAR achievement status (an indicator of meeting the approaches level) to measure student outcomes. STAAR outcomes were different for grade-level bands (e.g., high school students are tested in Algebra rather than "math"). CORE used the Reading and Math STAAR approaches indicators (as a binary indicator) for elementary and middle grades. For high-school grades, CORE used the Algebra I and English I indicators. Note that STAAR data were not available for 2019-2020 due to COVID disruptions and also for 2021-2022 as the assessment has not yet been administered at the time of this report.

The procedure for analysis is as follows:

1. First, we summarized trends of student outcomes **per summer** in comparison with non-DCOL students in DISD. **This simple comparison aimed at showing the trends of DCOL vs non-DCOL students in each academic year after a specific summer programming**. Thus, each summer group was comprised of DISD students that enrolled in any program according to records. The comparison group for each particular summer was comprised of DISD students that *never attended* to DCOL programs by excluding potential students that were part of the DCOL system at any time point.

2. Then, we created conducted analyses to better estimate the effects of attending summer programming on STAAR achievement. **For these analyses, we go beyond the descriptive summaries of test scores and consider prior achievement, participation in multiple summers, and comparison group equivalency. These analyses provide more accurate estimates of the unique effect of summer programming on student achievement.**
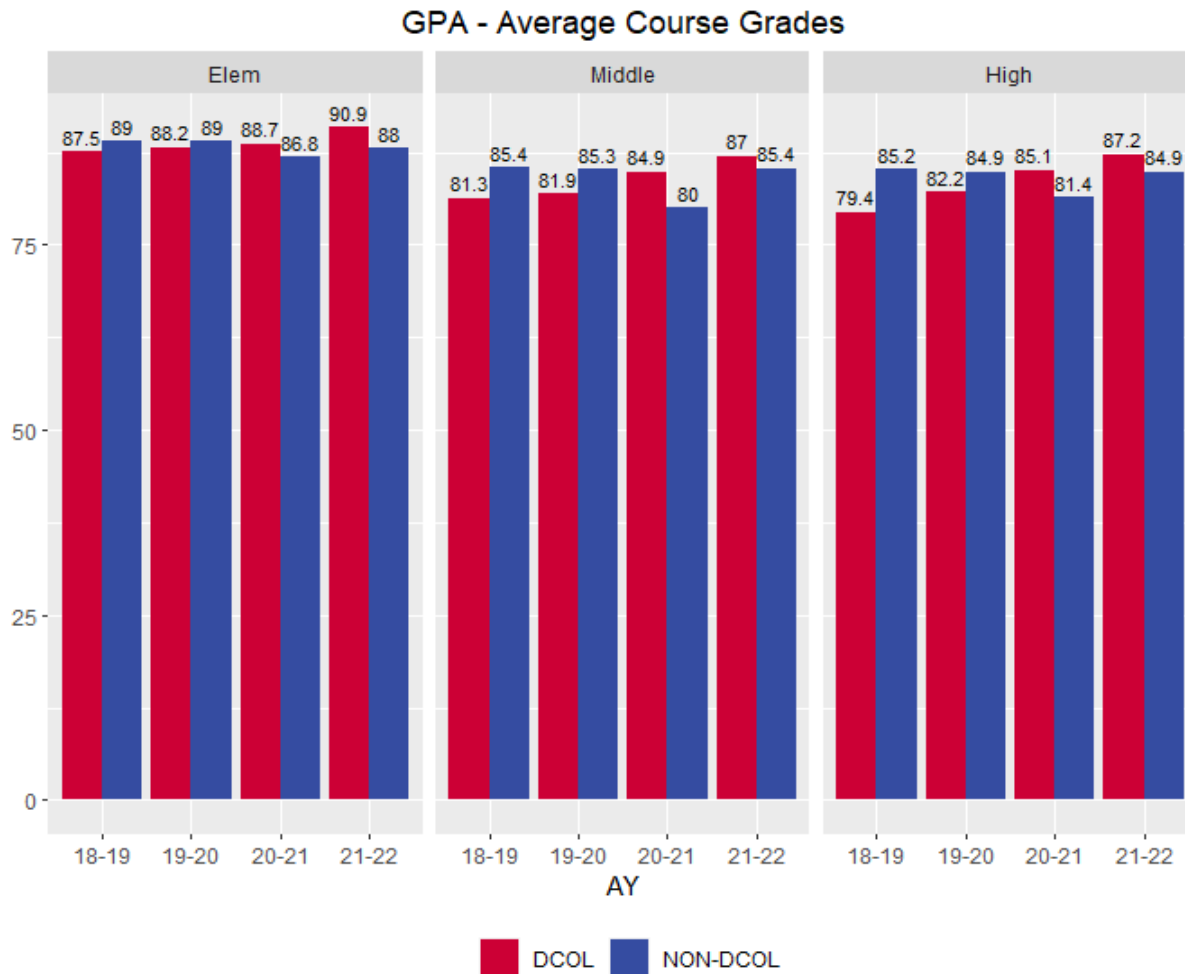
1. Outcome Trends Per Summer

As explained above, these descriptions focus on each summer at a time. Note that we do not exclude DCOL students from the data per summer even though they may be included in the multi-summer groups also. In these descriptions, the outcome for each school year describes the outcomes for students that participated or did not participate in the most immediate prior summer. For example, 18-19 outcomes describe participants/non-participants for summer 2018 programs.

Beginning-of-Year Course Grades (GPA)

Based on this preliminary description in Figure Four, Pre-COVID, students participating in summer programming started off the school year post-summer doing a little worse in their courses compared to students not participating in DCOL summer programs. Since the pandemic began, students engaging in summer programming are doing better at the start of the school year in their courses compared to those without documented participation. This is partly because many DCOL program students are in course recovery programs through Dallas ISD. DISD did not offer these programs in summer 2020 and we don't have record of which students attended them in 2021, so they aren't factored in to both of those summers. Therefore the summer 2020 and summer 2021 DCOL students are just those in community-based programming. *Further analyses will control for these comparison group differences to better estimate group differences in outcomes.*

Figure Four. *Beginning of Year GPA for each year by grade-level type*

GPA - Average Course Grades

Elem: DCOL/NON-DCOL — 18-19: 87.5/89, 19-20: 88.2/89, 20-21: 88.7/86.8, 21-22: 90.9/88

Middle: DCOL/NON-DCOL — 18-19: 81.3/85.4, 19-20: 81.9/85.3, 20-21: 84.9/80, 21-22: 87/85.4

High: DCOL/NON-DCOL — 18-19: 79.4/85.2, 19-20: 82.2/84.9, 20-21: 85.1/81.4, 21-22: 87.2/84.9

Legend: DCOL, NON-DCOL

STAAR Exam Achievement

We see a similar finding with STAAR reading scores as was observed with GPA. See Figure Five. Pre-pandemic, students engaged in summer programs weren't performing as well in reading. Following the pandemic, **students engaging in the types of programs that have been provided and documente**d, which represents a unique subset of our typical summer ecosystem offering, **are scoring higher on STAAR reading, particularly middle school students**.

The same is true for math STAAR, with observed differences most notable for middle school. See Figure Six.

Note again, with these preliminary descriptions we aren't controlling for baseline and comparison group equivalence and don't have a true matched comparison group. **However, at face-value, students engaging in summer are doing better post-pandemic.** Further analyses will provide better estimates of group differences.

Finally, as seen in Figures Seven and Eight, **the same finding is true for English 1 and Algebra 1 STAAR end-of-course exams**. Note that these are mostly freshman high school students taking this exam with some exceptions for eighth grade and 10th-12th grade students.

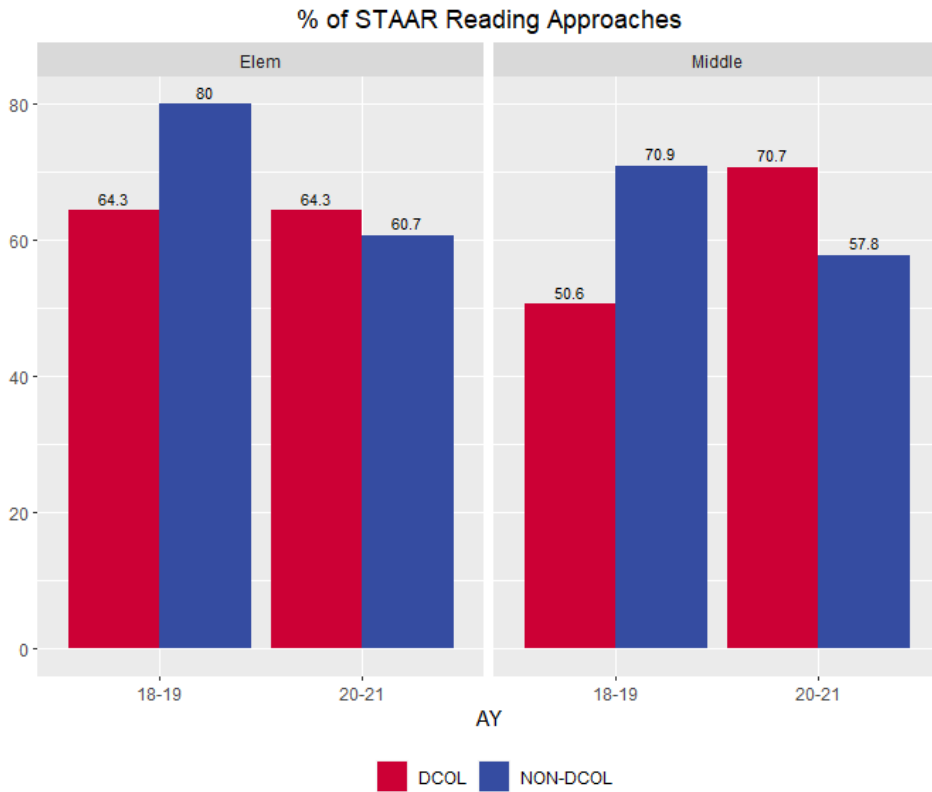**Figure Five.** *STAAR Reading achievement by grade level type*

% of STAAR Reading Approaches

Figure Six. *STAAR Math achievement by grade level type*

% of STAAR Math Approaches
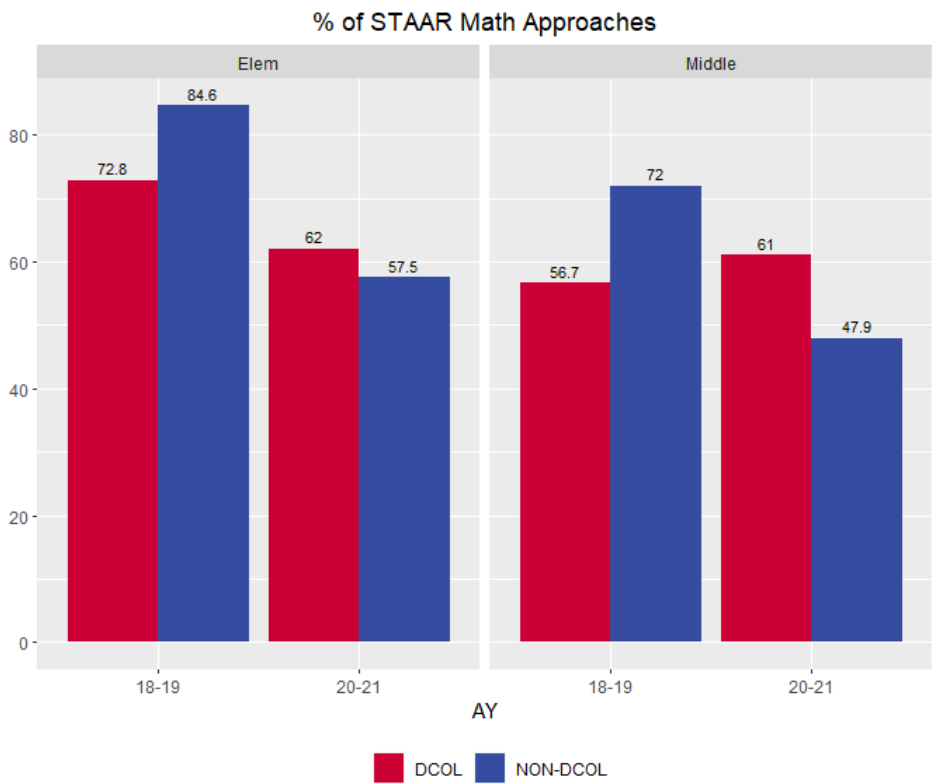
Figure Seven. *STAAR English 1 achievement*

% of STAAR English I Approaches

High

	18-19	20-21
DCOL	26.2	64.7
NON-DCOL	65.4	47.9

AY

■ DCOL   ■ NON-DCOL

Figure Six. *STAAR Algebra 1 achievement*

% of STAAR Algebra I Approaches

High

	18-19	20-21
DCOL	45.3	59.6
NON-DCOL	82.3	48.2

AY

■ DCOL   ■ NON-DCOL

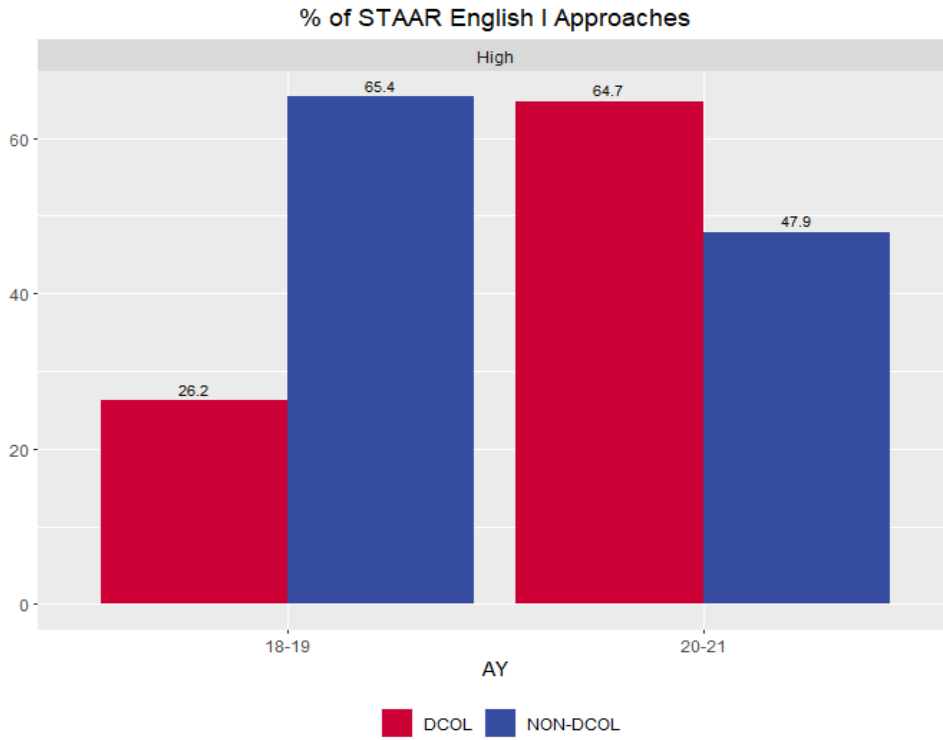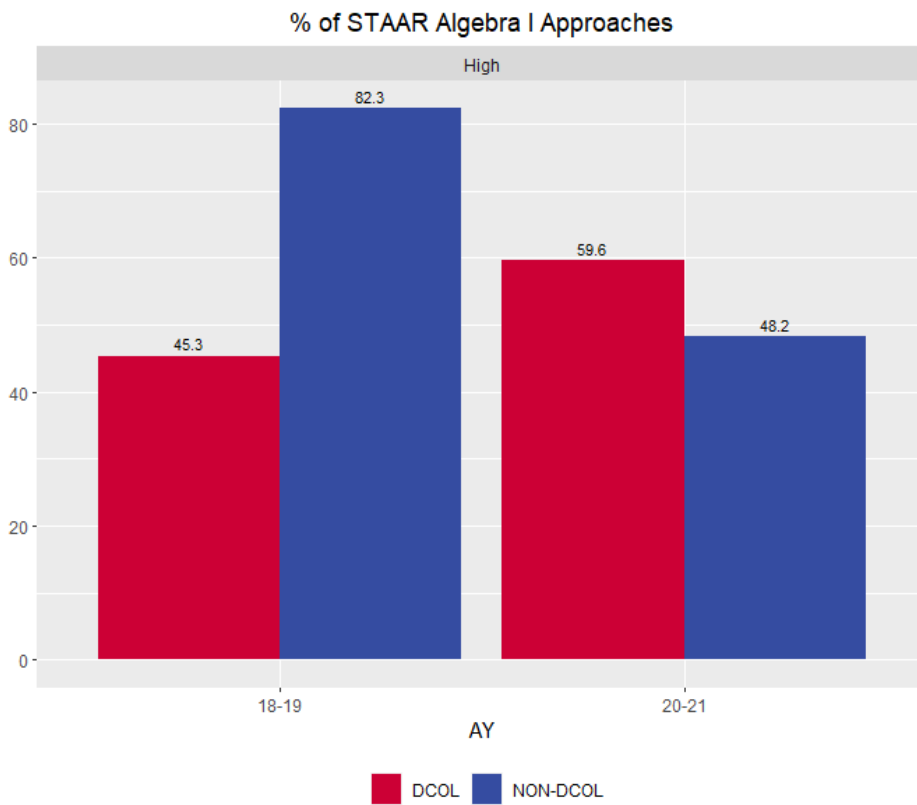# 2. Main Analyses of Effects of Program Participation on STAAR Outcomes

This section will focus on estimating effects of program participation on STAAR Reading, STAAR Math, English 1 and Algebra 1 achievement in spring 2021. We will not focus on further analyses of GPA due to lack of standardization in that outcome measure.

Notes/factors to consider:

- By age level (one set of analyses for elementary and another for middle for math and reading)
- Control for prior achievement (spring 2019)
- Number of summers prior to 2020-2021 school year
  - Summer 2020 only
  - Summer 19 and 20
  - Summer 18, 19, and 20
- PSA to better estimate comparison group

Presented results so far depend on descriptive analyses, where either means or medians were compared between DCOL vs non-DCOL students. Aside from providing rich information about the outcome differences between these two groups, descriptive analyses fall short on revealing the true differences. Thus, **we rely on inferential analyses to better explain the student outcome differences between DCOL vs non-DCOL groups, which leads us to approximate a better explanation of the true DCOL effect.**

Where a randomized controlled trial (RCT) is not possible to employ, the exploration of program effect can be approximated through propensity score analysis (PSA). **PSA is an analysis method used to balance the confounding differences between the two groups to be compared based on outcome**(s). It uses statistical techniques to form a comparison group with similar background measures (such as low SES status) to the treatment group prior to outcome comparison. The common strategy in PSA is to form a 1-1 matched group of students from the control group. Thus, a matched student is expected to have as close characteristics (in terms of background variables) as possible to the target student in the treatment group. **A balanced group then sets the stage for apples to apples comparison so that the observed differences can be adhered to the true effect of the program**. In this vein, CORE employed PSA with 1-1 matching for a better comparison of DCOL vs non-DCOL (referred to also as matched DISD peers) students on STAAR achievement levels.

Following the same approach as with the descriptive analyses, grade-levels were combined to form elementary (3-5), middle (6-8), and high (9-12) grades for the relevant STAAR outcomes (0/1 indicators of fail/pass based on "approaches" threshold). Despite of this aggregation, CORE still used the actual grade levels of students in PSA analyses so that the comparison group would have a similar concentration of grades in elementary-, middle-, and high-grades groups. **Besides the grade-levels CORE used the following background variables to form a balanced non-DCOL comparison group: sex, race, low SES, and LEP.** STAAR passing status from Spring 2019 were NOT used as pre-test passing variable in PSA due to two related reasons: 1) sample sizes became very low when focusing on students with available 2019 STAAR data, 2) former STAAR passing status for high school outcomes were not relevant (e.g., limiting the sample to students with two Algebra 1 STAAR scores within their high-school years).

Results of the PSA analyses are presented below separately for each of the three summer groups. The tables under each section share the same structure and way of interpretation. The first three columns of the tables refer to summer group, grade-band, and STAAR outcome. Next, "N" is the sample size of the DCOL students specific to that analysis. *Note that the number of the DISD students matched would be exactly the same as N.* **"raw_est" and "p_val" are the estimated difference in raw (i.e., logit) scale and statistical significance. A**

positive raw estimate refers to larger likelihood of passing STAAR for DCOL student and a p value below 0.05 indicates that such a difference is statistically significant. The last three columns quantify the magnitude of the effect size, namely the difference between DCOL vs matched DISD students. **"eff_size" is the effect size in odds ratio scale. It can be interpreted as the ratio of odds of passing STAAR for DCOL vs non-DCOL students. The last two columns ("prob_disd" and "prob_dcol") are the model-based estimates of the probability of passing STAAR for matched DISD and DCOL students.** Detailed interpretations of the results are presented under each section below.

Results for Summer 2020 Only

Table Six shows that **all raw estimates were positive and statistically significant. Effect sizes ranged from 1.19 to 2.2, where a value of 2.2 can be interpreted as the odds of passing STAAR for DCOL students is 2.2 times larger than their matched DISD peers.** Probability differences between DCOL vs matched DISD students also reflect the magnitude of the effect size estimate. Namely, **larger probability differences would be observed for larger effect size estimates.** In conclusion, **for summer 2020 only group, DCOL students of all grade bands were found to be more likely to pass STAAR. The largest advantage was found in passing Algebra 1 among high school graders.**

Table Six. *PSA results for Summer 2020 only group*

sum	grd	out	N	raw_est	p_val	eff_size	prob_disd	prob_dcol
s20	Elem	read	1119	0.175	0.045*	1.191	0.602	0.643
s20	Elem	math	1118	0.190	0.028*	1.209	0.574	0.620
s20	Middle	read	973	0.706	0.000*	2.026	0.544	0.707
s20	Middle	math	780	0.556	0.000*	1.744	0.473	0.610
s20	High	eng1	173	0.642	0.004*	1.901	0.491	0.647
s20	High	alg1	89	0.820	0.007*	2.271	0.393	0.596

* p < .05

Results for Summer 2019 and 2020

Table Seven shows that all raw estimates were positive and statistically significant, except for Algebra 1 results for high school graders. The sample size for this non-significant analysis was also the lowest. Effect sizes ranged from 1.3 to 2.2, with the highest value observed for English 1. **In conclusion, for summer 2019 & 2020 group, DCOL students of all grade bands were found to be more likely to pass STAAR, except for Algebra 1 for which the result was not statistically significant.**

Table Seven. *PSA results for Summer 2019 & 2020 group*

sum	grd	out	N	raw_est	p_val	eff_size	prob_disd	prob_dcol
s19_20	Elem	read	541	0.258	0.039*	1.295	0.586	0.647
s19_20	Elem	math	540	0.292	0.019*	1.339	0.556	0.626
s19_20	Middle	read	385	0.493	0.001*	1.637	0.548	0.665
s19_20	Middle	math	336	0.614	0.000*	1.848	0.455	0.607
s19_20	High	eng1	98	0.786	0.007*	2.195	0.388	0.582
s19_20	High	alg1	45	0.722	0.093	2.059	0.378	0.556

* p < .05

Results for Summer 2018, 2019, and 2020

As can be observed in Table Eight, sample sizes per analysis were low compared to former results. This is expected since the number of DCOL students who were exposed to programs three summers in a row would be low. **For students in programs in summers 2018, 2019, and 2020, only the results for middle-grade Reading were found to be statistically significant. The effect size of 1.9 for this analysis indicates that the odds of passing STAAR Reading among middle grades is 1.9 times larger for DCOL students compared to their matched DISD peers**.

It is important to imply that the non-significant results observed for this group of DCOL students might be a result of low sample sizes per analysis. Thus, these results do not necessarily mean that DCOL programs were not effective for this specific group of students who were enrolled three summers in a row. Also, these results do not give healthy answers to the question about the effect of more exposure to DCOL programs.

Table Eight. *PSA results for Summer 2018, 2019 & 2020 group*

sum	grd	out	N	raw_est	p_val	eff_size	prob_disd	prob_dcol
s18_19_20	Elem	read	120	0.074	0.785	1.077	0.650	0.667
s18_19_20	Elem	math	120	0.319	0.232	1.376	0.583	0.658
s18_19_20	Middle	read	111	0.625	0.027*	1.868	0.559	0.703
s18_19_20	Middle	math	96	0.547	0.061	1.727	0.458	0.594
s18_19_20	High	eng1	32	0.251	0.617	1.286	0.500	0.562
s18_19_20	High	alg1	10	0.405	0.654	1.500	0.500	0.600

* $p < .05$