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Effects of Dual-Language Immersion on Attendance and Reclassification in a Large Urban District

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Dual-language immersion (DLI) programs have proliferated across the United States, yet evidence on their effects for English Learner-designated (EL) students in large, diverse urban districts remains limited. This study examines DLI's effects on attendance and reclassification—two outcomes that worsened for ELs following the COVID-19 pandemic. Using restricted student-level data from the Los Angeles Unified School District (2015–2022), we employ doubly-robust estimation to compare DLI and non-DLI students within the same schools. DLI enrollment is associated with substantially higher attendance for all student subgroups, including low-income ELs—an important finding given that attendance is strongly related to student engagement and long-term academic success. For reclassification, while DLI students show modestly lower rates in K–2, these differences disappear by third grade. By the end of elementary school, ELs in DLI reclassify at rates indistinguishable from peers in English-only classrooms, regardless of income status or home language-program language match. These findings directly address a common parental concern—that DLI will delay children's English acquisition—and the evidence suggests otherwise. As California seeks to dramatically expand bilingual education in the state, these results support DLI as an equity-enhancing intervention that benefits students while developing their multilingual assets.

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ABSTRACT

Dual-language immersion (DLI) programs have proliferated across the United States, yet evidence on their effects for English Learner-designated (EL) students in large, diverse urban districts remains limited. This study examines DLI's effects on attendance and reclassification—two outcomes that worsened for ELs following the COVID-19 pandemic. Using restricted student-level data from the Los Angeles Unified School District (2015–2022), we employ doubly-robust estimation to compare DLI and non-DLI students within the same schools. DLI enrollment is associated with substantially higher attendance across all student subgroups, including low-income ELs—an important finding given that attendance is strongly related to student engagement and long-term academic success. For reclassification, while DLI students show modestly lower rates in K–2, these differences disappear by third grade. By the end of elementary school, ELs in DLI reclassify at rates indistinguishable from peers in English-only classrooms, regardless of income status or home language-program language match. These findings directly address a common parental concern—that DLI will delay children's English acquisition—and the evidence suggests otherwise. As California seeks to dramatically expand bilingual education in the state, these results support DLI as an equity-enhancing intervention that benefits students while developing their multilingual assets.

Keywords: Dual-language immersion, Bilingual Education, English Learners, Multilingual Learners, Reclassification, Attendance, Culturally-Relevant Pedagogy

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1. Introduction

The question of how best to educate children who arrive at school speaking a language other than English—commonly referred to as English Learners (ELs)[2]—has been a source of controversy in American education policy for over five decades. EL-designated students frequently face academic marginalization and reduced opportunities to learn, contributing to lower high school graduation rates and diminished academic outcomes more broadly (Cervantes-Soon et al., 2017; Santibañez & Umansky, 2018; Thompson, 2017). The COVID-19 pandemic exacerbated these inequities: EL-designated students experienced disproportionately negative academic impacts (Hough & Chavez, 2024) and declining reclassification rates, resulting in a growing share of Long-Term ELs (Hill & Deng, 2025; Leger et al., 2023). Chronic absenteeism—historically not high among EL-designated students in California prior to 2020—increased sharply during the pandemic and has not returned to pre-pandemic levels (Hill & Deng, 2025; Santibanez et al., 2024).

Two-way dual-language immersion (DLI) has emerged as a way to educate EL-designated children in a way that improves their learning outcomes while maintaining and developing their linguistic and cultural assets.[3] DLI is a pedagogical model that integrates ELs and English-speaking students to teach them the traditional public-school curricula in English and a partner-language. It seeks to promote high academic outcomes, foster bilingualism and biculturalism (Howard et al, 2018), and in some cases, promote critical consciousness (Dorner et

[2] We acknowledge the deficit implications of the term "English Learner." This is the official term for identifying students with a home language other than English (who have not yet demonstrated proficiency on various types of English assessments). To remain consistent with official terminology, we use the term in this paper but refer to students as "EL-designated" or classified to highlight the temporary, programmatic and administrative nature of the term and not to an individual characteristic.

[3] There are several bilingual education models including one-way immersion, transitional, developmental, etc. The models have differing goals: some seek to quickly transition students into English (transitional bilingual) while others seek to maintain and develop knowledge of both languages (two-way dual language immersion).

al., 2023). Despite decades of shifting political and financial support for bilingual education at state and federal levels, DLI programs have proliferated across the country in recent years (American Councils Research Center, 2021).

DLI programs are popular with parents of heritage language speakers, who appreciate the benefits of preserving their language and culture (Williams, et al., 2025) and with English-only speaking families who seek the enrichment aspect of learning a second language. They are also popular with school districts because they curb public school enrollment decline amidst rising competition from charter schools, among other non-district school options (Darriet & Santibañez, 2024). DLI have demonstrated positive academic benefits, while helping students develop and maintain the partner language (Bibler, 2021; Morales, 2024; Shen et al., 2022; Steele et al., 2017; Steele et al., 2024; Umansky & Reardon, 2014; Valentino & Reardon, 2015; Watzinger-Tharp, et al., 2018, 2021). Recognizing this potential, California has set a goal of having half of its K–12 students enrolled in programs that develop proficiency in two or more languages—including DLI—by 2030, and 75% by 2040.[4]

EL-designated students are uniquely positioned to benefit from DLI. These programs offer instruction that is culturally responsive and treats bilingualism as an asset rather than a deficit, thereby reducing the academic marginalization that many EL students encounter in traditional English-only classrooms (Cervantes-Soon et al., 2017; Gándara & Orfield, 2012; Kaveh et al., 2022). DLI also lowers language barriers between non-English-speaking families and school staff, potentially fostering greater family engagement and improving student attendance. Because DLI programs maintain the standard public-school curriculum, students are expected to maintain or develop a heritage or second language while developing English proficiency. There is no

[4] Global California 2030: https://www.cde.ca.gov/sp/ml/documents/globalca2030.pdf

published research to examine DLI's impact on attendance, but prior research on EL reclassification finds that DLI enrollment either benefits reclassification (Steele et al., 2024 using data from Utah) or has no effect (Bibler 2021 using North Carolina data; Steele et al., 2017 using Oregon data). Many parents of EL-designated students, however, worry that enrolling their children in these types of programs could delay or impede their children's English-language acquisition (King & Fogle, 2006; Williams et al., 2025). They are often hesitant to enroll unless districts engage in active outreach and information campaigns (Hill & Deng, 2025).

In this paper we use restricted student- and program-level data from Los Angeles Unified, the 2nd largest district in the nation with large numbers of EL-designated students, to examine the effects of DLI programs on attendance for all students and reclassification for EL-designated students.[5] While not experimental, the design leverages the two-strand nature of nearly all DLI programs in Los Angeles Unified to compare students attending DLI with those attending English-only classrooms in the same school – providing a rigorous comparison group. The availability of a rich set of covariates, including whether students live inside or outside of a DLI schools' attendance zone, allow us to control for major influences on outcomes and the selection of families into programs.

Our study makes three main contributions to the literature on dual-language immersion. First, prior studies of DLI impact on student outcomes (including reclassification) focused on smaller, less diverse districts. Los Angeles Unified provides a considerably larger and more diverse setting: over 250,000 students in grades K–6, nearly 40% EL-designated at kindergarten entry, and more than 180 DLI programs across multiple languages. Second, to our knowledge no prior studies have examined DLI's impact on attendance—an important determinant of student

[5] We do not have access to data on student learning outcomes during the time period of our analysis.

learning outcomes (Gottfried, 2014)—despite the fact that attendance among EL-designated students suffered greatly during and after the COVID-19 pandemic and has yet to fully recover (Santibañez et al., 2024). Third, DLI has undergone a remarkable scale-up in recent years that may have affected instructional quality and program access in ways earlier analyses could not capture. A decade ago, Los Angeles Unified offered a few dozen programs; it now offers more than 180, the majority founded in the past five years (Darriet & Santibañez, 2024). This makes our analysis particularly policy-relevant as California and other states seek to dramatically expand DLI program offerings.

Our findings indicate that DLI improves attendance for ELs (and all students) and has no detrimental effects on reclassification for ELs relative to English-only programs. On average, students in DLI programs have higher predicted attendance than students not in DLI (0.33 standard deviations (SD) higher). This represents about 12 additional days attended, a significant difference. Low-income ELs in DLI have higher predicted attendance than low-income ELs not in DLI. Conditional on their EL status at school entry, EL reclassification rates by the end of elementary school are not significantly different for students enrolled in DLI relative to those enrolled in non-DLI programs in the same school. While there are some differences by program-language match. Korean/Mandarin/Japanese speakers in Korean/Mandarin/Japanese programs have slightly higher reclassification rates than those not in DLI in 2nd through 4th grade, but no significant differences by the end of elementary school. The results are robust to controlling for students' residing in the school's attendance zone (a measure of family motivation to travel for access to DLI programs). We conclude the paper with a discussion of results, limitations, and policy implications.

2. Literature Review

Achieving English proficiency (as expected by reclassification criteria) for EL-designated children typically takes four to seven years (Thompson, 2017). Even though some students show negative or mixed effects of reclassification when the standards are set too low (Robinson-Cimpian & Thompson, 2016) or when implementation is highly heterogeneous (Cimpian et al., 2017), a robust body of evidence indicates that reclassification has a positive impact on academic outcomes (Carlson & Knowles, 2016; Chin, 2021; Pope, 2016). There appears to be a critical "reclassification window" during upper elementary grades, and students not reclassified by this point become less likely ever to do so (Thompson, 2017). Many students who remained classified for 6 years of longer (usually labeled “long-term English learners” [LTELs]) will have met at least some proficiency criteria at some point, and a significant proportion (about one-third) will have also qualified for special education services (Thompson, 2015b).

Parents of DLI students are overwhelmingly enthusiastic about raising bilingual children (Del Hoyo Soriano et al., 2023; Williams & Zabala, 2024). However, many parents also report concern that enrolling their child in a DLI program could hinder or delay the child's English-language acquisition.[6] A recent survey of Latinx parents in California found that over one-half of surveyed parents reported being worried that learning in two languages would slow down their children’s English language development (Wiliams, Marcus & Escobedo, 2025). Similar sentiments were echoed by district administrators interviewed for a recent study (Hill & Deng, 2025).

A small body of work suggests that EL-designated students who stay in DLI programs through 5th grade do not reclassify at lower rates than ELs in mainstream, English-only

[6] See: https://hechingerreport.org/how-to-keep-dual-language-programs-from-being-gentrified-by-english-speaking-families/ and (King & Fogle, 2006). For some older research.

programs. The most robust evidence comes from lottery-based randomized controlled trials, which provide causal estimates of program effects by comparing students who won admission lotteries to those who did not. These results mainly come from small to medium-size districts with low proportions of Latinx and EL children. Steele et al. (2017) conducted the largest random-assignment study of DLI programs to date, analyzing seven cohorts of lottery applicants across twelve schools in Portland Public Schools. They found that ELs in DLI were no more or less likely to reclassify than ELs not in DLI by 5th grade, but by sixth and seventh grade, EL lottery winners' probabilities of remaining classified as EL were 3 to 4 percentage points lower than control students. This effect was stronger for ELs whose native language matched their DLI program's partner language (Steele et al., 2017). Bibler (2021), using lottery-based data from North Carolina, found no statistically significant evidence that attending a DLI school changed the probability of having EL status throughout elementary school. His sample only included two DLI programs. Umansky and Reardon (2014) used non-experimental hazard analysis with 12 years of district data to examine reclassification patterns, finding that Latinx students enrolled in bilingual programs (including one-way, transitional and dual immersion) were reclassified at a slower pace in elementary school but had higher overall reclassification rates by the end of high school. A study using data from Utah, using a sample of mostly White students (85%) with a low proportion of ELs (10%), found that ELs in DLI whose primary languages matched the schools' partner languages had higher reclassification rates by 5th grade. These results were mostly driven by schools with larger shares of primary speakers of the partner language (Steele et al., 2024).

None of the major randomized controlled trials or quasi-experimental studies discussed above included absenteeism as an outcome measure despite its importance for students and schools. This is an important gap in the research because absenteeism became a significant issue

for EL-designated students after the COVID-19 shut down schools across the country (Santibañez, et al., 2024). Families of ELs were hard hit by the pandemic, leading to health, housing, and economic insecurity all of which are related to lower school attendance (Santibañez & Saint Martin, 2025). Harsh immigration enforcement has also been found to predict higher levels of EL absenteeism (Kirskey, 2020; Kirskey & Sattin-Bajaj, 2021). While some attendance indicators improve slightly after the first pandemic year, chronic absenteeism remains a persistent issue (Hill & Deng, 2015).

The literature points to several mechanisms through which DLI may affect reclassification. DLI programs have flexibility in the amount of content taught in each language. Many schools frontload partner language teaching with K-2nd grade being 90 or 80 percent delivered in the partner language and 10 to 20 percent in English, and with upper elementary grades moving toward a 50/50 balance. This would suggest that reclassification rates would likely be lower in the lower elementary grades because ELs have less exposure to English in the classroom. However, DLI students could still catch up by the end of elementary –both because there is more English instruction and because of language transfer. Language transfer happens when the use of a partner language (or home language) in the classroom transfers to second language acquisition (Cummins 1979; Genesee, 2011). How much of this transfer happens depends on how similar in structure the two languages are. Indo-European languages like Spanish, German or French will be more structurally similar to English and have higher transfer than Sino-Tibetan languages (e.g. Mandarin) or those considered to be more isolated (e.g. Korean) (Genesee, et al., 2006; Lado, 1964).

As for student attendance, because DLI centers language and culture as assets, instruction is likely to be more culturally-relevant – and engaging - for the groups represented by the partner

language. In addition, a critical mass of teachers of DLI programs tend to be bilingual in the partner language themselves and be of the same race/ethnicity of the students—something which has been found to positively affect attendance and other behavioral outcomes for students of color (Blazar, 2021; Gottfried et al., 2021; Holt & Gershenson, 2019). Second, it is possible that by reducing language barriers usually associated with low levels of participation in schools (among immigrant parents), DLI schools could create communities where parents of ELs might be more likely to feel included and become engaged. Higher levels of family engagement have been found to predict higher student attendance (Epstein & Sheldon, 2002).

3. Setting, Data and Methods

3.1. Setting: Los Angeles Unified

LAUSD is a large, urban school district in southern California with the second largest number of EL-designated students of any district in the country.[7] About 40% of students entering kindergarten in the district are bilingual and around 35% are designated ELs. There is a rich linguistic diversity in the district: students speak over 80 languages, and while most EL-designated students speak Spanish (>80%), thousands of others speak Korean, Armenian, Mandarin, Tagalog, Russian, Cantonese, Farsi, Hebrew, Vietnamese, Japanese, Arabic, and other languages.

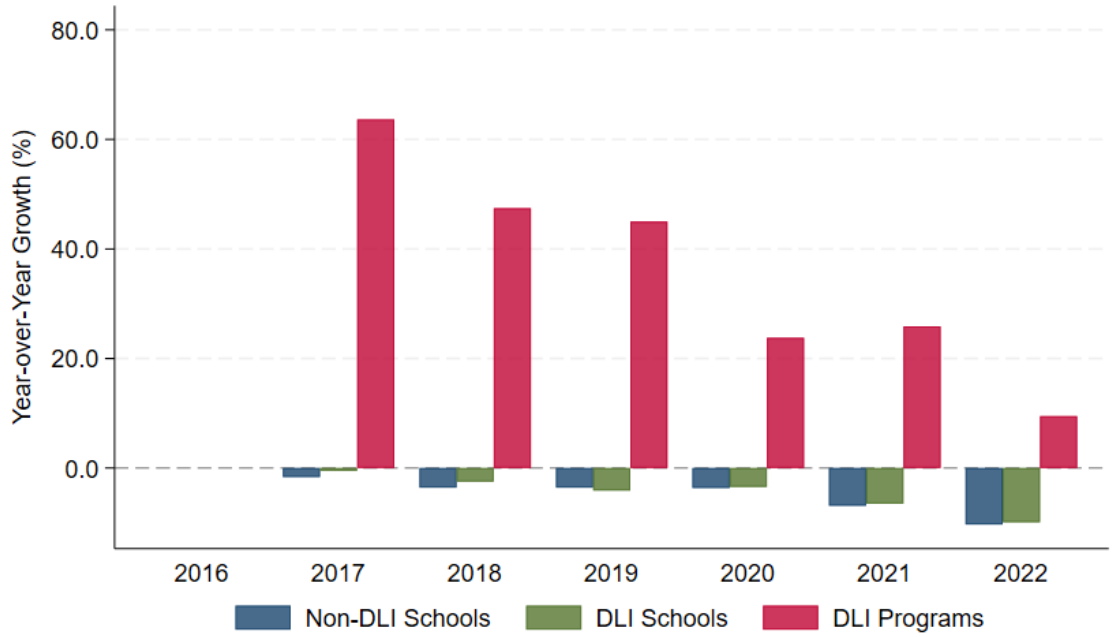
Declining enrollment has been the most noticeable demographic trend in LAUSD over the past 20 years. District enrollment peaked in 2002-03 and has dropped every year since and across every racial/ethnic group, especially African Americans. These trends can be explained by lower birth rates, dwindling immigration, out-migration of families with school-aged children, the high

[7] Dataquest reports that in the SY 2024/25 LAUSD had close to 100,000 ELs (see here: https://dq.cde.ca.gov/dataquest/DQCensus/EnrELAS.aspx?cds=1964733&agglevel=District&year=2024-25) This is lower than New York City Public Schools, the largest district in the nation, which has close to 170,000. See here: https://infohub.nyced.org/docs/default-source/default-document-library/2024-25-ell-demographics-at-a-glance.pdf

costs of living, and the growth in independent charter schools (Los Angeles Unified School District, 2018a, 2022a). Over the last two decades, the district lost more than 150,000 elementary students and is projected to lose an additional 30% of its total enrollment over the coming decade (Los Angeles Unified School District, 2022a). While enrollment declines have been widespread across LAUSD, schools offering DLI programs have proven considerably more resistant to these trends than their non-DLI counterparts (see Figure 1). One key driver of this growth has been adding new programs to existing schools: the district had 45 DLI elementary-level programs in 2016 and now has over 135.[8]

Figure 1

Enrollment Growth in Elementary Schools with and without DLI Programs (2016-2022)



Note: Elementary schools only. "DLI Schools" bars measure the growth in total enrollment in schools with a DLI program. "DLI Programs" bars represent growth only in the DLI program enrollment (within DLI schools).

[8] While the growth in new DLI programs is clear, what is less clear is where the additional enrollment is coming from: students from outside of the district coming into DLI schools or students from the district who would have gone elsewhere (i.e. charter schools). Recall that most DLI programs only enroll new students in Kindergarten and 1st grade; beginning in 2nd grade new students (with no prior DLI experience) are subject to language verification; thus it is unlikely that most of the new enrollment is students already enrolled in English-only programs (in the same or other schools).

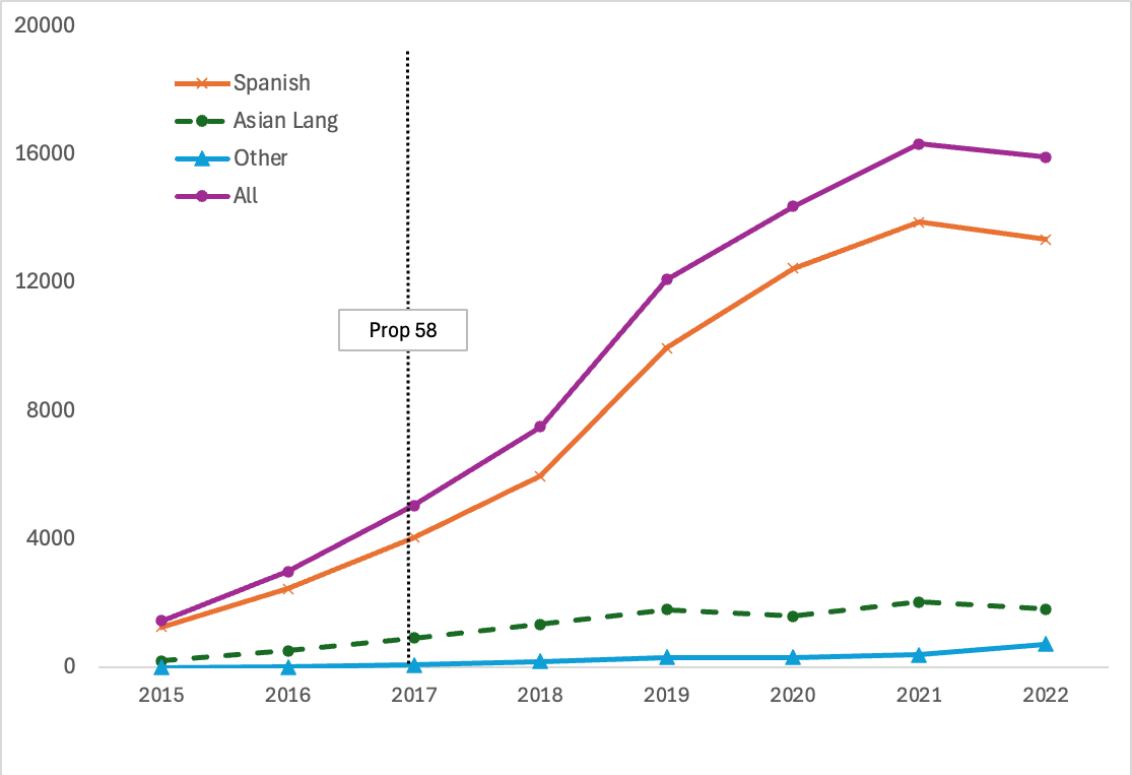
Bilingual Education in Los Angeles Unified

During the 1960s, Chicano students fought for educational equality and opportunity culminating in the 1968 "Walkouts." Student demands included training and hiring of bilingual staff and teachers and increasing the number of bilingual programs in the district. In this era, federal grants (along with state grants) provided significant financial support to grow bilingual programs. By the 1980s, however, political support for bilingual education in California had waned. In 1986, Proposition 63 designated English the official language of California (although it never became effective because of overruling federal laws). In 1994, California voters approved Proposition 187 banning undocumented immigrants from accessing education and health services, which was almost immediately struck down by federal courts. Voters again supported an anti-immigrant initiative by overwhelmingly approving Proposition 227 in 1997. Proposition 227 required ELs to be taught in English and imposed severe restrictions on bilingual education programs. Across the state, the proportion of EL-designated students receiving bilingual instruction dropped from 25% to 8% in the years after Prop 227 was passed (Parrish et al., 2006).

DLI Program Context

In 2016, California voters reversed the ban on bilingual education by approving Proposition 58, accelerating the growth of bilingual schools in the district, and specifically DLI programs. (see Figure 2).

Figure 2
Growth in Elementary-Level DLI Program Enrollment (All Grades), by Partner Language (2015-2022)



*Asian language programs include Korean (N=10), Mandarin (N=7) and Japanese (N=1).
**Other language programs are Armenian (N=4) and French (N=2).
Note: N=134 for elementary DLI programs (grades K-6 in 2021/22).

In 2022, close to 16,000 elementary school students were enrolled in more than 135 DLI programs. This enrollment represents close to 8% of the district's elementary-level student population. All but two of LAUSD's elementary DLI programs are housed in traditional public schools within neighborhood attendance zones.[9] Though the vast majority DLI programs in the district operate as a separate strand within a traditional (English-only) school, in most cases, their enrollments are a substantial portion of their schools' total enrollments. The average DLI program in the district offers grades K-2. New DLI programs begin in Kinder, and 1st grade and

[9] Two programs currently exist in non-zoned schools, including one in an affiliated (LAUSD-operated) charter school and one in a pilot community school meant for small innovative programs.

gradually offer new grades as cohorts progress through their schooling. DLI program enrollment makes up about a quarter of the school's total enrollment (about one-third of 1st grade enrollment).

Eligible students, even those living outside the school's boundary area, can apply to attend a DLI program. Students who are designated as ELs or speak the partner language of the program at home can enter at any grade level.[10] Non-partner language speakers can enter in grades K-1 (or in transitional kindergarten (TK)), but after 2nd grade they are subject to language verification. Once eligibility has been verified, students and their siblings living within the school's attendance zone are given first priority. Students and their siblings living in LAUSD neighborhoods, but not in-zone, are given next priority, and students on inter-district permit are given last priority.

Table 1 shows selected descriptive statistics for DLI schools in the most current year of data (2022). We show only figures for elementary schools because those are the focus of our analysis.

Table 1
Elementary Level DLI Program and Enrollment Characteristics (2021/22)

Overview	
Number of DLI Programs	138
Number of DLI students	15,907
% of overall elementary K-5 pop in DLI	7.6%
% of ELs (K) among DLI Students	47.4%
% of ELs (All) in DLI Programs	9.6%
Enrollment by DLI Program Partner Language	
Spanish (N=121)	83.9%
Asian Lang (Korean/Mandarin) (N=10)	11.4%
Other languages (N=5)	4.6%
Program Language Match	

[10] More information is available at the Choices website of LAUSD: https://choices.lausd.net/dle.

Spanish (primary language) in Spanish-lang DLI	95.8%
Spanish ELs in Spanish DLI	96.3%
Asian (primary language) in Asian-lang DLI	95.7%
Asian ELs in Asian-lang DLI	92.7%
Program Enrollment Compliance	
Switch out (after K)	0.9%
Switch in (after K)	1.9%

DLI programs are racially/ethnically, and economically diverse than non-DLI schools (Asson et al., 2026). In 2022, DLI programs in LA Unified enrolled a significantly higher proportion of ELs than non-DLI schools: 47% of Kindergarten enrollment in DLI programs is EL-designated. But because there are significantly fewer DLI schools than non-DLI schools, only about 10% of EL-designated students overall were enrolled in DLI programs.

There is a high degree of language-match between a child's home language and the DLI program's partner language. Almost all Spanish-language DLI students are enrolled in Spanish-language DLI programs, and the same is true for Asian-language speakers and Mandarin/Korean programs (i.e. "Asian-language" programs). Most students who begin kindergarten in a DLI program tend to stay there. Only about 1% switch out of DLI, and among those who do, the majority switch out before 2nd grade. Because the district allows students to enter in other grades, there is a slightly higher percentage of students switching into DLI (~2%). The vast majority of those moving into DLI do so before 2nd grade. Consequently, students who switch-out of DLI have had little exposure to the program (one to two grades), and most of those switching-into DLI have high exposure to the program (four to five grades).

3.2. Data and Sample

Data access is provided by LAUSD through CORE – an organization founded in 2010 to engage districts in cooperative efforts to implement new academic standards, improve training

for teachers and administrators, and pool data.[11] Data includes restricted-access, student-level demographics, program-designations, socioeconomic, linguistic proficiency outcomes, and other behavioral and attendance indicators.

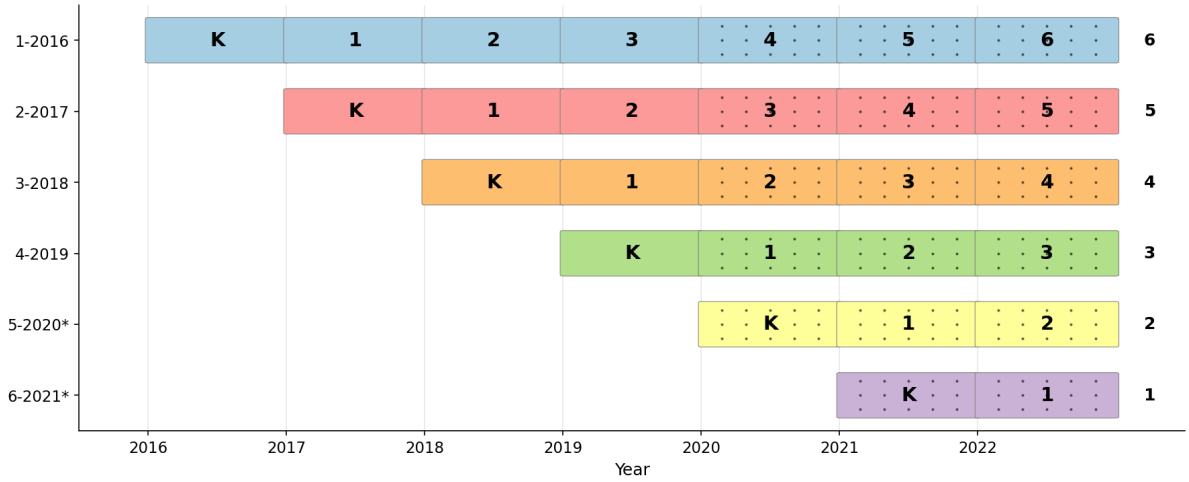
We restrict our analysis to elementary schools because they constitute the vast majority of programs in Los Angeles and because those are the years when most reclassifications occur.[12] We include students up to 6th grade, provided that their school is an elementary school (i.e. highest grade offered is 6th grade). Sixth graders and above in middle and K-12 schools are excluded. We also exclude 2014/15 because of missing data in some key variables. A small number of schools (N=6) with DLI programs are excluded because we could not find a matched sample within that school. Those are most likely whole-school DLI programs which do not offer a non-DLI strand. The final analysis sample includes 138 elementary DLI programs in grades K-6 across the school years 2015/16 to 2021/22.

A DLI program enrollment flag was provided by the district beginning in the year 2019/2020. Before this year, there was no official Language Instructional Educational Program (LIEP) enrollment code that would allow student-level identification of participation in DLI.[13] Using the LIEP enrollment code, we backfill DLI program participation for students to 2015/16. We considered students to be enrolled in DLI between 2015/16 and 2018/19 if they (1) attended a DLI school with a DLI program prior to 2020, and (2) were enrolled in a DLI program between 2020 and 2022 so that we have a LIEP flag for them.[14] The sample includes slightly over one

[11] See https://coredistricts.org/.
[12] Most programs in our data teach in ratios of 80/20 (80% target language, 20% English) in the lower grades gradually moving toward a 50/50 ratio in the upper elementary grades. In contrast, middle and high school DLI programs are much less intensive and deliberate about the two-way immersion. At the secondary level, students in DLI programs usually take one or two classes in the partner language (usually science or math or social studies plus the language itself (i.e. AP Spanish in high school).
[13] CDE instituted this requirement in 2019/20. See here for more information or see CALPADS Flash #163.
[14] It is possible that these assumptions miss labeling as DLI some students who finished elementary before 2020. In addition, we could miss some students who entered DLI as new students between 2016 and 2020, but who either left

million students (DLI and a matched non-DLI group) representing around 145,000 unique students per year (see Figure 3).

Figure 3
Cohorts used in the Analysis



Note: Dotted squares represent non-imputed cohorts (DLI student-program flag is included in district data); solid squares represent imputed cohorts. Years with an asterisk represent fully non-imputed cohorts (2020 and 2021).

Outcome Variables

The analysis uses three outcomes: reclassification rate (annual), whether a student has reclassified by the end of elementary (5th or 6th grade depending on school configuration), and attendance.[15] EL reclassification in California is based on four criteria: results on the summative

the DLI program OR finished elementary school before 2020. In the case of newly entering students, we are fairly confident that these assumptions will correctly flag most DLI students because older students would have needed to demonstrate language skills to participate in DLI and are thus not likely to constitute a large group. We also do not think that the students who left DLI before 2020 constitute a large group given the high stability of DLI students once they are in the program. Lastly, about students who graduated before 2020, we have no way of labeling these students but they are not part of the final sample since they would have been in grades 2-5 before 2020 and not part of the study's cohorts.

[15] We do not use SBAC ELA or math test scores because these were not administered during the COVID-19 pandemic in 2019-2020 and 2020-21. In addition, students are tested beginning in 3rd grade. Thus, we do not have enough post-3rd grade years before 2020 to establish a clear trend. Similarly, we do not use linguistic scores on the ELPAC because of changes to the assessment (the prior test, CELDT was discontinued in 2017, with the ELPAC beginning in 2018. Scores are not directly comparable. The ELPAC was not administered during 2019/20, and it is entirely missing from our data in 2022.

ELPAC test;[16] results on a basic skills of English assessment (usually the SBAC or Smarter Balanced Assessment Consortium test in English Language Arts); teacher evaluation; and parent consultation. This last criterion is not required for the decision to take place. Once a student has been reclassified, they "exit" EL status. Attendance is measured by days attended over the school year and is standardized by year and grade.[17]

3.3. Descriptive Statistics

Table 2 shows descriptive statistics for the matched sample of elementary students (see Online Appendix Table A1 for whole, non-matched sample).

Table 2
Descriptive Statistics for Matched Student Sample (2015/16 – 2021/22)

	DLI		Non-DLI		Mean Diff. (DLI – Non-DLI)	All Schools	
Variable	**Mean**	**SD**	**Mean**	**SD**		**Mean**	**SD**
Female	0.52	0.50	0.48	0.50	0.03	0.49	0.50
Latino	0.80	0.40	0.72	0.45	0.09	0.72	0.45
White	0.10	0.30	0.14	0.35	-0.04	0.14	0.35
African-Am.	0.06	0.23	0.11	0.32	-0.05	0.11	0.31
Asian-Filip.	0.10	0.29	0.07	0.26	0.02	0.07	0.26
Ever EL	0.55	0.50	0.43	0.50	0.11	0.44	0.50
EL	0.37	0.48	0.26	0.44	0.11	0.27	0.44
EL in K	0.54	0.50	0.40	0.49	0.13	0.41	0.49
SWD	0.06	0.24	0.12	0.33	-0.06	0.12	0.33
FRPL	0.80	0.40	0.65	0.48	0.14	0.66	0.47
Parent has College	0.25	0.43	0.28	0.45	-0.03	0.28	0.45
Bilingual in K	0.62	0.49	0.46	0.50	0.16	0.47	0.50
Primary Lang: Spanish	0.55	0.50	0.45	0.50	0.10	0.45	0.50
Primary Lang: Asian-Lang*	0.05	0.22	0.01	0.10	0.04	0.01	0.11
Primary Lang: Other	0.03	0.16	0.05	0.22	-0.03	0.05	0.22
Total suspensions	0.00	0.02	0.00	0.05	0.00	0.00	0.05

[16] An overall performance level of 4 was approved by the State Board of Education as the statewide standard Note that students with disabilities take the Alternate ELPAC. Their cutoff score is overall level = 3. See: https://www.cde.ca.gov/sp/ml/reclassification.asp.

[17] Attendance for 2019/20 was provided by the district and reflect accurate figures. These numbers are slightly lower than for other years, possibly reflecting uneven attendance taking patterns during the school shutdown period (mid March to end of May). The N's for attendance figures are in line with those of other years.

Distance home-school (miles)	1.05	2.64	0.98	3.29	0.06	0.99	3.27
Student is in-zone	0.58	0.49	0.68	0.47	-0.09	0.67	0.47
Attendance	155.5	30.8	153.9	36.8	1.6	154.0	36.6
Reclassification Rate	0.61	0.49	0.56	0.50	0.05	0.56	0.50
Reclass by End of Elementary	0.99	0.10	0.99	0.10	0.00	0.99	0.10

Note: These statistics refer to the matched sample. Thus, the non-DLI numbers are for students in DLI schools, in the non-DLI program strand. N for non-DLI schools is about 2 million observations. For DLI schools it is around 76,000 observations.
*Korean, Chinese languages (Mandarin, Cantonese, etc.), Japanese.

In general, more Latinx students (80% vs. 72%), Asian/Filipino/PI students (10% vs 7%) enroll in DLI vs. non-DLI. African-American students have significantly lower representation in DLI (6% vs 11% in non-DLI) as do White students (10% vs. 14%). DLI programs have higher proportions of students who are eligible for free and/or reduced lunch (FRPL)—a proxy for low-income (80% vs. 65%) and students designated as Ever-ELs (55% vs 43%). DLI programs have fewer students with disabilities (6% vs 12%) and a slightly fewer parents with a college degree relative to non-DLI students (25% vs 28%). As expected, a much higher share of students in DLI are bilingual at kindergarten (62%). It is worth noting that a large proportion of kindergartners in non-DLI programs (46%) are also bilingual. The most common home language among DLI students is Spanish (in this sample and among students who are ELs or Bilingual, the proportion of Spanish speakers is close to 90%). More families travel to DLI-programs from out-of-zone vs. to non-DLI programs. The proportion of in-zone students in DLI-programs is 58% relative to 68% for students in non-DLI programs in the same school. Consequently, the home-school distance is slightly longer for families in DLI programs (1.05 mi vs. 0.98mi).

3.4. Methods

To estimate the effect of DLI program participation on EL-designated student outcomes, we estimate doubly robust average-treatment models. This approach combines within-school

propensity score matching with regression adjustment. We adopt an intent-to-treat (ITT) framework in which treatment is defined as enrollment in a DLI program at kindergarten entry, regardless of subsequent program changes. This approach avoids bias from endogenous program switching and estimates the effect of initial DLI assignment. Given low rates of program switching in our sample (see Table 2), the ITT estimate closely approximates the effect of continued DLI participation.

To obtain a matched sample, we estimate the propensity for a student to enroll in DLI at kindergarten entry based on baseline observable characteristics. Matching is conducted within schools—comparing DLI and non-DLI students who entered kindergarten at the same school—to account for school-level selection and ensure that both groups faced the same school environment. The propensity score is estimated using logistic regression:

$$logit(D_i = 1) = \alpha + X_i\beta \quad (1)$$

Where D_i indicates DLI enrollment and X_i includes student characteristics: gender, race/ethnicity, FRPL eligibility, EL classification, disability status (SWD), and bilingual designation at kindergarten entry. All covariates are measured at baseline to avoid conditioning on post-treatment variables. Matching is performed using nearest-neighbor matching with up to 5 matches and a caliper of 0.025 standard deviations of the propensity score. The goal of matching is to achieve balance such that DLI enrollment is no longer associated with observable characteristics within the matched sample (Ho et al., 2007).

After treatment balance in all variables is achieved and the mean absolute standard bias is reduced to acceptable standards (<0.05) (see Table A2 in the Online Appendix). Matching diagnostics and propensity score density plots demonstrating good common support are provided in the Online Appendix (Figs A1a and A1b).

Using the matched sample, we estimate the following outcomes regression model:

$$Y_{igct} = \quad \tau D_i + X_i'\beta \quad + \gamma_s + \delta_c + \theta_g \, \varepsilon_{igst} \qquad (2)$$

Where Y_{igct} is the outcome of interest (attendance or reclassification) for student i, in grade g, cohort c (kindergarten entry year). D_i is baseline DLI enrollment status. X_i' are baseline covariates used in matching and $\gamma_s, \delta_c,$ and θ_g are school, cohort and grade fixed effects. School fixed effects are defined based on each student's school at kindergarten entry to align with the within-school matching design. Observations are weighted by propensity score weights from the matching procedure, and standard errors are clustered at the baseline school level. The coefficient τ is the estimated treatment (ITT) effect.

Event Study Analysis for Reclassification

To examine how DLI effects on English Learner reclassification evolve across elementary school we allow the DLI effect to vary by grade. This specification tests whether any early-grade differences in reclassification rates between DLI and non-DLI students persist, widen, or narrow as students advance through elementary school. For the reclassification outcome, we follow students from kindergarten entry until they reclassify from English Learner to Fluent English Proficient status, with observations censored after reclassification. The outcome variable equals 1 in the year a student reclassifies and 0 in all prior years.

Robustness Checks

Without an explicit lottery or experimental design, it is difficult to disentangle the effects of DLI on student outcomes because of the voluntary nature of DLI program participation. There is a strong component of family self-selection into these programs with many parents traveling out-of-zone and long distance to enroll in DLI (Asson et al., 2026) which makes it difficult to make causal statements about DLI effects if this potential selection bias is not considered.

As previously mentioned, our design leverages the fact that most DLI schools exist as programs within traditional schools—this takes care of the most obvious source of self-selection bias which is choosing a program within a school. Some families, however, are especially motivated for their children to attend DLI and willing to travel to these schools and expend more time and other resources than those who are zoned to attend the school. Unobserved motivation and other factors are likely to affect the outcomes of interest. To account for this second potential source of bias, we restrict the sample to students residing within their school's attendance zone. This restriction addresses the concern that families who travel out-of-zone for schooling (approx. 42% of the DLI sample, less so for the non-DLI sample) may differ from neighborhood families on unobserved dimensions related to both program selection and student outcomes.

A second robustness check concerns the effects of the COVID-19 school closures on our outcomes, especially attendance outcomes which were heavily impacted by the pandemic (Santibañez, et al., 2024). In a separate analysis we exclude the years post 2019/20. We can only do this for attendance outcomes, since we do not have enough years of data to exclude these years and be able to measure effects on reclassification.

4. Results

4.1. Effects of DLI Enrollment on Attendance

Table 3 shows the ITT effect of dual-language immersion (DLI) enrollment on student attendance. We find that students enrolled in DLI programs in kindergarten have significantly higher attendance than their matched peers in traditional classrooms. DLI enrollment is significantly associated with a 0.33 standard deviation (SD) increase in attendance (Column 1)—about 12 additional days attended (over the control group standard deviation).

Results in Column 2 show estimates when we restrict the sample to students residing within their school's attendance zone. The estimated effect is slightly higher (0.36 SD or aboug 13 additional days), suggesting that differential parent motivation associated with out-of-zone enrollment does not drive our results. Column 3 results use only pre-COVID cohorts, excluding students who entered kindergarten during or after the 2020-2021 school year. The pre-COVID estimate is slightly smaller (0.27 SD, about 10 additional days attended), but still significant and meaningful. It is possible that that later cohorts, which experienced pandemic-related disruptions, attended DLI programs at a higher rate, possibly because these programs provided more structured language support for families and ELs during periods of remote or hybrid learning. Lastly, Column 4 results are those for sample of non-imputed DLI program status (cohorts 2020-2022, see Figure 3). This specification yields an estimated effect of 0.45 SDs, the largest among our specifications. Across all robustness checks, the qualitative conclusion remains unchanged: DLI enrollment is associated with significantly higher attendance.

Table 3
Effect of DLI Enrollment on Attendance

	(1)	(2)	(3)	(4)
	Main	In-Zone Only	Pre-COVID (2016-2019)	Non-Imp. Cohorts
DLI Enrollment (at Baseline, K)	0.334***	0.356***	0.265***	0.447***
	[0.021]	[0.044]	[0.021]	[0.025]
N	84,034	25,826	49,926	34,108

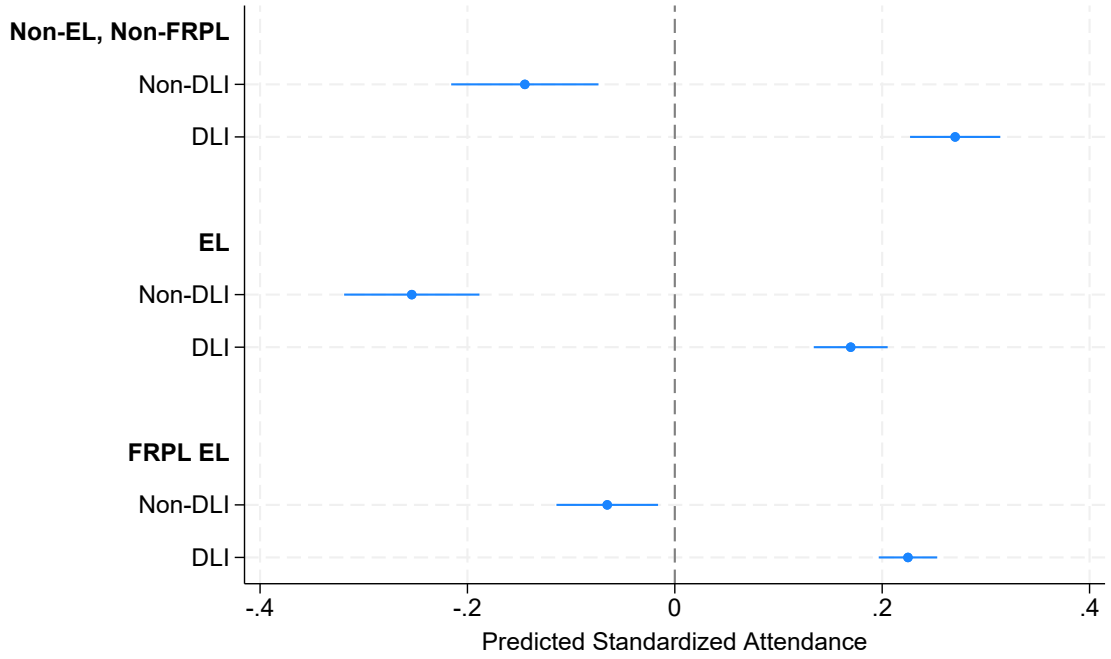
Notes: The dependent variable is attendance standardized by grade and year. DLI Enrollment indicates assignment to a dual-language immersion program at kindergarten entry. Estimates are from a doubly-robust specification combining within-school propensity score matching with regression adjustment. Baseline controls include gender, race/ethnicity, English Learner status, free/reduced-price lunch eligibility, disability status, and bilingual status, all measured at kindergarten entry. Robust standard errors clustered at the school level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

To explore estimate heterogeneity, we interact DLI status with EL-classification and low-income status as measured by eligibility for FRPL. A graphical representation is shown in Figure

4 (full regression results are in the Online Appendix, Table A3). Students in DLI programs have higher predicted attendance across all subgroups, including EL-designated students from low-income families relative to the comparative group in non-DLI programs (a predicted standardized attendance slightly above .20 SD). These results are robust to restricting the sample to in-zone students only (see Online Appendix, Figure A2).

Figure 4

Predicted Marginal Estimates for DLI Program Enrollment Effects on Attendance



Note: Estimates shown are for predicted marginal effects of the attendance coefficient by student subgroup after running a doubly-robust outcome regression on standardized attendance. 95% confidence intervals shown around predicted margin estimate. Attendance is standardized by grade and year.

4.2. Effects of DLI Enrollment on EL Reclassification

Table 4 shows the effect of DLI enrollment on annual reclassification from EL to Fluent English Proficient (RFEP) status. In contrast to the positive attendance effects documented above, we find that DLI enrollment is associated with modestly lower annual reclassification rates. In every grade after kindergarten, DLI students have, on average, a 4.9 percentage point

lower probability of reclassifying compared to their matched peers in traditional English-only classrooms (a similar coefficient is apparent for the pre-COVID cohorts, Column 3). This effect is attenuated and no longer statistically significant when we restrict the sample to students residing within their school's attendance zone, suggesting this effect is driven by negative selection from students coming out-of-zone.

DLI program enrollment does not appear to make a difference in whether students reclassify by the end of elementary school. Results are robust to in-zone only restrictions but note that the sample size is much smaller than for other analyses.

Table 4
Effect of DLI Enrollment on Annual Reclassification

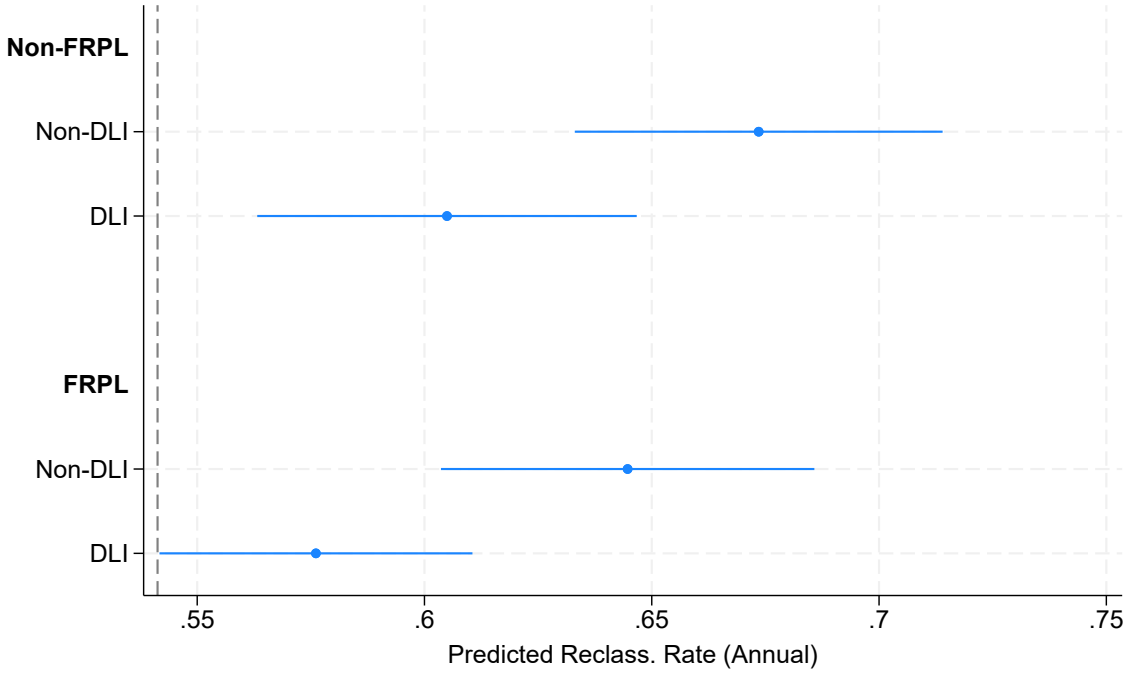
	(1)	(2)	(3)	(4)	(5)
	Annual Reclassification			Reclass by End of Elementary	
	Main	In-Zone Only	Pre-COVID (2016-2019)	Main	In-Zone Only
DLI Enrollment (at Baseline, K)	-0.049***	0.030	-0.056***	-0.001	-0.003
	[0.015]	[0.019]	[0.020]	[0.002]	[0.004]
Observations	17,556	8,888	8,769	1,529	710

Notes: The dependent variable is an indicator for reclassification from English Learner to Fluent English Proficient status in a given year. Sample restricted to students classified as English Learners at kindergarten entry (N = 19,695 student-year observations). DLI Enrollment indicates assignment to a dual-language immersion program at kindergarten entry. Estimates are from a doubly-robust specification combining within-school propensity score matching with regression adjustment. Baseline controls include gender, race/ethnicity, and bilingual status at kindergarten entry. Robust standard errors clustered at the baseline school level in parentheses. *** p<0.01, ** p<0.05, * p<0.1.

We also tested for heterogeneity by income status (see Figure 5). ELs who are eligible for FRPL in non-DLI programs reclassify at higher rates than those in DLI programs, although the intervals overlap suggesting these differences are not statistically significant.

Figure 5

Predicted Marginal Estimates for DLI Program Enrollment Effects on Annual Reclassification Rates



Note: Estimates shown are for predicted marginal effects of the reclassification coefficient by student subgroup after running a doubly-robust outcome regression on standardized attendance. 95% confidence intervals shown around predicted margin estimate.

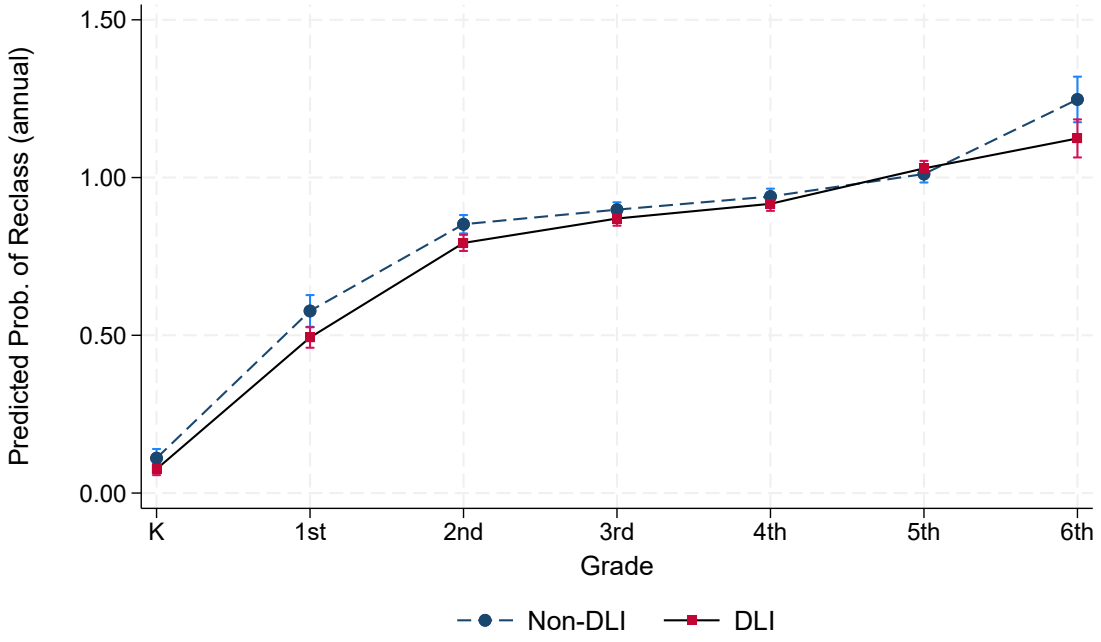
Although annual reclassification rates are informative, what matters most for students' long-term trajectories is reclassification by the end of elementary school.[18] Students who do not reclassify by this point risk designation as LTELs, which is associated with tracking into less rigorous coursework, restricted access to grade-level content, and diminished educational opportunities (Santibañez & Umansky, 2018). As previously shown, there do not appear to be differences in reclassification by the end of elementary school for ELs in DLI vs not in DLI.

[18] In this sample we can see only one cohort (cohort 1) up to 6th grade. The vast majority are only seen up to 5th grade. 80% of the schools in our sample are K-5. Results are similar when only K-5 schools are considered.

To better understand the temporal dynamics of reclassification, we run an event study specification that allows the DLI effect to vary by grade level. This analysis addresses a key question: does the lower annual reclassification rate for DLI students reflect a permanent deficit in English acquisition, or a temporary delay that resolves as students advance through elementary school?

Results are shown in Figure 6. DLI students show lower reclassification rates in early grades, but by third grade their reclassification rates are statistically indistinguishable from ELs in non DLI programs and remains so through the end of elementary (there is a slight advantage of reclassification by 6th grade in non-DLI, but the difference is small).[19] Results are robust to restricting the sample to in-zone students only (see Online Appendix, Figure A3).

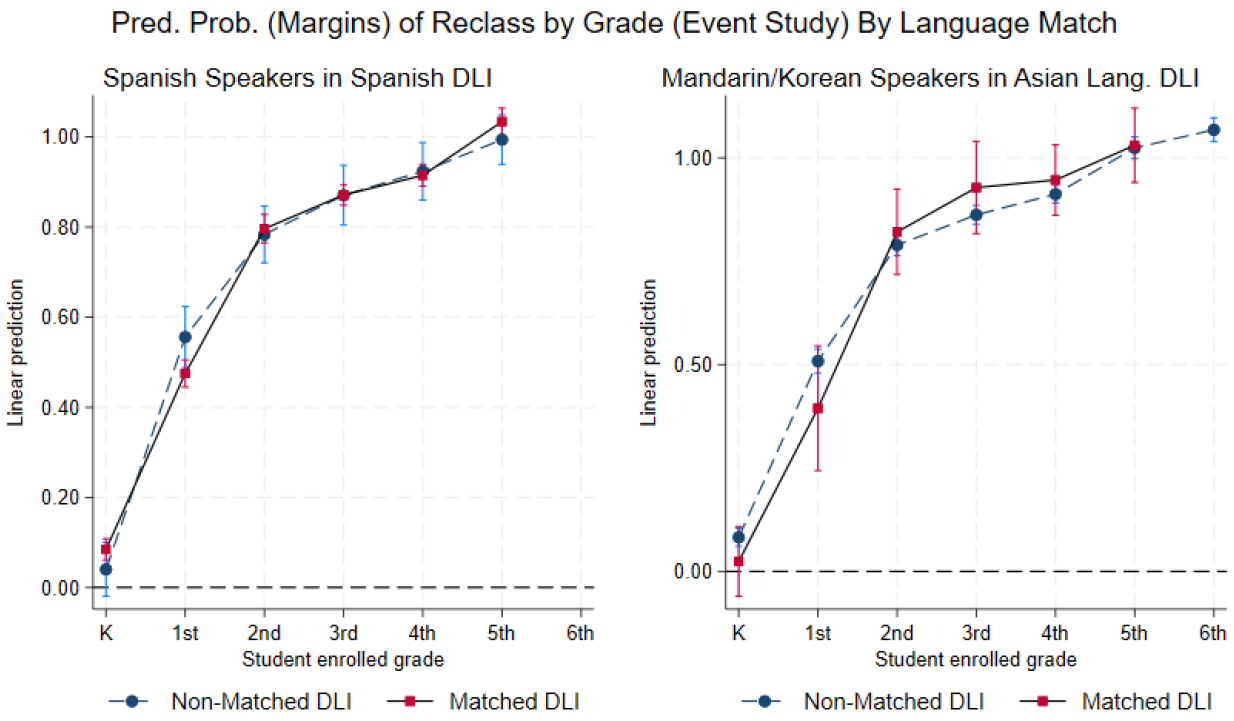
Figure 6
Effect of DLI Enrollment on Reclassification by Grade (Event-Study)



[19] We do not have a sufficiently long time period to run this analysis only for the pre-COVID years.

To further understand whether our results vary by student subgroup, we tested for heterogeneity among FRPL-eligible and EL-designated students and added a three-way DLI × Grade × FRPL-eligible interaction. We find no consistent evidence of differential effects by FRPL-eligibility across grades (Figures A4 and A5). We also tested reclassification by grade separating out ELs who were in programs that matched their heritage language vs. those in programs that did not (recall that most students are in language-matched programs). Results are shown in Figure 7. Essentially there are no differences in reclassification rates throughout elementary schools for students who are in DLI programs who match their heritage language and those who are in programs where it doesn't (Figure 7).

Figure 7
Effect of DLI Enrollment on Reclassification by Grade (Event-Study) by DLI Program Language Match



Language-matched instruction in Asian language programs is associated with higher reclassification rates among in-zone students, although the confidence intervals are wide because of small samples for these groups. For Spanish-matched speakers, the effects are virtually indistinguishable from ELs in non-DLI (online appendix, Figure A6).

5. Conclusions and Implications

EL-designated students frequently face academic marginalization and reduced opportunities to learn, contributing to lower high school graduation rates and diminished academic outcomes more broadly (Cervantes-Soon et al., 2017; Santibañez & Umansky, 2018; Thompson, 2017). After the COVID-19 pandemic EL-designated students experienced disproportionately negative academic impacts (Hough & Chavez, 2024), higher absenteeism (Santibañez et al., 2024; Santibañez & Saint Martin, 2025) and declining reclassification rates, resulting in a growing share of Long-Term ELs (Hill & Deng, 2025). In the past decade or so, DLI has surged in popularity as a way to improve learning and linguistic outcomes for EL-designated students while honoring and centering their cultural assets. School districts have supported DLI programs because in addition to being a good option to educate ELs, they are attractive with parents and help maintain enrollments in traditional public schools. Despite broad support for bilingualism more generally, however, many parents of EL-designated students are concerned that DLI enrollment may delay or impede their children's English-language acquisition. And as districts seek to significantly scale-up DLI programs, there could be risks to program quality and implementation.

5.1. Summary of Findings

This study uses data from the 2nd largest school district in the nation to examine the effects of DLI enrollment on attendance and reclassification outcomes. We find that students

enrolled in DLI programs have significantly higher attendance than those not enrolled in DLI programs. This effect holds across all subgroups including low-income ELs. Given that attendance is a key predictor of academic success and engagement, and that EL attendance was hard hit by the COVID-19 pandemic (Santibañez et al., 2024), this is an important result. While our data do not allow an analysis of student learning outcomes, the attendance boost can be seen as a protective factor helping ELs stay academically engaged as they progress through elementary school.

We also find that DLI does not harm reclassification rates. While DLI students show slightly lower reclassification rates in early grades (K-2), they catch up by 3rd grade and reclassify at identical rates to non-DLI peers by the end of elementary school. This directly addresses the primary concern of many parents, particularly Latinx parents, who worry that DLI will delay their children's English acquisition (Williams et al., 2025; Williams & Zabala, 2024).

Finally, DLI benefits persist at scale in a setting far more racially, ethnically, and linguistically diverse — and with a substantially higher share of EL-designated students — than the districts examined in prior research. This matters because earlier studies largely predated the recent national expansion of DLI and were often conducted in contexts where EL-designated students, one of the populations DLI is most intended to serve, were a small minority. It is a well-known finding in the evaluation literature that when programs scale-up and reach larger, more diverse populations small-scale impact effects are either reduced or cannot be replicated because programs significantly change to adapt to new circumstances (Klingner et al., 2013). The benefits of DLI appear robust to the rapid program expansion Los Angeles has undergone — from a few dozen programs to more than 180 in just a few years — a finding that bodes well for

the state's ambitious Global California 2030 goals and suggests that quality can be maintained even as programs scale.

5.2. Limitations

Although our analysis is methodologically rigorous and controls for many potential biases (including family motivation when enrolling their children in DLI), it is not experimental. We cannot completely rule out the possibility that unobserved factors not included in our models affect attendance and reclassification. In addition, the DLI program flag was unavailable prior to 2020 and had to be imputed for 2016-2019 (the state does not require districts to provide data on DLI-program enrollment, but districts can elect to collect and provide it). Even though we believe our imputation is rigorous and highly accurate given the structured nature of DLI enrollment, it could still introduce some error in our estimates. Lastly, the disruptions associated with the COVID-19 pandemic precluded the use of standardized test score data, limiting our ability to assess academic achievement outcomes. Future research should examine whether the enrollment and attendance patterns documented here translate into measurable gains in academic performance as assessment data become more reliably available in the post-pandemic period.

5.3. Policy Implications

DLI enrollment should be considered an integral component of districts' Long-Term English Learner (LTEL) prevention strategies. The attendance benefits associated with DLI participation, combined with reclassification trajectories that converge with those of non-DLI peers, make a compelling case for DLI. Second, district and school leaders should communicate clearly to families that reclassification rates may lag initially (relative to students not in DLI), but that by the end of elementary school their children will reclassify at the same rate on average than others—while developing and maintaining partner language skills. This can help parents

make fully informed enrollment decisions. Transparency about expected reclassification timelines is especially important given that parental concern about English-language acquisition delay is one of the most commonly cited barriers to DLI enrollment (Hill & Deng, 2025; King & Fogle, 2006). Third, expanding DLI access for low-income EL-designated students should be a policy priority. Our findings indicate that FRPL-eligible EL students experience attendance and reclassification benefits from DLI participation comparable to those of their more advantaged peers, while also standing to gain from the broader benefits that DLI programs are documented to provide. Currently, however, only about 10% of LAUSD's elementary EL-designated students are enrolled in DLI programs, indicating substantial potential demand and considerable room for expansion. Beyond EL-designated students, districts should also actively recruit bilingual students who have already been reclassified or were never classified as ELs, as these students are well-positioned to thrive in two-way DLI models and further enrich the linguistic and cultural environment of these programs.

Other Considerations

Expanding equitable access to high-quality DLI programs is not only an investment in individual students; it is an investment in a more linguistically rich, culturally inclusive, and academically excellent public education system. Realizing the promise of DLI for all learners will require sustained investment in program infrastructure including bilingual teacher preparation, ongoing professional development, parent outreach, and adequate pedagogical and assessment resources (Santibañez, 2026). A grand vision needs the necessary funding to support it. California relies mostly on one-time grants to fund DLI expansion. The last round of competitive DLI grants expired in 2022. Other states with significant multilingual populations, like Texas, provide more systematic, formula-based funding, and additional funds for

multilingual learners in DLI (Lopez, Saldaña & Santibañez, 2026). Reinstating and expanding such funding mechanisms — moving where possible toward more stable, formula-based support rather than competitive grants or allowing ELs to be separately counted for local control funding purposes — would allow more districts to build and sustain high-quality DLI programs and extend their benefits to a greater share of EL-designated students.

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ONLINE APPENDIX

Table A1
Descriptive Statistics, Entire Sample of Elementary Students, 2015-2022

Variable	Mean	SD	Min	Max	N
Female	0.49	0.50	0	1	2069310
Latinx	0.72	0.45	0	1	2074036
White	0.14	0.35	0	1	1929679
African-American	0.11	0.31	0	1	1929679
Asian-Filipino-Pac Is	0.07	0.26	0	1	2074036
FRPL-eligible	0.66	0.47	0	1	2074036
English Learner-designated	0.27	0.44	0	1	2050408
Ever - EL	0.44	0.50	0	1	2050622
RFEP	0.17	0.37	0	1	2074036
Student with disability	0.12	0.33	0	1	2074036
Foster Youth	0.01	0.07	0	1	2074036
Homeless	0.02	0.14	0	1	2074036
Parent Has College	0.28	0.45	0	1	2068956
Bilingual	0.50	0.50	0	1	2074036
Primary Lang: Spanish	0.45	0.50	0	1	2050408
Primary Lang; Mand/Kor/Jap	0.02	0.14	0	1	2074036
Primary Lang: Other	0.04	0.21	0	1	2074036
School has DLI	0.19	0.39	0	1	2074036
Days attended	153.97	36.64	0	236	2063779
Reclass rate (annual)	0.56	0.50	0	1	309142
Reclass by end of Elementary	0.99	0.10	0	1	309162
Suspensions (total)	0.00	0.05	0	9	2074036
Distance home-school (mi)	0.99	3.27	0	579	1751077
Student is in-zone	0.67	0.47	0	1	1343984

Table A2

Variable Balance Before and After Matching

	Before Matching					After Matching				
	Treated Mean	**Control Mean**	**Diff.**	**Std Diff**	**p-val**	**Treat Mean**	**Control Mean**	**Diff.**	**Std Diff**	**p-val**
Female	0.517	0.477	0.040	0.080	0.000	0.519	0.520	-0.001	-0.001	0.945
Ever EL	0.480	0.416	0.064	0.128	0.000	0.469	0.480	-0.011	-0.022	0.301
FRPL	0.727	0.753	-0.026	-0.059	0.000	0.709	0.719	-0.009	-0.022	0.269
SWD	0.065	0.120	-0.056	-0.193	0.000	0.061	0.057	0.004	0.015	0.144
Bilingual	0.571	0.469	0.102	0.205	0.000	0.558	0.565	-0.007	-0.014	0.469
Hispanic	0.773	0.787	-0.014	-0.034	0.000	0.738	0.745	-0.007	-0.016	0.434
Black	0.069	0.119	-0.050	-0.171	0.000	0.069	0.059	0.010	0.036	0.002
White	0.118	0.067	0.051	0.178	0.000	0.118	0.112	0.007	0.023	0.303
Asian-Fi	0.107	0.061	0.046	0.165	0.000	0.128	0.122	0.006	0.020	0.395
Mean Absolute Std Bias (MASB)				0.135						0.019
Root Mean Squared Error (RMSE)				0.147						0.021

Table A3
Heterogeneous Effects of DLI Enrollment on Standardized Attendance

	(1) Full Sample	(2) In-Zone Only
DLI Enrollment	0.415***	0.356***
	[0.050]	[0.059]
English Learner (EL)	-0.109*	-0.144
	[0.055]	[0.106]
DLI × EL	0.008	0.099
	[0.065]	[0.119]
Free/Reduced-Price Lunch (FRPL)	0.066	-0.057
	[0.042]	[0.055]
DLI × FRPL	-0.099**	0.01
	[0.048]	[0.061]
FRPL × EL	0.123*	0.229*
	[0.065]	[0.120]
DLI × FRPL × EL	-0.034	-0.155
	[0.068]	[0.127]
Observations	84,034	25,826
R-squared	0.051	0.078
Baseline Controls	Yes	Yes
Year FE	Yes	Yes
Grade FE	Yes	Yes
District FE	Yes	Yes
Propensity Score Weights	Yes	Yes

Notes: The dependent variable is attendance standardized by grade and year. DLI Enrollment indicates assignment to a dual-language immersion program at Kindergarten entry. EL indicates English Learner status at baseline. FRPL indicates eligibility for free or reduced-price lunch at baseline. Estimates are from a doubly-robust specification combining within-school propensity score matching with regression adjustment. Additional baseline controls include gender, race/ethnicity, disability status, and bilingual status. Robust standard errors clustered at the school level in parentheses. *** p<0.01, ** p<0.05, * p<0.1

Figure A1a
Overlap between Matched Treated and Controls Over Propensity Score Region

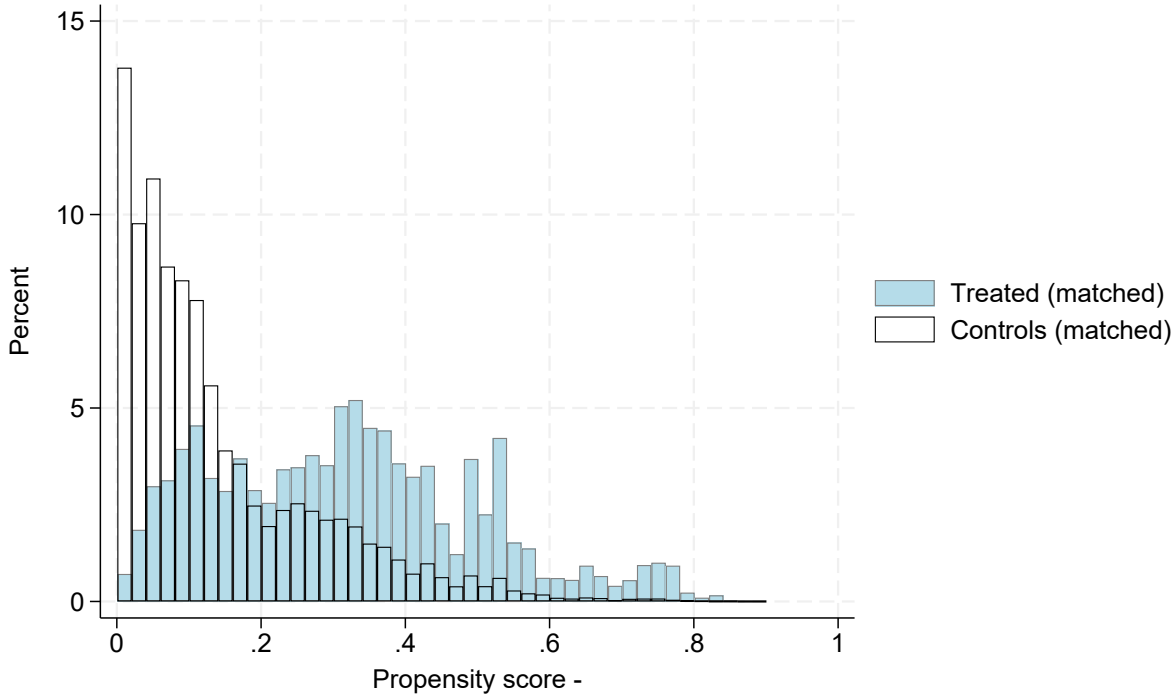

Figure A1b
K-Density Plot

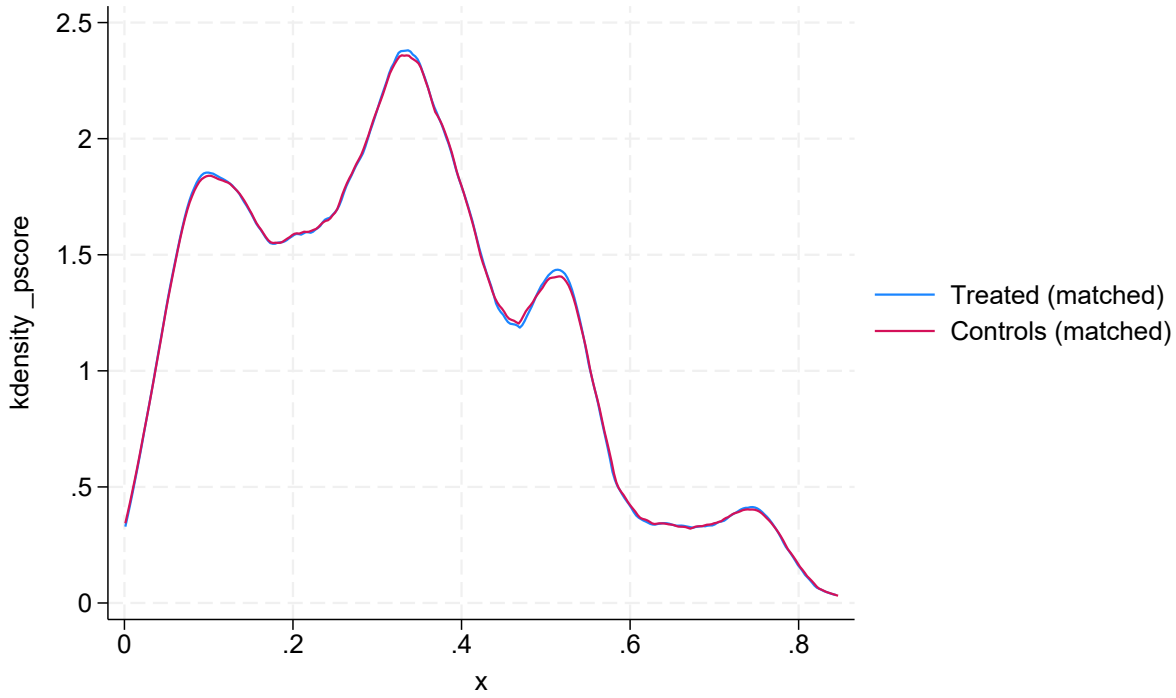

Figure A2

Predicted Marginal Estimates for DLI Program Enrollment Effects on Attendance, In-Zone students only

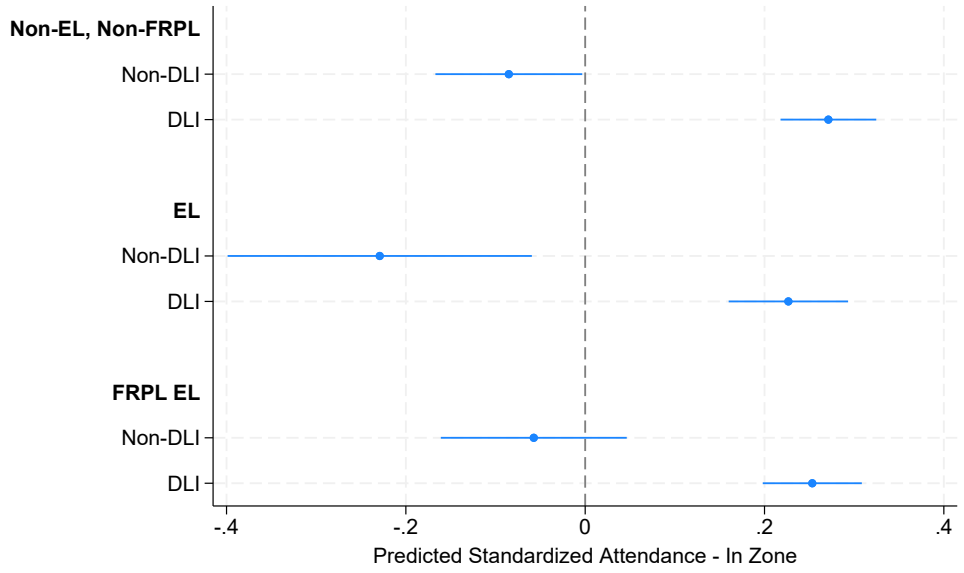

Figure A3

Effect of DLI Enrollment on Reclassification by Grade (Event-Study), In-Zone students only

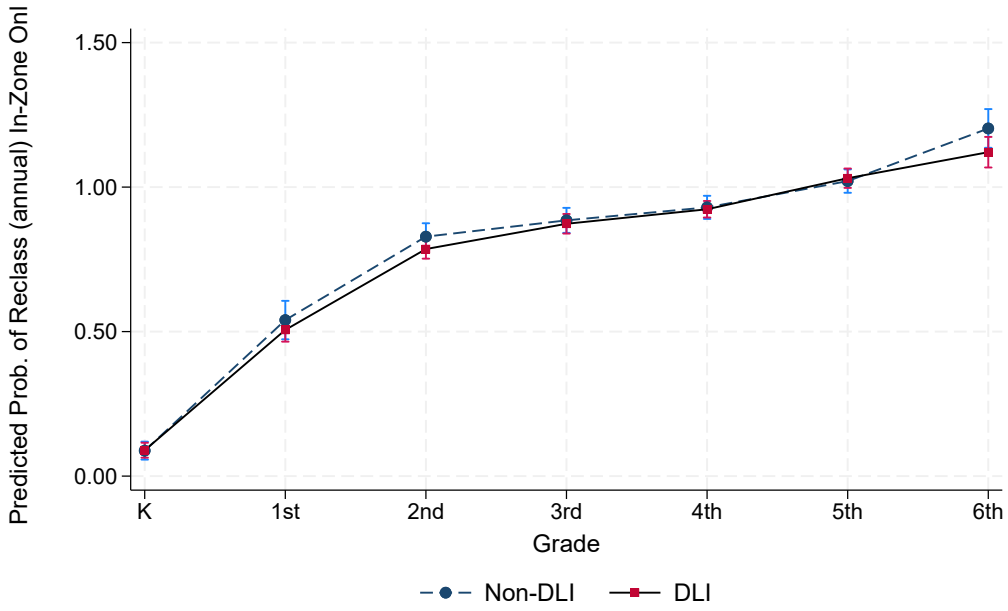

Figure A4

Effect of DLI Enrollment on Reclassification by Grade (Event-Study), by FRPL status

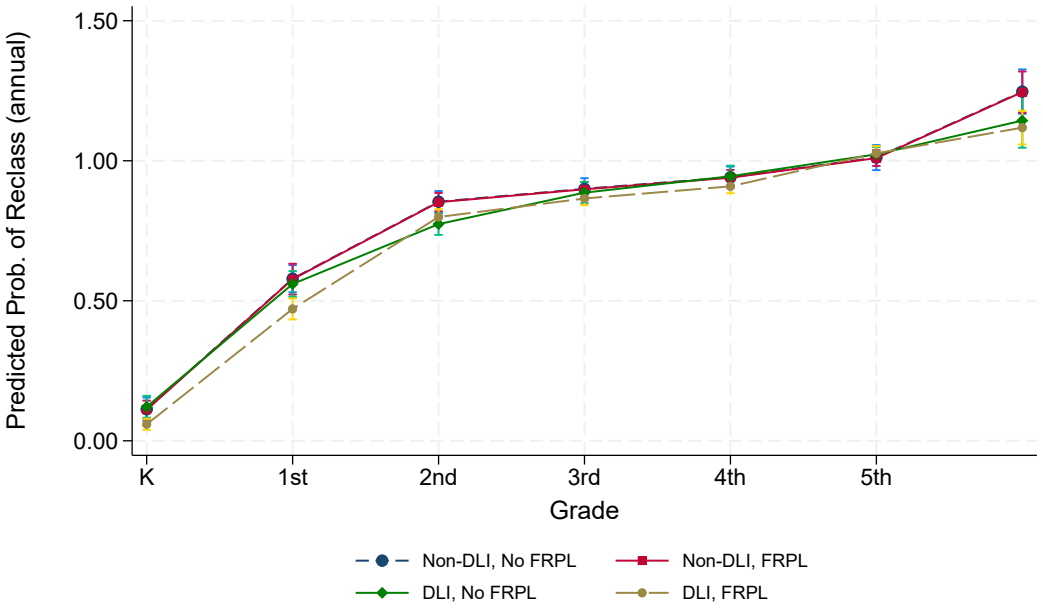

Figure A5

Effect of DLI Enrollment on Reclassification by Grade (Event-Study), by FRPL status, In-zone students only

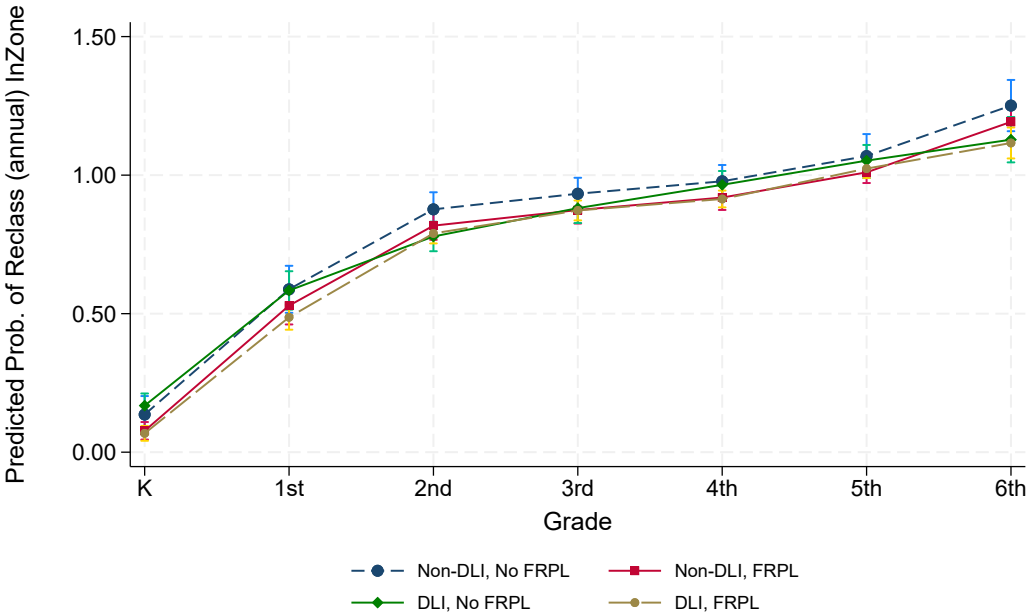

Figure A6

Effect of DLI Enrollment on Reclassification by Grade (Event-Study), by Language Match, In-Zone only