



# Racial, linguistic, and economic diversity across schools with two-way dual language immersion programs: Evidence from Los Angeles Unified School District

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**Abstract**

Two-way dual language immersion programs (TWDL) aim to integrate English speakers and speakers of a partner language in the same classroom to receive content instruction in both languages. Stated goals include bilingualism and biliteracy, high academic achievement, and sociocultural competence. In school districts aiming to reduce segregation, TWDL programs can also integrate students from diverse linguistic, racial, and economic backgrounds, though mounting evidence shows equitable integration does not always happen. Using school-level enrollments and district data on TWDL program growth from 2000 to 2021, this paper describes enrollment and segregation patterns across Los Angeles Unified School District (LAUSD) elementary schools with TWDL. We find elementary schools with TWDL programs are enrolling increasing numbers of racially, linguistically, and economically marginalized students, but the increasingly uneven sorting of students among TWDL schools demonstrates limits on the potential for intergroup contact.

Keywords: Dual language, two-way immersion, bilingual education, linguistic minority students, English learners, racial segregation, economic segregation, linguistic segregation, descriptive analysis

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## Introduction

Since the 1974 Supreme Court decision in *Lau v. Nichols*, public schools in the U.S. have been required to support the education of language minoritized students, including English Learner-classified students (ELs).<sup>1</sup> Two-way dual language immersion programs (TWDL)—which are rapidly growing in number around the nation—are a specific type of bilingual education program that aim to integrate English speakers and speakers of a partner language (e.g., Spanish) in the same classroom to receive content instruction in both languages.<sup>2</sup> Stated goals of these programs include bilingualism and biliteracy, high academic achievement, and sociocultural competence (Howard et al., 2018). Given that students who enhance linguistic diversity often also enhance racial and economic diversity, TWDL programs can also integrate students along racial and economic lines (Gándara & Aldana, 2014; Kotok & DeMatthews, 2018; Uzzell & Ayscue, 2021). However, mounting evidence shows equitable linguistic, racial, or economic integration does not always happen in TWDL programs (Cervantes-Soon, 2014; Cervantes-Soon et al., 2017; Valdés, 1997; Valdez, Delavan, et al., 2016).

This research is part of a larger project studying TWDL program access and equity in Los Angeles Unified School District (LAUSD), California. The current paper uses publicly available school-level data to describe enrollment and segregation patterns across LAUSD elementary schools with TWDL programs. TWDL programs in LAUSD are all strand programs, meaning they exist alongside the mainstream program within a host school, but we analyze school-level enrollments to first understand who has access to TWDL by virtue of being enrolled in a school with a program. Two questions guide our analysis: (1) how does enrollment by race/ethnicity, language, and economic status compare in schools with TWDL programs and schools without

TWDL programs? And (2) how does racial, linguistic, and economic diversity in schools with TWDL compare to diversity in schools without TWDL over time?

While TWDL was originally designed to disrupt English-only and other subtractive approaches to educating students designated as English learners, recent qualitative research has brought attention to the pitfall of implementing TWDL programs in ways that primarily benefit already privileged English-speaking students and families or that “gentrify” or push out students from historically marginalized communities. While this inequitable trend can manifest in various ways (Cervantes-Soon et al., 2017; Delavan et al., 2021), one concern centers around unequal access to bilingual education, evident in enrollment patterns. Since the early 2000s, when a number of restrictive language policies took effect in California, Arizona, and Massachusetts, the enrollment of designated ELs in bilingual programs plummeted, while enrollment of English speakers increased (Linton & Franklin, 2010; Wentworth et al., 2010). Other studies have pointed to enrollment and recruitment practices in TWDL that exclude African American students (Palmer, 2010). Although the last decade has brought a reversal of restrictive language policies, and TWDL programs are booming in states with and without a long-standing presence of bilingual education, there is a dearth of empirical research examining demographic trends in TWDL enrollment.

On the other hand, TWDL has often been conceived as a vehicle for racial desegregation efforts (Ee, 2021; Gándara & Orfield, 2010; López, 2016). In fact, the U.S. Department of Education’s Magnet Schools Assistance Program supports dual language as one possible voluntary racial desegregation strategy (Walton et al., 2018). Several districts including Pasadena, CA, Tucson, AZ and Elgin, IL have leveraged TWDL as a form of voluntary desegregation (Ee, 2021; Lozano, 2007). TWDL programs can especially help to desegregate

Latinx students, who encompass the largest population of designated ELs and have historically been marginalized and segregated precisely on the basis of their identification with the Spanish language (as a proxy for race) (Santiago, 2019). While courts have gradually prohibited the segregation of Latinx children (e.g., *ISD v. Salvatierra*, 1930; *Keyes v. School District No. 1 Denver*, 1973; *Mendez v. Westminster*, 1946), de facto racial and socioeconomic segregation of Latinx and other children persists (Donato & Hanson, 2012; Gándara & Aldana, 2014; Orfield & Frankenberg, 2014).

Given these concerns and gaps in the literature, we conceptualize diverse school building enrollments as the first of multiple steps necessary to achieve equal-status learning in integrated classrooms—an ideal outcome of TWDL programs. Additional steps to be investigated in future research include diversity of program-level enrollments, equitable access to high quality teachers and other resources, and equalized power relations. Growing evidence shows these later steps are not being accomplished or sustained in many TWDL (or other) programs around the country (Cervantes-Soon, 2014; Cervantes-Soon et al., 2017; Mickelson, 2001; Palmer, 2010; Valdés, 1997; Valdez, Delavan, et al., 2016). But by systematically studying school enrollments over time, this paper lays an important foundation upon which other research of TWDL access, integration, and equity can build. In particular, our descriptive analysis of demographic trends can provide basic understanding of the potential and limitations to address integration and equity goals in TWDL by “identifying hidden patterns in large datasets” and “[diagnosing] issues that warrant the attention of policymakers, practitioners, and researchers” (Loeb et al., 2017, p. 2).

We find LAUSD’s elementary schools with TWDL programs are enrolling increasing numbers of racially, linguistically, and economically marginalized students, but the increasingly uneven sorting of students among TWDL schools demonstrates limits on the potential for

intergroup contact. Our findings help illuminate the potential of TWDL programs to fulfill their aspirations to provide equal-status, integrated learning environments by describing which students have the potential to benefit from these programs.

The remainder of the paper is organized as follows. We first review literature describing the history of TWDL programs in the United States, as well as the benefits of and equity concerns around these programs. We then describe our theoretical framework, which draws on contact hypothesis and Critical Race Theory, before discussing the LAUSD context in which this study is situated. We describe our data, methods, and findings, organized by research question. Finally, we conclude by interpreting our results through the lens of our theoretical framework, discussing how enrollment trends in LAUSD's schools with TWDL programs illuminate the potential and limitation of these programs to foster racial, linguistic, and economic diversity.

## **Literature Review**

### **History of TWDL programs**

In the U.S., federal law requires schools and school districts to ensure EL students have equal access to education, regardless of their language abilities. The rights of EL students have been established through decades of school desegregation litigation and the passage of civil rights law. For example, in 1947, *Mendez v. Westminster* a federal court found the segregation of Mexican American students was unconstitutional because it delayed their learning of English. In 1968, Congress amended the Elementary and Secondary Education Act to add Title VII funding for a range of bilingual education programs. And in *Lau v. Nichols* (1974), the Supreme Court ruled that failing to provide supplemental language instruction to EL students violated the Civil Rights Act of 1964. Soon after, the Equal Educational Opportunities Act of 1974 cemented the

requirement that states and school districts take affirmative steps to help EL students overcome language barriers that prevent them from participating in educational programs.

In the years since, efforts to educate language minoritized students have evolved. Older approaches, like English as a Second Language, focus solely on teaching ELs English. Newer approaches, like maintenance bilingual education, recognize the importance of maintaining and developing students' skills in their primary language while also introducing and developing skills in English (Kim et al., 2015). However, schools and districts often insufficiently or inconsistently implement these education models (Gándara & Escamilla, 2017). Research also documents how schools and language programs enrolling language minoritized students are increasingly resegregating along linguistic, racial, and economic lines (Gándara & Orfield, 2012; Vasquez Heilig & Holme, 2013).

TWDL is a specific type of bilingual education that offers promising solutions to increased isolation of language minoritized students. TWDL programs combine aspects of maintenance bilingual education (aimed at designated ELs) and immersion education (aimed at English speakers) to integrate students of different language backgrounds in the same classroom. The first TWDL program opened in 1963 in Miami, Florida, and TWDL programs have become increasingly popular since the 1990s (Lindholm-Leary, 2001). An early description of TWDL popularity attributed the growth to “a convergence of factors, including increased attention to foreign language learning for English speakers, research on effective programs for educating language minority students, and the availability of federal and state funding for programs using this approach” (Christian et al., 2000, p. 260). A recent study of dual language programs cited surveys identifying anywhere from 3,600 to 5,000 programs in schools around the U.S. (Williams et al., 2023).

## **Benefits of, and concerns regarding, TWDL programs**

Most research on TWDL programs is focused on their benefits and on the conditions under which TWDL programs enhance or hinder educational equity. However, there is less research systematically describing who is enrolled in schools with TWDL and therefore has the potential to benefit from these programs; this paper addresses that gap.

A small body of rigorous research finds TWDL participation has long-term benefits for ELs relative to mainstream, English-immersion instruction. Benefits include improved reading and math test scores (Marian et al., 2013; Steele et al., 2017; Valentino & Reardon, 2015), higher language reclassification rates (Steele et al., 2017; Umansky & Reardon, 2014), and development of bicultural identity (Freeman, 1998; García-Mateus & Palmer, 2017; Martínez et al., 2017). Given the systematic education debt (Ladson-Billings, 2006) experienced by language minoritized students, current growth in TWDL could really benefit these students. The positive outcomes of TWDL programs also make them a potential strategy for addressing persistent linguistic, racial, and economic segregation, especially in a climate that favors voluntarily adopted and choice-based integration mechanisms (Siegel-Hawley & Frankenberg, 2013).

However, research suggests these benefits are not always being realized and, in some places, the opposite may be happening. As TWDL programs expand, they can begin to cater to privileged students, thus furthering the exclusion of language minoritized students (Cervantes-Soon, 2014; Cervantes-Soon et al., 2017; Flores & García, 2017; Heiman & Murakami, 2019; Palmer et al., 2019; Valdés, 1997; Valdez, Delavan, et al., 2016). In particular, some literature qualitatively describes the ways in which TWDL instruction can become inequitable, favoring the interests of middle-class, English-speaking students and their families rather those of the EL



students, and reinforcing power dynamics between traditionally advantaged and disadvantaged student groups (Cervantes-Soon, 2014; Valdés, 1997).

There is currently a lack of systematic research about TWDL school enrollments over time. One study in Utah found that, compared to dual language programs implemented in the early 2000s, newer programs opened in schools that had, on average, higher percentages of white, non-poor, and non-EL students (Valdez, Freire, et al., 2016). A more recent study analyzed enrollments over the past five years in 1600 U.S. schools with dual language programs and found patterns of gentrification varied substantially by school district (Williams et al., 2023). The authors note that in LAUSD, “white enrollment shares are [increasing] in a majority of [dual language] schools.” Additional qualitative research has documented dual language programs that under-enroll African American students (Blanton et al., 2021; Palmer, 2010). The current study adds to existing research by examining 20 years of enrollment in elementary schools with TWDL programs in LAUSD, a large urban district at the forefront of the national trend of TWDL growth. Though diverse school buildings certainly do not guarantee integrated or equitable learning environments for all students (Lewis & Diamond, 2015), they are a necessary first step.

### **Theoretical Framework**

This study draws on two theories that suggest potentially conflicting trends in TWDL school enrollments: contact hypothesis and Critical Race Theory (CRT). (These theories relate most directly to program-level enrollments, but we apply them to school-level data as the first of multiple steps necessary to achieve the goals of TWDL.) To begin, we use Allport's (1954) contact hypothesis to conceptualize the potential benefits of TWDL programs for students of all backgrounds. K-12 school integration can have a range of academic and social benefits for all students, particularly when structured to satisfy the four conditions outlined in Allport's contact

hypothesis: equal status, intergroup cooperation, common goals, and support of social/institutional authority (Domina et al., 2021; Mickelson, 2016; Mickelson et al., 2008; Mickelson & Nkomo, 2012; Pettigrew & Tropp, 2006; Reardon, 2016). When such integration exists within TWDL programs, it helps provide all students in the program with greater access to asset-based instruction and other resources necessary to meet academic, linguistic, and cultural goals. In particular, bringing together students from two linguistic backgrounds can increase all students' acquisition of both languages; language learners have access to native speaker models, while the TWDL additive context supports the ongoing development of the native language (Christian, 1996). In addition, integration that satisfies conditions of contact hypothesis can help enhance inter-group communicative competence, equalize power relations within the classroom, and reduce stereotypes, discrimination, and conflict (Wright & Baker, 2017).

CRT, on the other hand, suggests ways in which equal status may not be achieved in learning environments such as TWDL, using *race as subordination* as the central mechanism to understand inequality (Bell, 1980, 1995). Among the themes in CRT are the centrality and permanence of race and racism (Bell, 1992) and “interest convergence” (Bell, 1980), wherein policy changes for racial integration and equity will occur only insofar as the interests of dominant and minoritized groups converge, specifically, when dominant groups perceive that such policies will benefit them. Interest convergence and the permanence of racism may explain why traditionally advantaged students (i.e., more affluent, white, non-EL, students) are enrolled, or not, in TWDL schools generally and in specific TWDL schools. For example, they may anticipate personal benefit from enrolling in a school with a French program, while avoiding schools with Spanish programs, which is seen as a lower-status language (Flores et al., 2021; Rosa & Flores, 2017). Moreover, if schools with TWDL programs seek to attract advantaged

families that would otherwise leave traditional public schools for private or charter schools, they could tailor their programs to cater to these constituents, at the expense of students with less power (see Cervantes-Soon et al., 2017).

Collectively, these theories speak to objectives at tension within TWDL, including equitable program access, equalized power relations, and school integration. CRT predicts advantaged students will enroll in TWDL only if they perceive it to be personally beneficial. But CRT also predicts inequitable power dynamics will persist among historically advantaged and marginalized groups within TWDL. Such persistent power inequities will preclude the benefits promised by intergroup contact hypothesis. These tensions likely exist in different ways at the scale of TWDL *programs* and at the scale of *schools* housing TWDL programs. In this paper, we document enrollment and segregation trends in schools with TWDL, and we use both theories to explore possible explanations for and implications of those trends.

### **LAUSD Context**

LAUSD is a large, urban school district in southern California with approximately one thousand schools and the largest number of EL students of any district in the country (U.S. Department of Education, 2017). As of 2021-22, Latinx students made up nearly three-quarters of the district's elementary enrollment, white students comprised 11%, African American students 6.7%, Asian American students 3.7% and Filipino students 1.7%.

These demographics reflect a shift from decades past; white students made up the majority of LAUSD enrollment until the 1960s. Between 1966 and 1980, the district lost two-thirds of its white student enrollment to neighboring suburban areas and to private schools, suggesting white families' resistance to school desegregation efforts (Schneider, 2008). White enrollment in

LAUSD schools declined from 66% in 1963 (Gutiérrez, 1996) to 29% in 1987 (Clotfelter, 2001) and around 11% in 2021-22.

A more recent demographic trend is stark enrollment declines over the past 20 years (see figure 1 for elementary enrollments, figure A1 for total enrollments). District enrollment peaked in 2002-03, but has dropped every year since and across every racial/ethnic group though especially among African American students. The district has attributed these trends to declining birth rates, dwindling immigration, out-migration of families with school-aged children, and high costs of living (Los Angeles Unified School District, 2018a, 2022a). The enrollment growth of independent charter schools in Los Angeles also explains some of the enrollment declines across traditional public schools. In 2020-21, elementary enrollment in independent charters was more than 36,000 students. But over the last two decades, LAUSD's traditional public schools and district-affiliated charters (the focus of the analyses presented in this paper) lost more than 150,000 elementary students. LAUSD projects it will lose an additional 30% of its total enrollment over the coming ten years (Los Angeles Unified School District, 2022a).

—Figure 1 here—

### **Bilingual education trends in LAUSD**

As bilingual education grew significantly throughout the U.S. in the 1970s, LAUSD received federal and state grants to open bilingual programs in predominantly Latinx areas. The district's first TWDL program opened in 1991 at Grand View Elementary School (Los Angeles Unified School District, 2021). However, backlash against bilingual education also grew, culminating in the passage of California's Proposition 227 in 1998 which severely restricted bilingual education in public schools.<sup>3</sup> Despite Proposition 227 restrictions, LAUSD's TWDL programs grew steadily in the early 2000s. Some programs avoided restrictions because they

were billed as “enrichment” programs housed in district charter or magnet schools, and therefore bypassed the need for ELs to file for legally required waivers to opt out of English-only instruction (Linton, 2007; Stritikus & García, 2000). Additionally, TWDL programs were geared toward a population of EL and non-EL students while other bilingual programs were exclusively geared toward ELs, and TWDL programs have had access to federal funds not available to other types of bilingual programs (e.g., Cortez, 2017). In 2017, California voters passed Proposition 58 reversing the restrictions imposed on bilingual education, which further accelerated the growth of TWDL programs in LAUSD (see Figure 2).

TWDL programs in LAUSD are rapidly growing in number. While there were just four elementary TWDL programs in 2000-01, there were 148 programs by 2021-22, across 144 schools.<sup>4</sup> In 2000-01, three schools had Korean TWDL programs and one school had a Spanish TWDL program. Most newly added programs since then have been Spanish language programs. The first Mandarin program opened in 2007-08. Later, French, Armenian, and Arabic programs also opened; most recently, one Japanese program opened in 2021-22.

—Figure 2 here—

The district’s Multilingual and Multicultural Education Department (MMED) oversees TWDL programs. District policy suggests the office’s decision to create new TWDL programs is motivated by requests from families and schools with EL students. LAUSD notifies families if their student is classified as an EL and informs them of instructional program options, including dual language programs. District policy states school leaders will take steps to request a dual language program be placed in their school once the school receives “20 requests [for a dual language program] from families for the same grade level or 30 requests from families school-wide” (Los Angeles Unified School District, 2022c). The school will then work with the MMED

to assess the feasibility of implementing a new program (Los Angeles Unified School District, 2018b). When a program is not implemented in their home school, EL students can opt to attend a program located at another school with space, though transportation is typically not provided.

Almost all current elementary programs are located in traditional public schools with neighborhood attendance zones. Students must request to enroll in these programs. Students living within the school's attendance zone are given priority, and if space remains, students living outside the attendance zone may gain access via lottery. Two elementary programs currently exist as strands within non-zoned schools, including one in an affiliated (LAUSD-operated) charter school and one in a pilot community school meant for small innovative programs; any student can apply to attend those TWDL programs. Though TWDL programs are meant to serve both EL students and English speakers, it remains unclear how the lotteries prioritize student subgroups for seats in these programs.

These trends and policy history make LAUSD a useful context in which to study TWDL's potential to foster integration. For example, district policy around TWDL implementation indicates an explicit intention to foster linguistic integration, but not ethnoracial or socioeconomic integration.<sup>5</sup> Furthermore, given the district's stark and projected enrollment declines, it may be that TWDL programs will become increasingly viewed as a mechanism to attract and retain students (Medina, 2016; Stavely, 2022). Such a trend has the potential to dilute the intended benefits of TWDL programs if focus turns away from serving the most marginalized students and towards attracting advantaged students exercising school choice (Cervantes-Soon et al., 2017). Finally, the district's high and growing number of TWDL programs—currently serving seven different partner languages—provide a large, rich sample to analyze.

## **Research Methods**

## **Data**

We use publicly available school-level enrollment data from the California Department of Education (CDE) to describe LAUSD elementary school enrollments between 2001-02 and 2021-22. We limit our analyses to include only the elementary grades (grades K-5, or grades K-6 in the case of K-6 schools). We include LAUSD-affiliated charter schools in our dataset because they are funded through LAUSD and programs located in these schools are generally overseen by LAUSD administration.<sup>6</sup> Because they fall outside of the purview of LAUSD, we do not include independent charters that operate in LAUSD's geographic area. We also do not include alternative schools or special education schools.<sup>7</sup> CDE data include enrollments by grade level and race/ethnicity for all years in our sample, by EL status for all years except 2010-11, and by eligibility for free or reduced-price meals (FRPM) beginning in 2004-05. Though FRPM data are often critiqued by scholars pointing out their unreliability (Harwell, 2018), they remain one of the only available measures of students' economic status.<sup>8</sup>

From LAUSD's MMED, we obtained a list of all TWDL programs, along with data indicating their host school, partner language of instruction, grade levels served, and year of founding. Since school-level enrollment data include both those who participate in TWDL programs and those who do not, our research questions and the current analysis are focused only on trends among schools with TWDL programs and not specifically on TWDL program enrollments.

## **Methods**

To answer our first research question—how does enrollment by race/ethnicity, language, and economic status compare in schools with and without TWDL programs—we calculate enrollment statistics in LAUSD elementary schools over time (see Appendix table A1 for counts

of schools that fall within each category). We analyze student enrollments by race/ethnicity, language status (EL or non-EL), and economic status (receives FRPM or does not). In particular, these calculations help us understand the extent to which schools with TWDL programs enroll EL students and those routinely underrepresented in TWDL, like low-income students and African American students.

To answer our second research question—how does racial, linguistic, and economic diversity compare in schools with and without TWDL—we calculate four measures of school diversity in both types of schools over time. Diversity is a nuanced construct. Following previous research, we calculate four measures—including both absolute and relative measures—to assess different dimensions of diversity (see, e.g., Ayscue et al., 2018; Frankenberg et al., 2019; Massey & Denton, 1988; Reardon, 2016). These include the entropy index, Theil’s  $H$ , exposure/isolation indices, and concentration. While absolute measures describe the extent to which student certain groups are separated from others, relative measures consider trends in relation to the overall population of a larger unit, such as a school district. In doing so, relative measures facilitate comparisons over time and help account for realistic constraints (e.g., most public schools can only be as diverse as their district’s overall student population).

Using each measure, we calculate diversity among racial/ethnic groups (we focus on Latinx, non-Latinx Asian American, non-Latinx African American, and non-Latinx white students),<sup>9</sup> language status dyads (EL and non-EL), and economic dyads (eligible for FRPM or not) for schools with and without TWDL programs. As a robustness check, we also calculate the four measures using only 1<sup>st</sup> grade students (rather than total elementary enrollments). New TWDL programs are usually first made available in kindergarten and then expand to serve additional grade levels as students age. Because many TWDL programs in LAUSD were only recently



implemented, they may currently exist just in the early grades (e.g., K-2). Enrollment across all elementary grades in those schools may mask patterns specific to only the younger grade levels with TWDL programs. Using 1<sup>st</sup> grade enrollments allows us to more closely examine enrollments that include TWDL programs. Our analyses of 1<sup>st</sup> grade enrollments describe students' race and EL status but not their FRPM status, because CDE does not report FRPM counts by grade level.

We first calculate entropy for each school, an absolute measure of diversity. Entropy compares the actual composition of a unit (e.g., school) to a hypothetical composition in which each group is evenly represented. In other words, it conceptualizes diversity as equal representation from each group. It is important to note that equal representation is not always practical, or even desirable, when the composition of the larger area (e.g., district) does not have equal numbers from each group. However, entropy remains a useful measure for capturing the diversity of individual schools (Kebede et al., 2021). It also speaks to the potential for intergroup contact by describing the composition of schools.

Entropy ( $E$ ) is calculated as

$$E = \sum_{r=1}^R \left( \prod_r \right) \ln \left[ \frac{1}{\prod_r} \right] \quad (1)$$

where  $\prod_r$  refers to the proportion of a school that group  $r$  makes up, and  $R$  represents the number of categories represented in the population (e.g., the number of possible racial groups or language statuses). When scaled to a range of 0 to 1, entropy values of 0 represent complete homogeneity and values of 1 indicate that each group makes up an equal share of enrollment.

Next, we calculate Theil's  $H$ , a relative measure that captures the extent to which a district's total population is evenly sorted across schools. In this way,  $H$  speaks both to contact hypothesis,

by describing who is enrolled in different schools and the potential for intergroup contact, and to CRT, by acknowledging that sorting across schools is not random or even, but rather reflects the permanence of racism and the extent to which advantaged groups perceive it is beneficial to sort into specific schools.

$H$  is measured as

$$H = \frac{1}{TE} \sum_{j=1}^J t_j (E - E_j) \quad (2)$$

where  $T$  refers to the population of the district, and  $t_j$  refers to the total enrollment of each school  $j$ .  $E$  is the entropy of the overall district, while  $E_j$  is the entropy of each school  $j$ . Their's  $H$  can range from 0 to 1, where 0 indicates complete evenness (every school's composition matches the district's overall composition) and 1 indicates complete unevenness (every school is comprised of only one group). Values above 0.25 are generally considered highly uneven. A particular advantage of  $H$  is that it can be decomposed to understand how sorting within and between different kinds of schools contributes to the overall, districtwide measure of evenness. Here, we decompose total  $H$  as follows:

$$\begin{aligned} H_{total} = & H_{between\ non-TWDL\ and\ TWDL\ schools} + H_{among\ non-TWDL\ schools} \\ & + H_{among\ TWDL\ schools} \end{aligned} \quad (3)$$

The portion of  $H$  coming from between non-TWDL and TWDL schools is the amount of overall unevenness that occurs because the overall composition of students attending TWDL schools is different than the overall composition of students attending non-TWDL schools. In other words, this part allows us to know whether the types of students enrolled in schools with

TWDL programs are substantially different than the types of students enrolled in schools without. The portion of  $H$  coming from among TWDL schools describes how evenly distributed all TWDL school students are across schools with TWDL programs; the portion of  $H$  coming from among non-TWDL schools describes how evenly distributed all non-TWDL school students are across schools without TWDL programs.

Next, we calculate exposure and isolation indices for students from different groups to capture students' potential for contact with students from their own group and other groups. These indices are absolute measures that speak to students' everyday lived experiences in their schools and illuminates the potential for students from different groups to come into contact with other groups. The exposure index describes the weighted average school composition that a student of group  $x$  experiences. It is calculated as

$$P^* = \sum_{i=1}^n \left( \frac{x_i}{X} * \frac{y_i}{t_i} \right) \tag{4}$$

where  $n$  is the number of schools,  $x_i$  is the number of students from school  $i$  in group  $x$ ,  $X$  is the total number of students from group  $x$  in the district,  $y_i$  is the number students from school  $i$  in group  $y$ ,  $t_i$  is the total number of students in the school  $i$ . If all schools are perfectly desegregated, exposure is identical for students across all groups and reflects the composition of the school district (Massey & Denton, 1988). Isolation is a related construct and speaks to the average student of group  $x$ 's contact with other students from group  $x$ . To calculate isolation, we use the equation above and replace  $y_i$  with  $x_i$ . While exposure and isolation are absolute measures of segregation, we compare them relative to the district's overall composition.

Finally, we use a benchmark measure of segregation to capture the concentration of various groups. In capturing how (dis)advantage is concentrated in particular schools, this measure can

illustrate the permanence of racism and interest convergence (e.g., white students avoid schools with high concentrations of marginalized students, thereby perpetuating inequitable access to educational opportunities; Gándara & Orfield, 2012; Orfield & Lee, 2005). Benchmark measures appeared in the Coleman Report and continue to be used in school desegregation court cases and civil rights reports to identify highly segregated schools (e.g. George & Darling-Hammond, 2019; Government Accountability Office, 2016). In contrast to other indices that average the compositions of all schools, benchmark measures identify outlier schools.

In this paper, we measure both absolutely concentrated schools and relatively concentrated schools, which we refer to as identifiable schools. Absolutely concentrated schools are those with more than 90% of students falling into certain categories (e.g., African American, Latinx, EL). By definition, TWDL programs are meant to enroll 50% ELs and 50% non-ELs, but school-level enrollments may reveal some absolutely concentrated schools. Schools with TWDL programs may also be absolutely concentrated in terms of race or poverty. Identifiable schools are those in which the percentage of students from a particular group differs by more than 20 percentage points from that group's share in the district overall. For example, since ELs currently make up about 30% of LAUSD's overall elementary population, an identifiable school in terms of language is one that has less than 10% or greater than 50% EL students.

Throughout the findings, we refer to specific results using each measure's terminology (i.e., entropy, unevenness, exposure, isolation, absolute concentration, and identifiability). We use the term diversity when describing how our findings broadly contribute to a holistic understanding of school diversity.

## **Findings**

**RQ 1: How does enrollment by race/ethnicity, language, and economic status compare in schools with TWDL and in schools without TWDL?**

*Enrollments by Race/Ethnicity*

Within the districtwide context of declining enrollment presented in the context section of this paper, the numbers of students enrolled in schools with TWDL programs have increased dramatically as new programs have opened across the district (see Appendix figure A2). Enrollments have especially grown since about 2015, though they have decreased slightly since 2020, likely due in part to the Covid-19 pandemic. Overall, the number of students of all racial/ethnic groups attending schools with TWDL have increased over time, so we also focus here on assessing each group's share of enrollment in schools with TWDL. While Latinx students comprise most of the enrollment, TWDL schools have limited but growing enrollment of students from underrepresented ethnic/racial groups, including African American and Filipino students. However, enrollment patterns vary substantially according to TWDL program language.

The number of Latinx students enrolled in TWDL schools has grown quickly, particularly between 2017-18 and 2018-19, when 38 new Spanish language programs were created. TWDL schools have maintained a high percentage of Latinx students—approximately 80% or more of students in such schools for more than a decade (figure 3). TWDL schools now have a higher percentage of Latinx enrollment than does the district overall.

The enrollment counts of students from other racial/ethnic backgrounds, including those traditionally underrepresented in TWDL schools, have also increased in recent years (see Appendix figures A2 and A3). However, the proportionality of enrollment shares varies across groups. African American enrollment grew substantially in recent years, tripling in number since

2016-17, but the percentage of African American students in schools with TWDL programs has declined and is now lower than the African American share of the overall elementary school enrollment (6.2% compared to 6.7%, respectively). The number of Asian American students in TWDL schools has also doubled since the early 2000s, but they represent a dramatically shrinking percentage of TWDL school enrollments as TWDL schools have expanded particularly in non-Asian language programs. As of 2021-22, Asian American students represent just 3.6% of TWDL school enrollment, almost identical to their share of the overall district's enrollment. Similar patterns are also seen with Filipino students, a smaller group overall.

We also examined the enrollment patterns of white students, as previous literature has identified middle-class, monolingual white students as a group that may gentrify TWDL programs (Cervantes-Soon et al., 2017; Valdez, Freire, et al., 2016). Not all white students are middle-class or monolingual, and increasing white enrollment alone does not necessarily indicate gentrification (and, to fully assess, we would need to look at program-level enrollment). The number of white students enrolled in LAUSD elementary schools with TWDL programs consistently increased, and across the years they have comprised 3-6% of the enrollment in these schools (a considerably smaller percentage than their 11% districtwide proportion). The white proportion of TWDL school enrollment peaked at 7.0% in 2016-17 immediately preceding the creation of a large number of new programs, and has declined to 4.6% of enrollment in these schools in 2021-22.

—Figure 3 here—

Importantly, students of different races/ethnicities are enrolled in different kinds of TWDL schools. Latinx and African American students almost exclusively attend schools with Spanish TWDL programs (figure 4). Most Asian American students attend schools with Korean

programs and Mandarin programs. The majority of Filipino students had previously attended schools with Korean programs, which were more prevalent in earlier years, but now a majority of Filipino students attend schools with Spanish language programs. Finally, in almost every year studied, a minority of white students in schools with TWDL programs were in schools offering Spanish programs. Since their inception in 2016-17, a growing percentage of white TWDL school students attend schools with Armenian programs. Armenian-speaking students who likely racially identify as white do not represent the monolingual populations that scholars warn could gentrify TWDL (Valdez, Freire, et al., 2016). In contrast, the growing counts of white students enrolled in schools with Korean, Mandarin, and French programs (see Appendix figure A3) might be more likely to be middle-class, monolingual white students seeking unique educational opportunities.

—Figure 4 here—

### ***Enrollments by English Learner Status***

Next, we look at enrollment by English Learner (EL) status. LAUSD’s total EL enrollment decreased sharply over this time, though this may be due to differences in EL reclassification requirements, EL migration out of the district, and lower numbers of first-generation immigrants (Sequeira, 2022). The vast majority of EL students in LAUSD are Spanish speakers, though others speak Korean, Armenian, Russian, Cantonese, Hebrew, Japanese, Mandarin, or Arabic.

Despite the decline in the percentage of EL students in LAUSD, the number of EL students enrolled in schools with TWDL programs has increased steadily over the last two decades as the number of TWDL schools has grown. The percentage of EL students in schools with TWDL programs has declined during this time, though they have consistently enrolled higher shares of EL students than schools without TWDL programs.

These patterns also vary by the language of the schools TWDL program. For example, schools with Armenian TWDL programs have increasing percentages of EL students. Schools with French, Mandarin, and Korean programs have the lowest percentages of EL students, while those with Spanish programs enroll the highest percentages. We note, though, that there are differences in the size of each TWDL program as compared to the entire school enrollment that are not reflected in these trends. It may be that French TWDL programs have higher percentages of EL students, but are placed in schools with relatively low percentages of EL students. Future work will examine these patterns at the program and neighborhood level.

—Figure 5 here—

### ***Enrollments by Students' Economic Status***

Finally, we look at TWDL school enrollments by students' economic status, as measured by the percentage of students who are eligible for FRPM. Districtwide, about three quarters of LAUSD students are eligible for FRPM in each year. Schools with TWDL programs have higher percentages of eligible students than do schools without TWDL programs, and the percentage of FRPM students in each type of school has been diverging since 2017-18.

The trend of increasing percentages of FRPM-eligible students is not consistent across all TWDL schools. Similar to patterns reported above for race and EL, schools with French, Korean, and Mandarin programs have considerably lower (and decreasing) percentages of FRPM-eligible students. Schools with Arabic and Armenian programs have increasing percentages of FRPM-eligible. The vast majority of TWDL schools—those with Spanish programs—have also had increasing percentages of FRPM-eligible. In 2021-22, 93% were eligible.

—Figure 6 here—

### ***Summary***



TWDL schools have higher percentages of Latinx, EL and FRPM-eligible students than non-TWDL schools. However, enrollment patterns vary substantially according to TWDL program language. For example, Asian American students are mostly enrolled in schools with Korean and Mandarin programs while African American and Latinx students are almost entirely enrolled in schools with Spanish programs. The majority of all TWDL programs (including newly added programs) are Spanish language programs, which are in schools that enroll relatively higher percentages of African American, Filipino, Latinx, EL, and FRPM-eligible students. Low percentages of white students, by contrast, are enrolled in schools with Spanish programs; white students also attend schools with Korean and Armenian programs. Schools with French, Mandarin, and Korean programs have the lowest percentages of ELs and FRPM-eligible students, while those with Spanish programs enroll the highest percentages of students from those groups. Schools with Armenian programs have higher percentages of white students, but also increasing proportions of EL and FRPM-eligible students.

**RQ 2: How does the racial, linguistic, and economic diversity in schools with TWDL compare to the diversity in schools without TWDL?**

Turning to our second research question, we find that the enrollment patterns described above relate to decreases in the racial, linguistic, and economic diversity of TWDL schools over time. Nevertheless, students in TWDL schools are still more racially, linguistically, and economically diverse, in general, than students in non-TWDL schools. In particular, schools with TWDL are much more linguistically diverse than schools without, reflecting the explicit design behind TWDL. However, these patterns vary among schools with TWDL programs, including by TWDL program language.

***Entropy***

We begin by calculating multiracial entropy, the measure of diversity that compares each school's racial/ethnic composition to a hypothetical in which the school has equal proportions of students from each group. Entropy values near 0 indicate less diversity, and less potential for intergroup contact; values close to one indicate more diversity, and more potential for intergroup contact.

Median school-level racial entropy values for schools with TWDL programs vary substantially over time due to the relatively small—and changing—number of those schools (median values are indicated by the boxplot midlines in figure 7). Median racial entropy was higher in earlier years, when there were fewer TWDL schools, but decreased from 0.55 in 2000-01 to 0.25 in 2021-22. This indicates the overall population of students attending TWDL schools is, on average, less racially diverse now than it was two decades ago. Also, while TWDL schools tended to be more racially diverse than non-TWDL schools in earlier years, that is not the case in more recent years. TWDL schools are now generally less racially diverse than non-TWDL schools, largely because TWDL schools enroll higher shares of Latinx students. Looking at racial entropy by program language in the 2021-22 school year, we find schools with Korean and Mandarin programs are the most diverse, while schools with Spanish programs and the one with an Arabic program are least diverse (see appendix figure A7).

—Figure 7 here—

In terms of economic diversity, the median entropy value for schools with TWDL has declined since 2016-17 (see Appendix figure A5), as the number of schools with TWDL has rapidly expanded and the share of FRPM students in these schools has increased. In recent years, schools with TWDL have also become less economically diverse than schools without TWDL, because they enroll higher shares of FRPM students. Broken down by program language, schools

with Korean and Mandarin programs are more economically diverse than those with Spanish programs, because of their higher proportions of non-FRPM students (figure A7).

Finally, in terms of linguistic diversity, schools with TWDL programs are slightly more linguistically diverse than non-TWDL schools, indicating more TWDL schools approach an even composition of EL and non-EL students (see Appendix figure A6). In recent years, linguistic diversity in both TWDL and non-TWDL schools has decreased slightly, as the overall proportion of EL students in LAUSD has decreased. Schools with French and Mandarin programs are less linguistically diverse than schools with Spanish, Korean, Armenian, or Arabic programs (figure A7).

### ***Theil's H***

Next, we turn to Theil's  $H$ , a relative measure of evenness. While entropy describes the diversity of each school individually,  $H$  describes how evenly the district's overall enrollment is sorted across schools. This measure illustrates both the potential for intergroup contact and the tenets of CRT. We describe districtwide  $H$  values and then decomposed  $H$  values, which allow us to focus on schools with TWDL programs.

Districtwide, LAUSD elementary schools are highly racially uneven across all years examined, with  $H$  values consistently above 0.35 (values above 0.25 are considered high). High unevenness indicates the racial compositions of many schools are dissimilar to the district's overall composition. Unevenness has decreased slightly since 2012-13 (see Table 1 for selected years; A2 for all years). However, as described above, LAUSD itself has become less racially diverse over time. Thus, declining racial  $H$  values may indicate students are more evenly sorted across schools within the district, but because of decreasing district-level diversity, school-level enrollments may also be less racially diverse.

Trends for economic and linguistic unevenness diverge during this time period. Districtwide, economic unevenness is high and has increased over time, meaning FRPM and non-FRPM students are increasingly clustered in different schools. Linguistic unevenness, on the other hand, is lower and has been decreasing. This indicates EL students are more evenly distributed across LAUSD elementary schools rather than being overwhelmingly enrolled in certain schools. Though, we also note LAUSD's proportion of EL students has declined over time, meaning schools may each have declining linguistic diversity.

—Table 1 here—

Next, we decompose  $H$  into its component parts: sorting between TWDL and non-TWDL schools, sorting among TWDL schools, and sorting among non-TWDL schools. This decomposition is useful because it helps us to see how much segregation comes from school types as a whole enrolling (or attracting or targeting) students of a certain group (e.g., a student wanting to attend a school with a TWDL program in general) as opposed to segregation coming from within school types (e.g., a student wanting to attend a school with a particular TWDL program).

We begin by measuring the portion of total  $H$  that comes from the uneven sorting between school types (e.g., Latinx students may be overwhelmingly concentrated in TWDL schools and non-Latinx students concentrated in non-TWDL schools). Across all years, this portion of racial, linguistic, and economic  $H$  (blue in figure 8) is relatively low, meaning there is little sorting between TWDL and non-TWDL schools and the overall composition of TWDL schools is similar to the overall composition of non-TWDL schools in terms of students' racial, linguistic, and economic characteristics. However, since about 2017-18, this portion of  $H$  has slightly increased, indicating the composition of TWDL schools is slowly beginning to look different

than the composition of non-TWDL schools. In particular, the enrollment analyses showed that schools with TWDL programs have higher shares of Latinx, EL, and FRPM students. So while the unevenness between the types of schools is increasing, it is because schools with TWDL are, on the whole, enrolling higher shares of traditionally marginalized students than non-TWDL schools.

—Figure 8 here—

The remaining unevenness is caused by sorting among TWDL schools (e.g., some TWDL schools may enroll higher proportions of Latinx students relative to other TWDL schools) and by sorting among non-TWDL schools. The proportion of racial, linguistic, and economic  $H$  coming from the uneven sorting of students across TWDL schools (green in figure 8) has increased over time as the number of TWDL schools has increased. However, it remains lower than TWDL schools' share of total LAUSD enrollment. This indicates students in TWDL schools are more evenly distributed across TWDL schools compared to students in non-TWDL schools (in fact, sorting of students is mostly a result of unevenness among students in schools without TWDL).<sup>10</sup>

When further examining how program language accounts for unevenness that exists among TWDL schools in 2021-22, we found approximately half of the racial and economic unevenness among TWDL school compositions is due to the uneven sorting of students between schools with different language programs. A much lower share of linguistic unevenness is due to sorting between schools by their program language. This aligns with the idea that all TWDL schools, regardless of program language, are meant to enroll both EL and non-ELs, but particular TWDL language programs may attract students with different racial and economic characteristics.

### ***Exposure/Isolation***

Next, we calculate exposure and isolation indices to understand the school racial, economic, and linguistic composition of the average LAUSD elementary student enrolled in a school with TWDL. Isolation refers to the percentage of students from one's own group in his/her school while exposure is the percentage of students from other groups (whether racial, linguistic or economic). These indices speak to contact hypothesis by describing the average student's potential for contact with students from other groups. To provide context, we also compare these indices to those of students enrolled in schools without TWDL.

We begin by looking at the average school composition of Latinx students, the largest group in LAUSD. Latinx isolation (or exposure to themselves) in TWDL schools was relatively low in the early 2000s, when most of the district's TWDL programs were Korean language programs, but it has remained consistently above 85% since the late 2000s (figure 9). Latinx isolation is currently higher in TWDL schools than in non-TWDL schools. In 2021-22, the average Latinx student in a TWDL school attended a school that is nearly 90% Latinx, while the average Latinx student in a non-TWDL school attended a school that is 82% Latinx (see figure A9 for exposure rates for students in non-TWDL schools). The high isolation rates also mean that Latinx students in TWDL schools have very low exposure to students from other racial/ethnic groups.

African American TWDL school students' isolation has also increased over time, most noticeably between the 2016-17 and 2017-18 school years (see appendix figure A8). Dozens of new TWDL programs opened in 2017-18, several of which were located in south central LA where there are larger African American populations, and the African American TWDL school enrollment grew substantially in that year. The isolation of African American TWDL school students is relatively high given their overall enrollment in TWDL schools, and its increase over time indicates the new African American enrollees are only located in a few, specific TWDL

schools. Granted, TWDL schools still provide African American students with lower isolation and greater exposure to Latinx students than non-TWDL schools, but they do not expose African American students to greater percentages of white or Asian American students.

White students enrolled in TWDL schools also experience increasing isolation over time, though it is not yet as high as it is in non-TWDL schools. While schools with TWDL programs have historically provided white students with increased exposure to students of other races than non-TWDL schools, that benefit has waned over time. In supplementary analyses, we also find that the isolation of white 1<sup>st</sup> graders in schools with TWDL is even higher than the isolation of white elementary schoolers in schools with TWDL, indicating gentrification may be on the rise in younger cohorts of students.<sup>11</sup> If the current trend continues, higher exposure for white students in TWDL schools to students of other races may not hold.

Finally, the average Asian American student in a TWDL school has experienced slight decreases in isolation and increases in exposure to white students over time. Asian American students' isolation remains much higher in TWDL schools than in non-TWDL schools (34% compared to 14% in 2021-22).

—Figure 9 here—

We also examine exposure rates in TWDL schools separately by TWDL partner language, for the 2021-22 school year (see Appendix figure A12). Spanish-language programs are often in schools attended by mostly African American and Latinx students, so students in those schools have high rates of exposure to Latinx students. Additionally, African American students in Spanish-language TWDL schools are disproportionately isolated; by comparison, African American students in schools with non-Spanish language programs have higher exposure to students of other race/ethnicities. Among white students in schools with TWDL, those in schools

with Armenian and French programs have the highest isolation; the same is true for Asian American students in TWDL schools with Korean and Mandarin programs. Some of these patterns like Armenian or Korean we would expect due to the need for native speakers in the TWDL program, but high white isolation in French-speaking program schools is likely not explained by language background given the low number of French speakers in LAUSD (Los Angeles Unified School District, 2022b). The high isolation of white and Asian American students in language-specific TWDL schools helps to explain why African American and Latinx TWDL school students have such low exposure to them overall.

Lastly, we examine exposure by students' EL status and economic status. Across all years, the average non-EL student has higher exposure to EL students in schools with TWDL (see the dashed blue line in figure 10) as compared to in schools without TWDL (solid blue line). For example, in 2021-22, the typical non-EL student in a TWDL school was exposed to 34% ELs; the typical non-EL student in a non-TWDL school was exposed to only 24% ELs. The proportion of ELs is higher in TWDL schools than in non-TWDL (green lines), which helps to explain some of the higher exposure. Moreover, non-EL and EL students have more similar exposure rates to EL students in TWDL schools (see the differences between the dashed red and blue lines) than in non-TWDL schools (the difference between the solid red and blue lines). This is especially true in more recent years, and is indicative of less linguistic segregation within TWDL schools.

—Figure 10 here—

In terms of economic exposure, across all years, the average non-FRPM student experiences greater exposure to FRPM students in TWDL schools (dashed blue line in figure 11) than in non-TWDL schools (solid blue line). In 2021-22, the average non-FRPM student in a TWDL school



was exposed to 64% FRPM students, while the average non-FRPM student in a non-TWDL school was exposed to only 47% FRPM students. But non-FRPM students in TWDL schools remain relatively under-exposed to FRPM students, especially given FRPM students' overall presence in TWDL schools (dashed green line). By contrast, FRPM students have high and relatively equal isolation rates in both types of schools (dashed and solid red lines). In the last three years, despite an increasing percentage of FRPM students in TWDL schools, non-FRPM exposure to FRPM students has actually decreased (dashed blue line) while FRPM isolation has increased (dashed red line), suggesting increasing economic segregation within TWDL schools.

—Figure 11 here—

### ***Concentration***

Finally, we identify the proportion of students attending absolutely concentrated schools (>90% one group) and identifiable schools (those that differ by more than 20 percentage points from a group's district percentage).<sup>12</sup> In describing the schools in which (dis)advantage is concentrated, this measure helps demonstrate CRT's notions of racism as permanent and interest convergence. We report findings for students attending schools with TWDL programs, and compare them to students attending non-TWDL schools.

Among all students in TWDL schools, only Latinx and FRPM-eligible students attend absolutely concentrated schools. (In contrast, some Black and EL students attended absolutely concentrated non-TWDL schools in earlier years we studied.) Since the early 2000s, the percentage of Latinx TWDL school students attending an absolutely concentrated Latinx school has increased and surpassed the level of absolute concentration in non-TWDL schools (figure 12). The high absolute concentration rates among Latinx students reflect the fact that the district overall is predominantly Latinx. TWDL programs are also predominantly Spanish-language

programs and may be placed in schools with high Latinx populations. The percentages of FRPM-eligible student attending absolutely concentrated low-income schools is quite variable over time because a large number of schools have FRPM proportions just above or below 90%, and values fluctuate on either side of the cutoff over time. Absolute economic concentration trends associated with TWDL schools largely track those of non-TWDL schools, though in the past five years, higher percentages of TWDL school students attend absolutely economically concentrated schools—the reverse of the pattern prior to five years ago.<sup>13</sup>

— Figure 12 here —

Next, we calculate the percentage of elementary school students attending identifiable schools, where a group's share is more than 20 percentage points higher than the group's districtwide share.<sup>14</sup> Because groups such as Asian American, African American, white, and non-FRPM students make up such a small percentage of the district's enrollment, it is very rare to see schools in which they are absolutely concentrated (more than 90% of school enrollment). It is more common to see identifiable schools, or schools with disproportionate enrollments of students from these groups, which illustrates cases of concentrated (dis)advantage.

We first calculate the percentage of Asian American, African American, and white students attending identifiable schools.<sup>15</sup> For example, given LAUSD is 4% Asian American, a school with more than 24% Asian American students is categorized as identifiable. We find that Asian American identifiability is substantially higher in TWDL schools than in non-TWDL schools (see figure 13). In 2021-22, two-thirds of Asian American students in TWDL schools attended an identifiably Asian American school. By comparison, 17% of Asian American students in non-TWDL schools attended an identifiably Asian American school. White identifiability in TWDL schools has increased in recent years, and is becoming closer to the high levels of white

identifiability present in non-TWDL schools. African American identifiability in TWDL schools has decreased over time and is now lower than their identifiability in non-TWDL schools.<sup>16</sup>

—Figure 13 here—

In terms of identifiability by language status, about 30% of LAUSD’s students were classified as EL in 2021-22 and 70% were non-EL. As a result, schools with greater than 50% ELs or greater than 90% non-ELs are identifiable. In terms of economic status, the district is 20% non-FRPM students, so schools with greater than 40% non-FRPMs are identifiable.<sup>17</sup>

The identifiability of EL students is somewhat similar across TWDL and non-TWDL schools, and is generally decreasing in both types of schools (see figure 14, dashed and solid red lines, respectively). The identifiability of non-EL and non-FRPM students, both traditionally advantaged student groups, is lower in TWDL schools than in non-TWDL schools (green and blue lines, respectively). However, the identifiability of non-FRPM students in TWDL schools has grown in recent years.

—Figure 14 here—

### ***Summary***

Together, the four indices we calculate tell a consistent story about racial, economic, and linguistic diversity in schools with TWDL programs. We examined different measures to understand both the absolute diversity of schools and relative diversity, or how enrollments in schools with TWDL compare to the district’s overall composition. Because non-Latinx students comprise a low share of LAUSD’s enrollment and of TWDL schools, some measures show them as overrepresented in comparison to their share of district enrollment, though they are only a fraction of the school’s overall enrollment on absolute measures. Moreover, due to the need to have native speakers of TWDL partner languages, we might expect to see less diversity among

some groups in schools with TWDL programs (e.g., among Asian American students in schools with a Korean program).

As measured by Theil's  $H$ , differences in overall student population characteristics between schools with TWDL programs and schools without TWDL is low, but increasing in recent years. Enrollment and entropy analyses showed TWDL schools are enrolling higher proportions of Latinx, EL, and FRPM-eligible students, and lower proportions of white students compared to non-TWDL schools, making them less diverse overall than non-TWDL schools. However, Theil's  $H$  also indicates students enrolled in TWDL schools are more evenly distributed across those schools than are students enrolled in schools without TWDL.

Additional indices show how TWDL enrollment patterns vary by type of diversity (i.e., racial, linguistic, economic) and by student group. African American and Latinx students in TWDL schools are mostly exposed to other African American and Latinx students. Asian American students in TWDL schools are much more isolated and identifiable than are Asian American students in non-TWDL schools. The isolation and identifiability of white students and non-FRPM students in TWDL schools is increasing, though they remain in more diverse schools than their peers in non-TWDL school. Linguistic diversity is substantially higher in TWDL schools than in non-TWDL schools, which aligns with the stated goals of TWDL.

### **Discussion**

Despite the growth of TWDL programs across the country and considerable discussion of their potential benefits for EL students and as a possible integration strategy, there is limited research that systematically studies enrollment patterns in schools with TWDL. In this paper, we analyze 20 years of enrollment and diversity in LAUSD's elementary schools with TWDL to understand who has the potential to access these programs. We find schools with TWDL are

enrolling increasing numbers of traditionally marginalized students, and students are generally more evenly sorted than students in schools without TWDL. However, the sorting of students across TWDL schools, especially according to TWDL program language, illustrates growing areas of concern.

Schools with TWDL programs in LAUSD enroll higher proportions of Latinx, EL, and FRPM students than schools without TWDL, and they have relatively proportionate rates of Asian American and Filipino students. They are also enrolling increasing numbers of ELs despite a decline in the districtwide proportion of designated EL students. This finding is particularly noteworthy given that the education of EL students is a critical goal of TWDL, and given other research documenting declining EL enrollment in other bilingual programs (Linton & Franklin, 2010; Wentworth et al., 2010). Moreover, our findings along racial and economic lines do not demonstrate the high levels of gentrification documented in other places, such as Utah (Valdez, Freire, et al., 2016; Williams et al., 2023). The presence of traditionally marginalized students in schools with TWDL is encouraging because it indicates they have the potential to benefit from intergroup contact in these programs.

However, other enrollment and diversity trends among TWDL schools indicate limits on the potential for intergroup contact. For one, the enrollment of African American and white students in TWDL schools is disproportionately low and decreasing over time. Moreover, many student groups are differentially sorted among TWDL schools according to program language. Schools with French, Korean, and Mandarin programs have lower proportions of EL and FRPM students than schools with Spanish programs. African American and Latinx students are increasingly isolated and concentrated in schools with Spanish programs. In particular, though African American students in TWDL schools have more intergroup exposure than their African

American peers in non-TWDL schools, they are not exposed to the same diversity of students and languages that others in TWDL schools are. This is important given previous research showing African American students are marginalized not only in their access to dual language schools, but also once they are enrolled in these schools (Blanton et al., 2021). Meanwhile, the relative isolation and identifiability of white and non-FRPM students is growing in some TWDL schools, like those with French programs. Ultimately, the relative isolation and concentration of students by racial, linguistic, and economic groups limits the potential for beneficial intergroup contact that TWDL could theoretically provide.

CRT helps explain some of these limits. Though TWDL schools have increasing numbers of advantaged students (e.g., white, non-EL, non-FRPM students), these students are concentrated in the minority of schools with non-Spanish language programs. Interest convergence predicts advantaged families in these groups will only enroll in schools they perceive to be personally beneficial. Illustrating the permanence of racism, their perception of which schools are beneficial may relate to the perceived status both of various languages and of the students associated with those languages. Spanish is perceived as a low-status language and is associated with Latinx and low-income students (Flores et al., 2021; Rosa & Flores, 2017), which may be why advantaged groups are avoiding schools with Spanish programs. This also helps explain why the proportion of white enrollment in all schools with TWDL programs remains relatively low and has been decreasing since 2017. As all enrollment has grown, the enrollment of white students in TWDL schools has increased, but not at the pace of other groups of students. Further, many are enrolling in newly opened French and Armenian programs, which remain far outnumbered by Spanish programs. Importantly, we also note that enrollment patterns and degrees of advantage may vary for particular white students in Armenian and French programs or for Asian American students

in Korean and Mandarin programs. However, our study cannot speak to the intersectional identities of students, nor can it analyze the diversity of TWDL programs or the opportunities and power relations within those programs. These factors matter greatly given the wealth of research highlighting how inequities within TWDL can harm marginalized students and prevent beneficial intergroup contact (Cervantes-Soon, 2014; Cervantes-Soon et al., 2017; Valdés, 1997; Valdez, Delavan, et al., 2016).

### **Research and Policy Implications**

To answer some of the research implications from this study, we plan to use student-level data in future work to look at intersectionality in enrollment trends (e.g., comparing white, Armenian-speaking, FRPM-eligible students and white, native English-speaking, non-FRPM students). Student-level data will also allow us to analyze TWDL program level enrollments to compare to the school-level findings presented here. Having understood how *school-level* enrollment and diversity varies in schools with TWDL programs—which is foundational to ensuring equitable access to diverse TWDL programs—we will next explore the extent to which TWDL *program* enrollments are diverse or segregated and the extent to which TWDL program enrollments differ from the rest of their host school enrollments.

Our future research will also compare school and program enrollments to neighborhood demographics in order to assess the role residential segregation plays in shaping these patterns. Though technically a form of school choice, most elementary-level TWDL programs are placed in zoned, neighborhood schools with enrollment preferences for in-boundary students and no provision of transportation.

In terms of policy implications, we find LAUSD's schools with TWDL programs have relatively high degrees of linguistic diversity, and lower degrees of racial and economic

diversity. While linguistic diversity is an important goal in and of itself, the district could also work to preserve and expand the racial and economic desegregative potential of TWDL programs. Unlike magnet programs, TWDL programs are not currently part of LAUSD's formal school integration efforts (Los Angeles Unified School District, n.d.). Designating and investing in TWDL programs to consider racial/ethnic diversity—as has been accomplished through the federally funded Magnet Schools Assistance Program and through means such as providing transportation to students whose attendance would enhance desegregation—could address this. However, racial and economic integration goals must also prioritize the provision of home-language maintenance education to designated ELs and address power relations within programs (López, 2016). These priorities can sometimes conflict, which means it will require constant, intentional work in order to achieve stable, equal-status integration.

### **Concluding Remarks**

This paper is one of the first to systematically study patterns of enrollment and diversity across elementary schools with TWDL programs in a large, diverse yet segregated district with a wide variety of TWDL schools. Our findings help describe the potential of TWDL programs to fulfill their aspirations to provide equal-status, integrated learning environments. We find elementary schools with TWDL programs are enrolling increasing numbers of racially, linguistically, and economically marginalized students, but the increasingly uneven sorting of students among TWDL schools demonstrates limits on the potential for intergroup contact.

### **Notes**

1. We recognize the term English Learner has a deficit connotation. In other work, we have used terms that counter these orientations such as emergent-bilinguals or dual-learners.



California and LAUSD use “English Learner” as the official term, so for simplicity, we use it in this paper.

2. There are other types of bilingual education programs, including other types of dual language immersion programs, that typically only enroll EL students. This paper focuses specifically on two-way dual language immersion programs (TWDL). In the few instances where we mean to refer broadly to all dual language immersion programs or all bilingual education programs, we use those phrases.
3. At the time, one-third of EL students in the state were enrolled in bilingual schools. After Proposition 227 passed, this proportion decreased to 8% (Parrish et al., 2006).
4. Four schools have two TWDL programs, each with a different partner language.
5. LAUSD has other explicit racial desegregation efforts, including magnet schools and permits with transportation (see Los Angeles Unified School District, n.d.). The district also remains under court oversight to implement its desegregation plan.
6. As of 2021-22, LAUSD had 51 affiliated charter schools serving the elementary grades, and one has a TWDL program.
7. We exclude these schools because they are not open to all students and they are traditionally not included in school segregation analyses. Depending on the year, LAUSD has anywhere from 20 to 30 alternative and special education schools at the elementary level; none have TWDL programs.
8. We also compared our findings to the Urban Institute’s model estimate of poverty in schools—a school-level estimated measure made available for public schools for 2013-2018 (Gutierrez et al., 2022). We find similar trends in the differences between TWDL schools and non-TWDL schools over time, though the estimated percentage of students living in poverty

is lower in value than the percentage of students eligible for FRPM (which includes those under 185% of the poverty line) (see Appendix figure A4).

9. We include only these four racial/ethnic groups because together, they comprise 96% of LAUSD's total elementary enrollment. When computing entropy and  $H$  (multiracial measures), we repeat calculations using all available racial/ethnic groups and find that trends are consistent with those we report in-text based on four groups. When calculating exposure and concentration (which are reported separately based on student race/ethnicity), we focus on the four largest student groups. We do not aim to erase any identities, and results for unreported groups are available from the authors upon request.
10. As a robustness check, we calculate  $H$  for 1<sup>st</sup> grade enrollments for racial and language segregation and present the findings in Appendix table A3. (We do not have FRPM eligible counts by grade level, only by school, so we cannot compute 1<sup>st</sup> grade economic segregation levels). Total racial and language segregation values are slightly higher in 1<sup>st</sup> grade than in elementary grades overall, but follow the same trend as total elementary segregation. Segregation among schools with TWDL contributes very similar amounts to total 1<sup>st</sup> grade racial and language segregation over time.
11. In years prior to 2017-18, the exposure indices of first grade students enrolled in schools with TWDL programs are very similar to those for all elementary TWDL school students (see Appendix figure A10). But in 2017-18 and later years, white 1<sup>st</sup> graders in TWDL schools have higher isolation than do all white students in TWDL elementary schools, perhaps presaging growing white isolation in TWDL schools. For example, in 2019-20, the average white, elementary student in a TWDL school attended a school that was 27.3% white, while the average white, 1<sup>st</sup> grader in a TWDL school attended a school in which 36.4% of 1<sup>st</sup>

graders were white. The trend could reflect that white enrollment in TWDL schools fades out in the upper grades, as it also does in non-TWDL schools. However, the difference between the isolation rates of white 1<sup>st</sup> graders and white upper elementary students is larger in TWDL schools than in non-TWDL schools, suggesting there may be something else going on in TWDL schools. It could be that newer TWDL programs—those currently only serving younger grades—are located in schools with larger percentages of white students or are attracting more white students, compared to older TWDL programs that serve all elementary grades. For example, the first French TWDL program opened in 2015-16 and the first Armenian program opened in 2016-17; both are located in schools that enroll relatively higher numbers of white students. It will be important to see how these trends develop as 1<sup>st</sup> graders age and TWDL programs are implemented across additional grades in their respective schools.

12. To test for sensitivity in specifying this measure, we also calculate this measure using +/- 15 percentage point difference from the district average, and we find consistent trends with higher percentages of students.
13. The percentages of 1<sup>st</sup> graders enrolled in schools with highly concentrated 1<sup>st</sup> grade student bodies are similar to the percentages of all elementary school students enrolled in schools with highly concentrated student bodies (see Appendix figure A13).
14. Another type of identifiability occurs when a group's share in a school is less than 20 percentage points below their districtwide share. These findings, displayed in appendix figure A16, largely overlap with the findings presented in text. For example, Latinx students make up 74% of LAUSD in 2021-22. Schools with less than 54% Latinx students are relatively concentrated in that Latinx students are identifiably underrepresented. But these also tend to

be schools in which other racial groups are identifiably overrepresented. As another example, EL students make up 30% of LAUSD. In schools with fewer than 10% EL students, EL students are identifiably underrepresented and non-EL students are identifiably overrepresented.

15. We do not discuss schools with identifiably Latinx student bodies because they are also schools with absolutely concentrated Latinx student bodies and are presented in the section above. (Latinx students comprise 74% of LAUSD in 2021-22, so identifiably Latinx schools have greater than 94% Latinx students.)
16. Among schools with TWDL programs, slightly higher percentages of 1<sup>st</sup> graders attend schools with racially identifiable 1<sup>st</sup> grade student bodies compared to all elementary school students (see Appendix figure A14). This is especially true of white 1<sup>st</sup> graders in schools with TWDL programs in years since 2015-16. These results reemphasize our findings in student exposure, which showed there are slightly higher levels of segregation among 1<sup>st</sup> grade TWDL school students, especially white students, than among total elementary TWDL school populations.
17. Because FRPM students comprise 80% of LAUSD overall, there cannot be schools in which FRPM students are identifiably overrepresented (>100% FRPM).

## Figures and Tables

Figure 1: LAUSD elementary enrollment, by student race/ethnicity

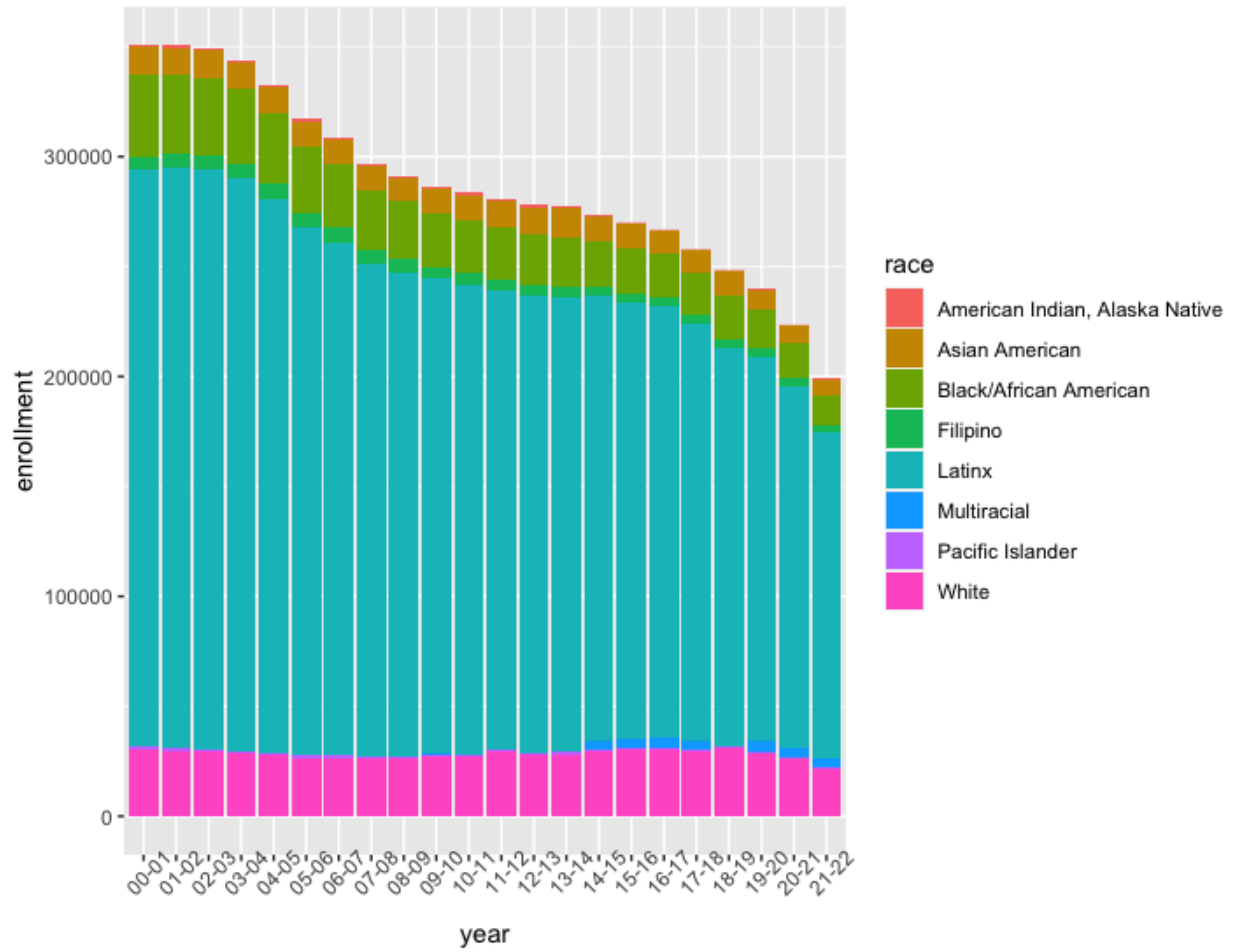
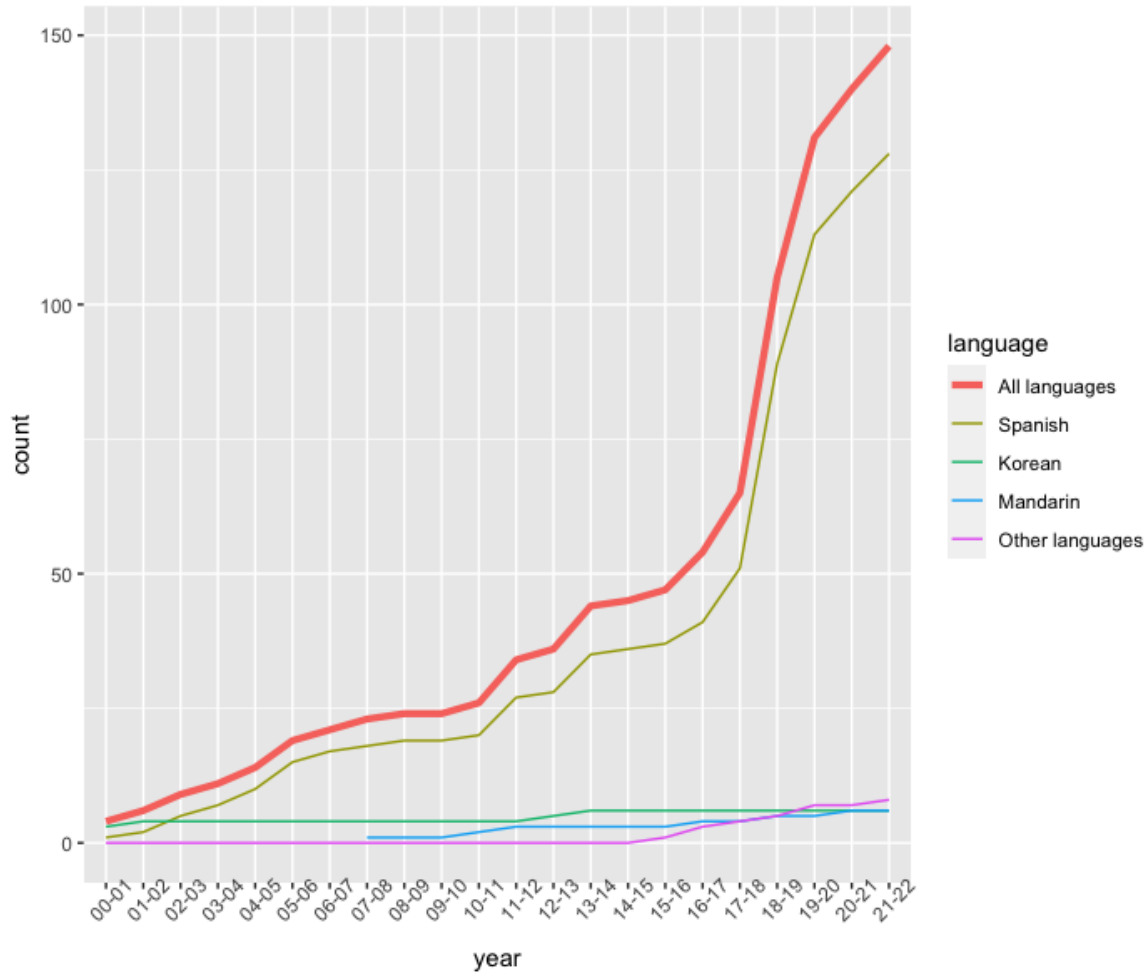


Figure 2: Count of elementary TWDL programs, by program language



Note: In 2021-22, the “other languages” category includes one Arabic program, four Armenian programs, two French programs, and one Japanese program.

Figure 3: Proportion of elementary enrollment in schools with TWDL programs by student race/ethnicity

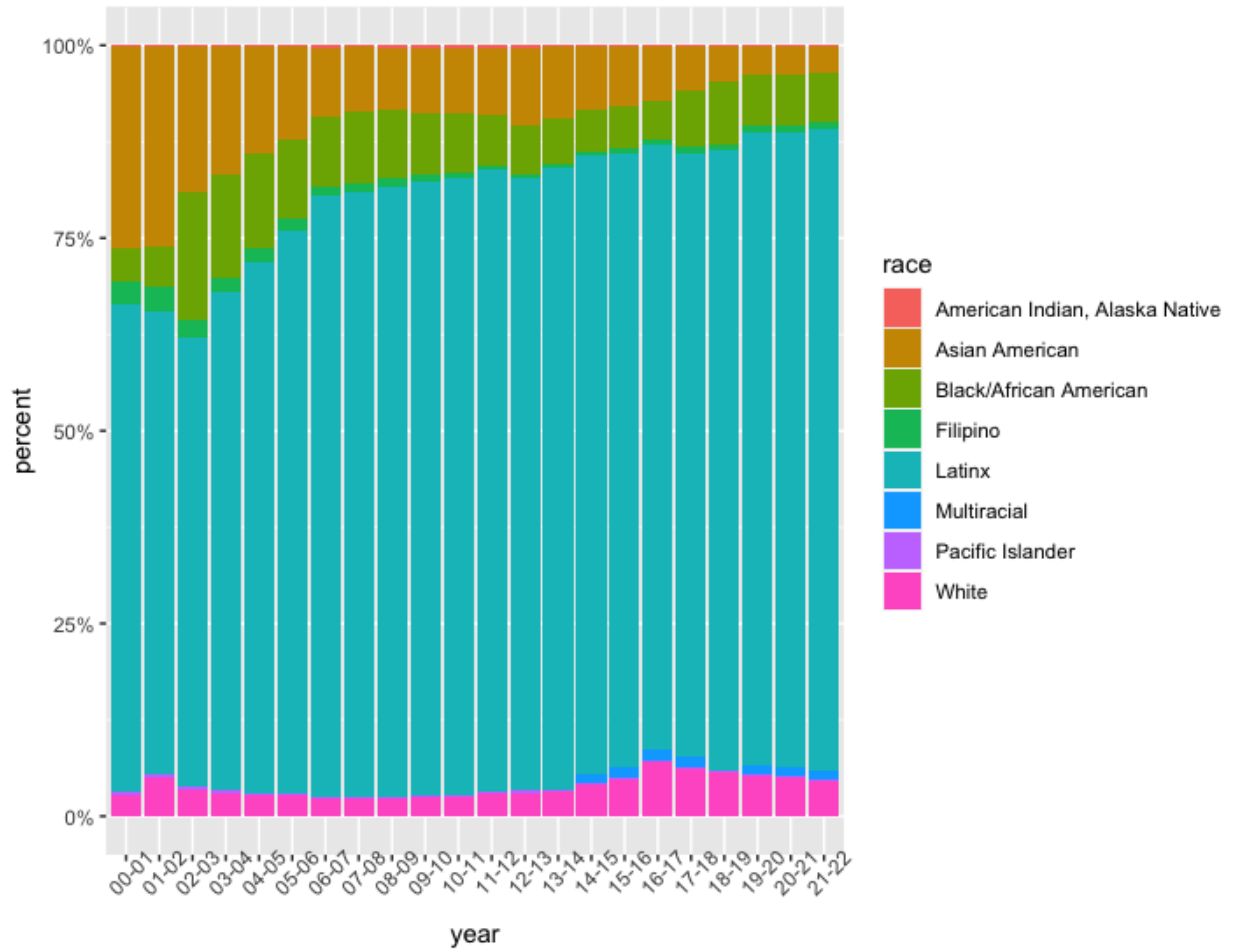
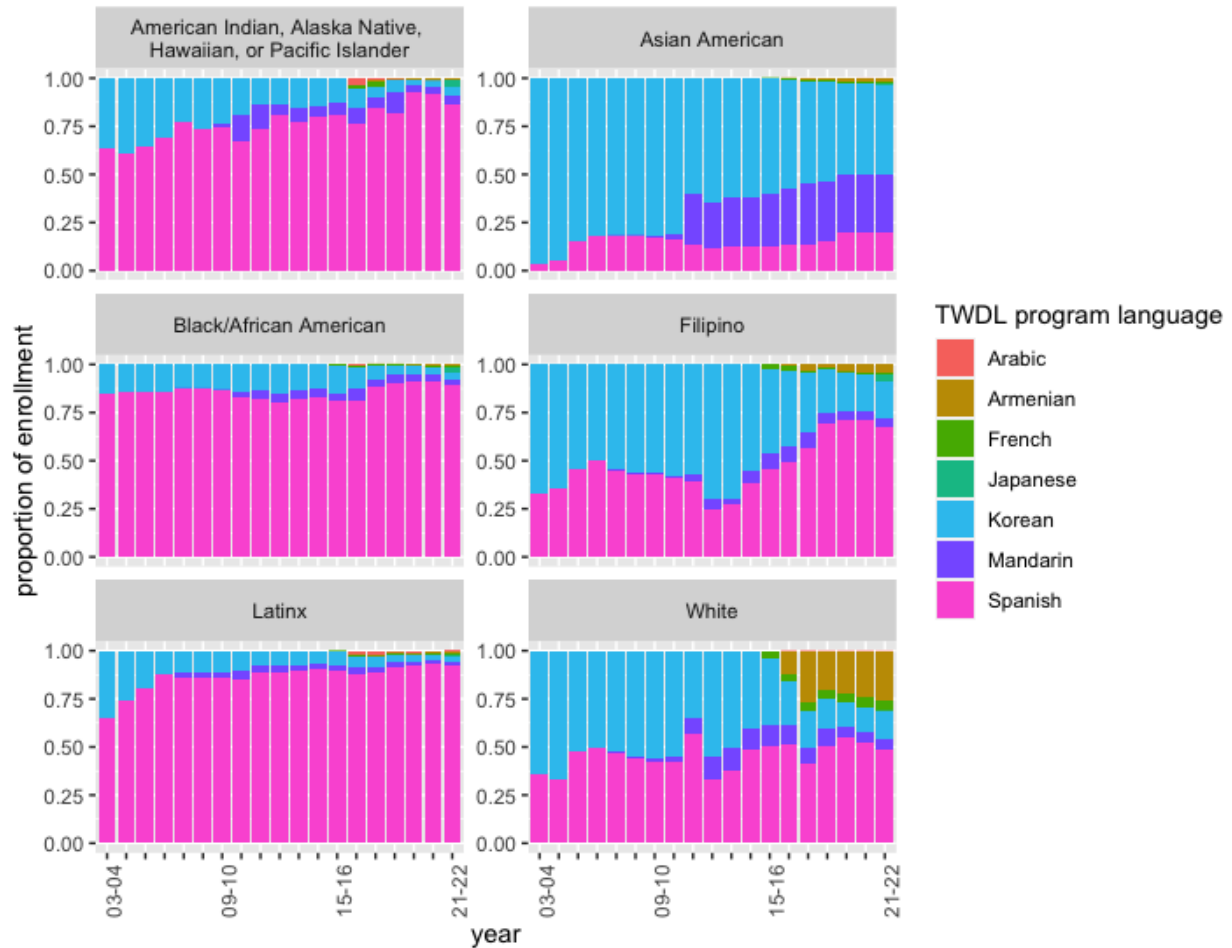


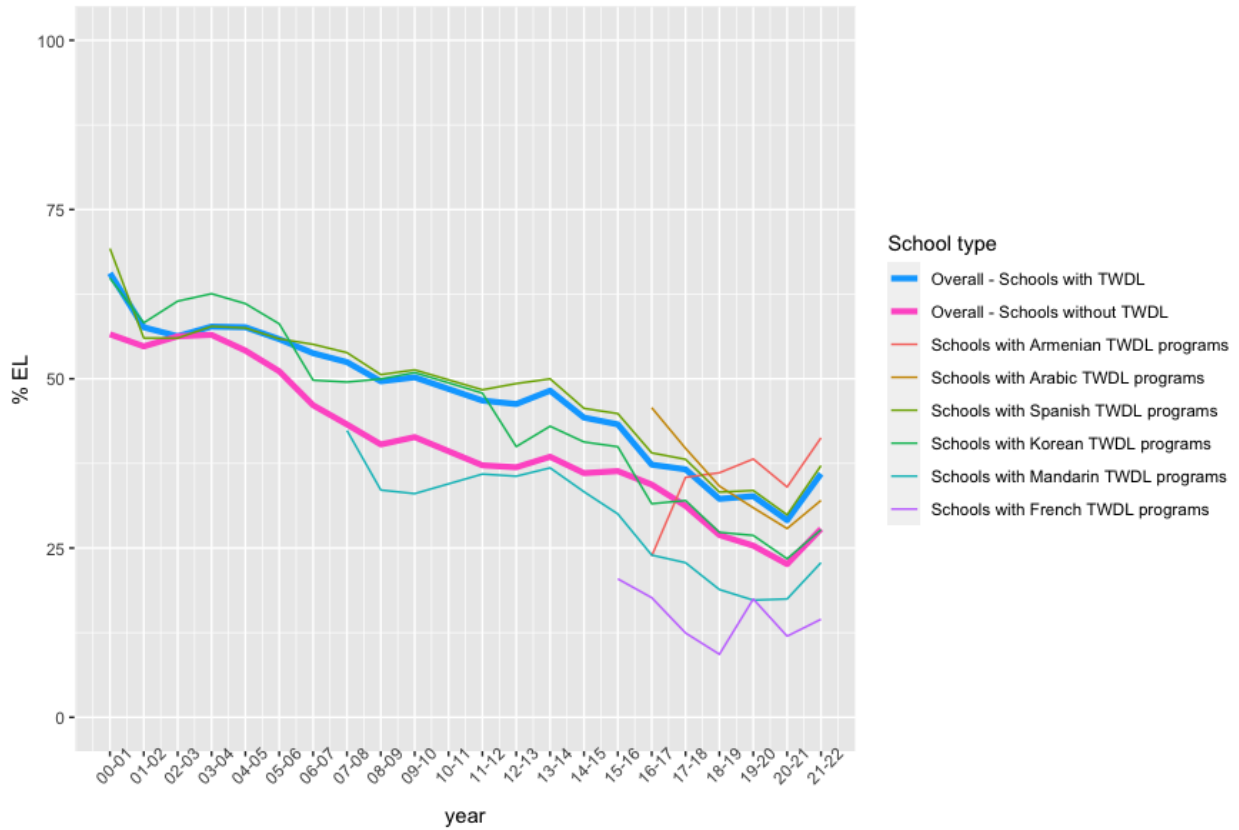
Figure 4: Enrollment in schools with TWDL programs, by student race/ethnicity and TWDL program language



Notes: We exclude years prior to 2003-04 because there were fewer than ten schools with TWDL programs in those years, and enrollment proportions by program language were quite variable. Four LAUSD elementary schools have two TWDL programs with different languages; this graph only includes enrollment counts for a school's oldest TWDL program so as not to double count students.

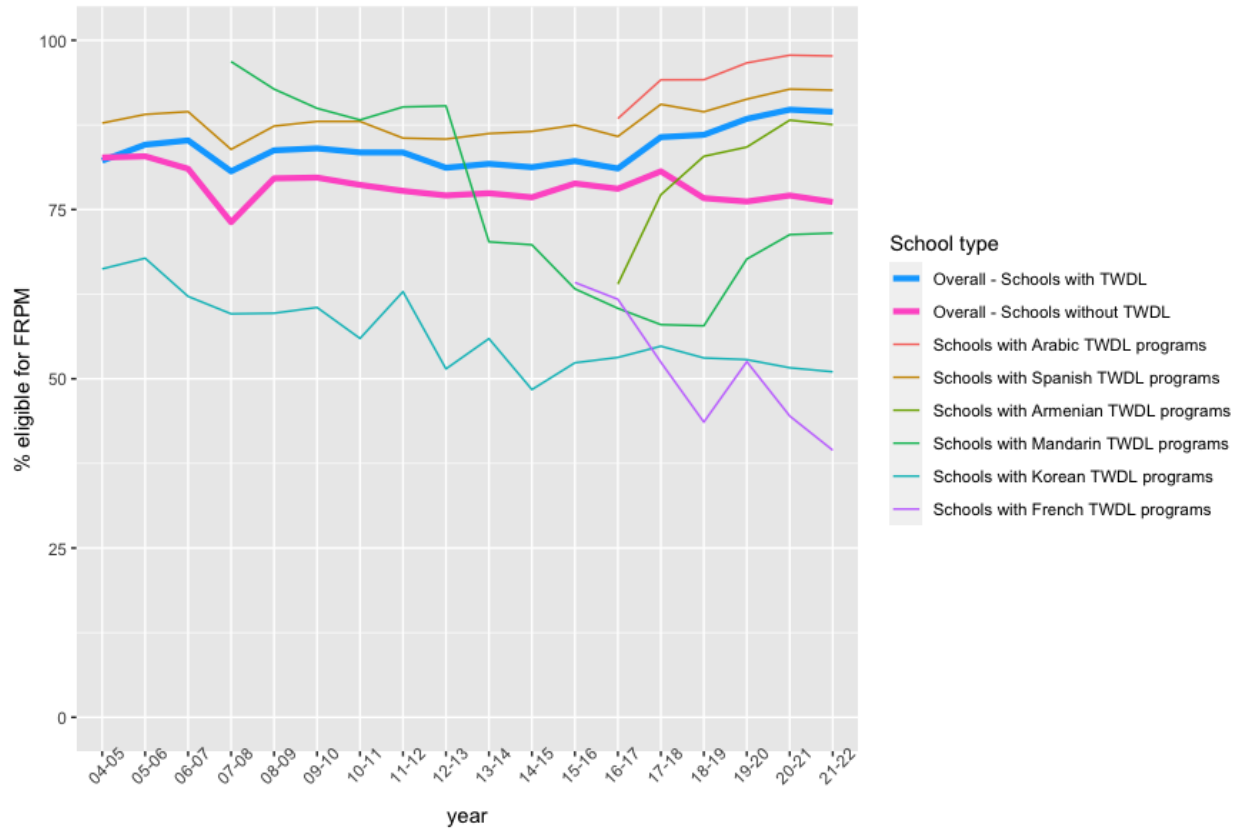


Figure 5: Percent of students identified as English Learners, by TWDL school type



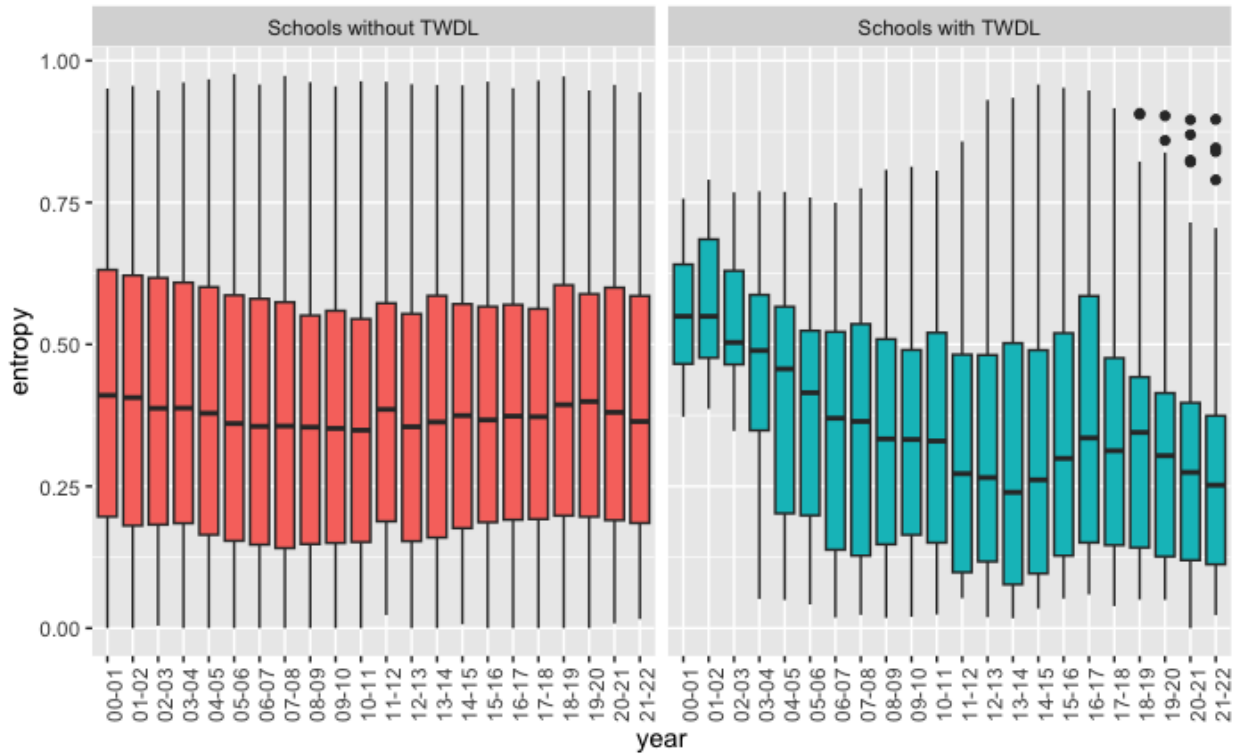
Notes: Enrollment counts by EL status are not available in 2010-11; values are continuously estimated through that year. Four LAUSD elementary schools have two TWDL programs with different languages; this figure includes enrollment counts from those schools towards both of the relevant languages, thus double counting their enrollments.

Figure 6: Percent of students eligible for FRPM, by TWDL school type



Note: Four LAUSD elementary schools have two TWDL programs with different languages; this figure includes enrollment counts from those schools towards both of the relevant languages.

Figure 7: Boxplot of entropy values considering African American, Asian American, Latinx, and white students, by TWDL school type



Note: Dots represent outliers. We also calculate entropy using all available racial/ethnic groups (African American, Asian American, Latinx, white, American Indian/Alaska Native, Filipino, Pacific Islander, and multiracial) and find that median entropy values are lower, but overall trends are consistent.

Figure 8: Decomposed multiracial, language, and economic segregation as measured by Theil's  $H$ , selected years

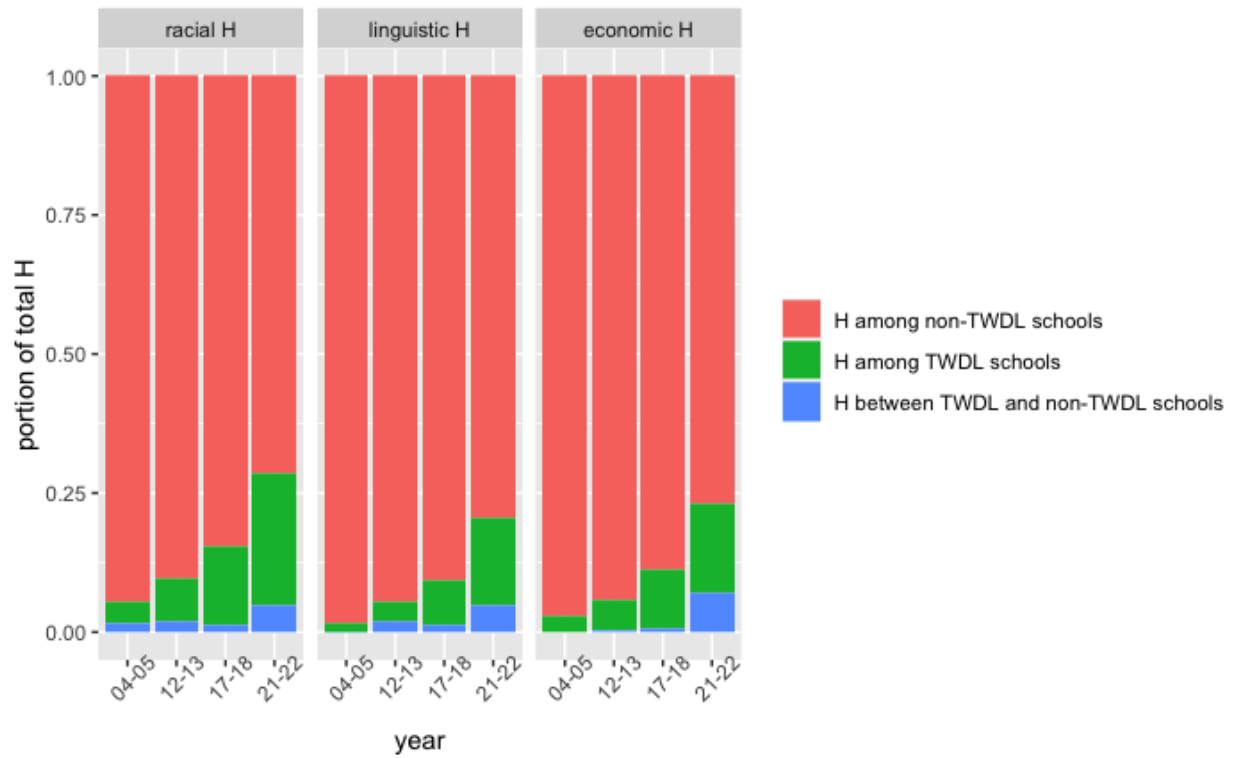
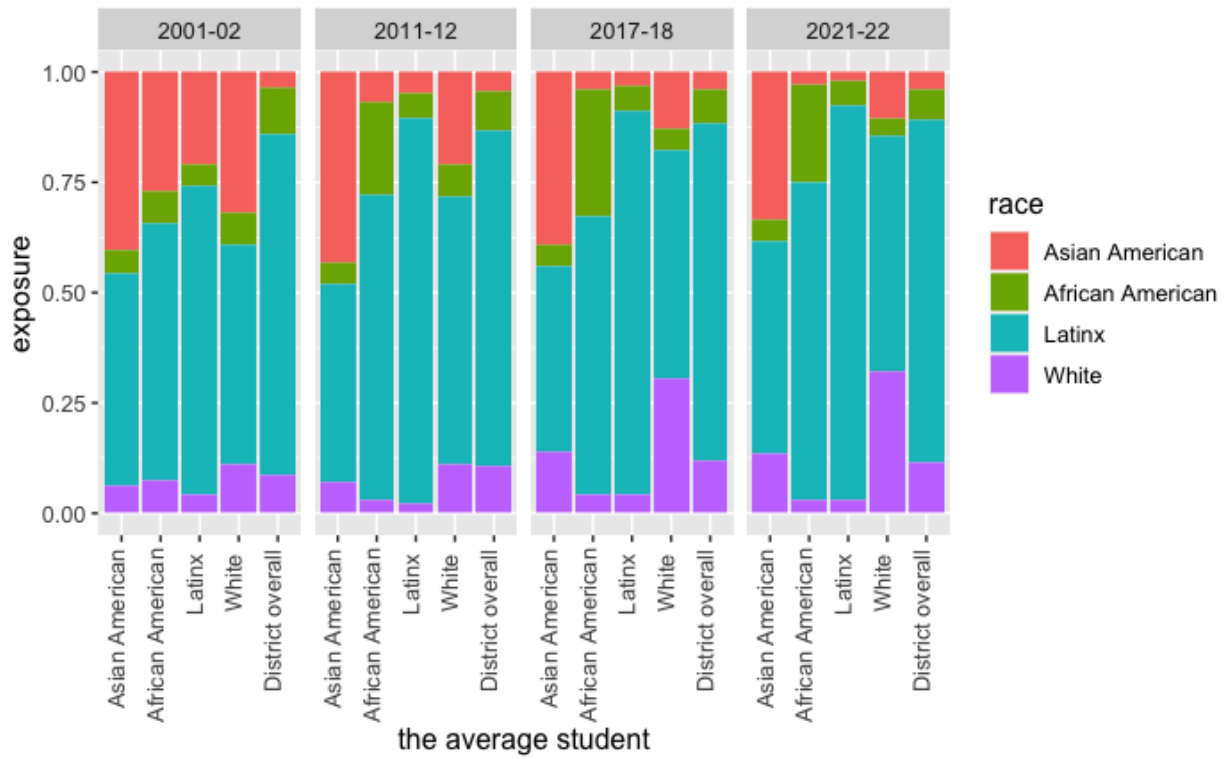
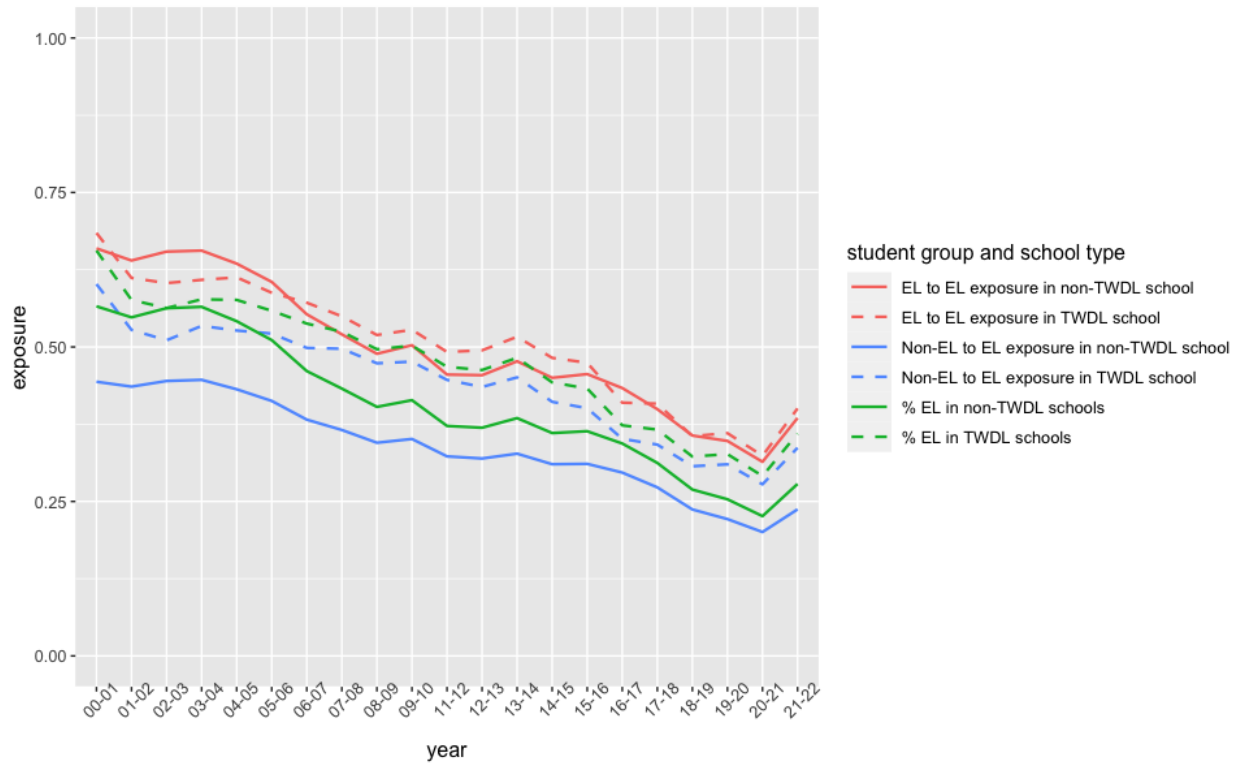


Figure 9: Interracial exposure in selected years for students in schools with TWDL programs



Note: Exposure indices for additional years are presented in appendix figure A8.

Figure 10: Exposure to English Learner students, by student EL status and TWDL school type



Note: Enrollment counts by EL status are not available in 2010-11; values are estimated continuously through that year.

Figure 11: Exposure to Free and Reduced-Price Meal students, by student FRPM status and TWDL school type

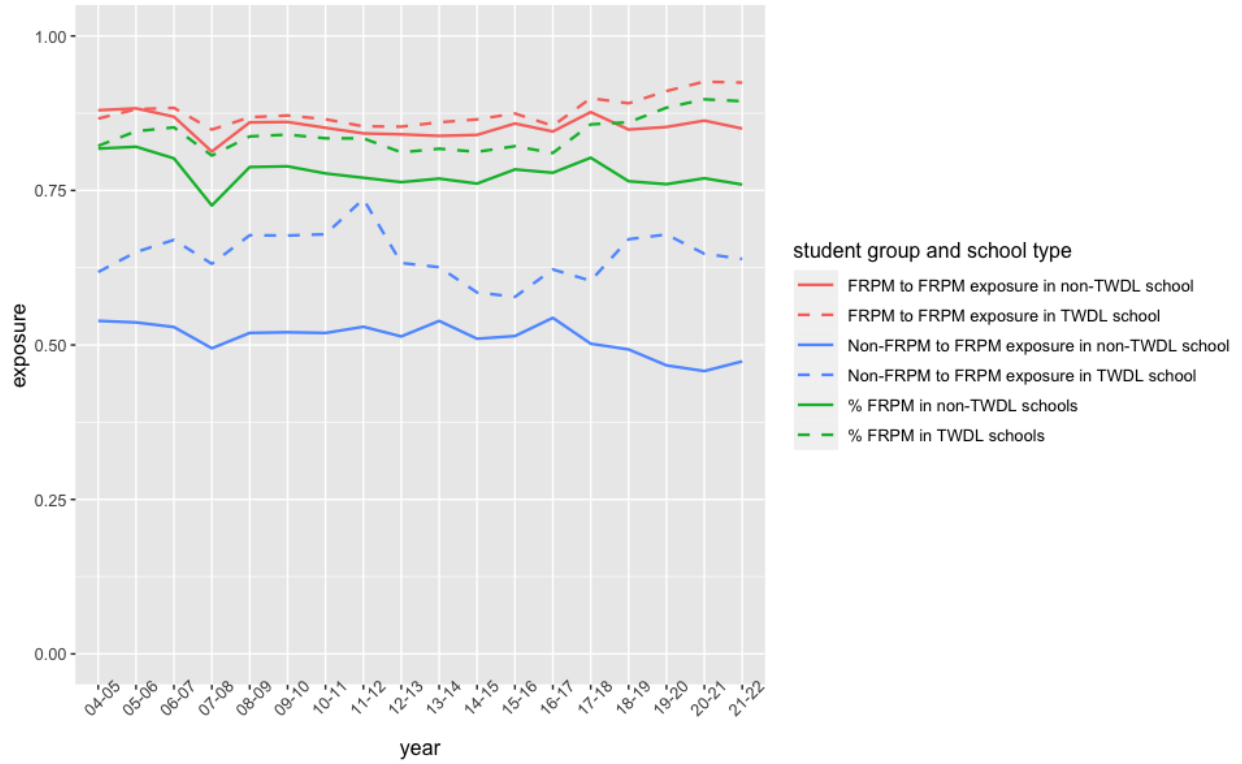
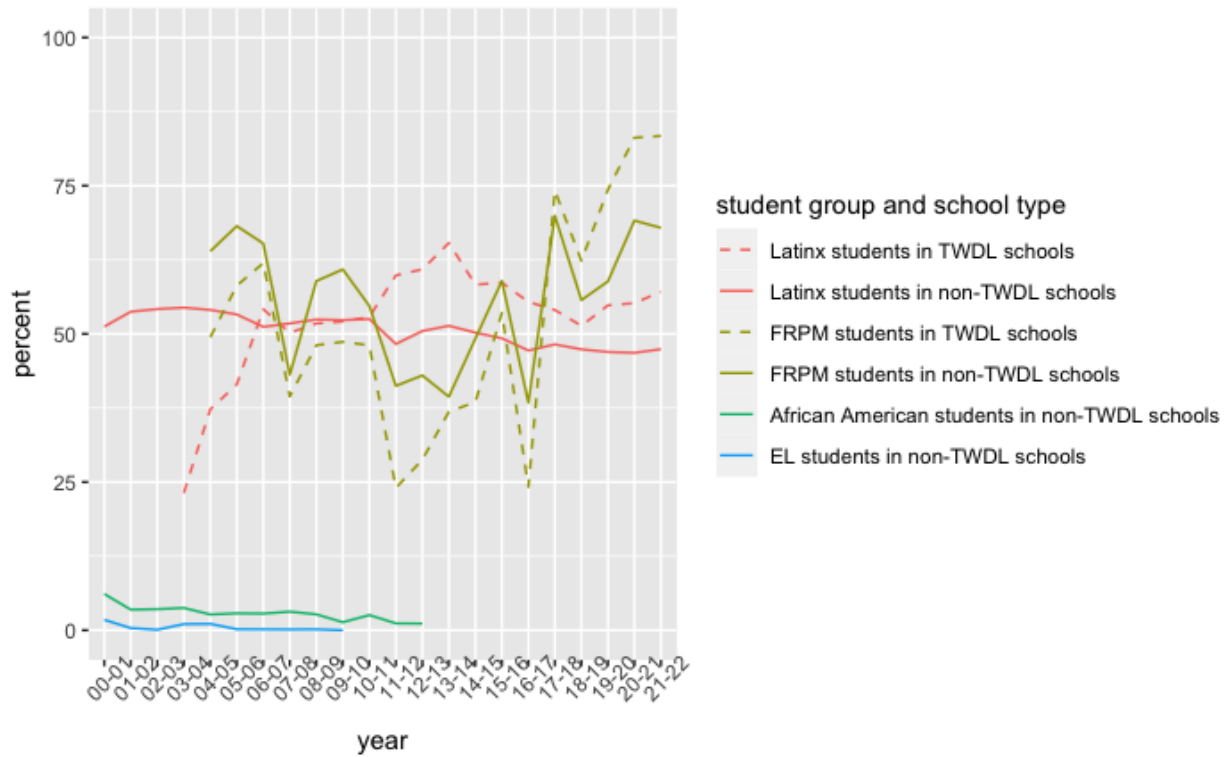


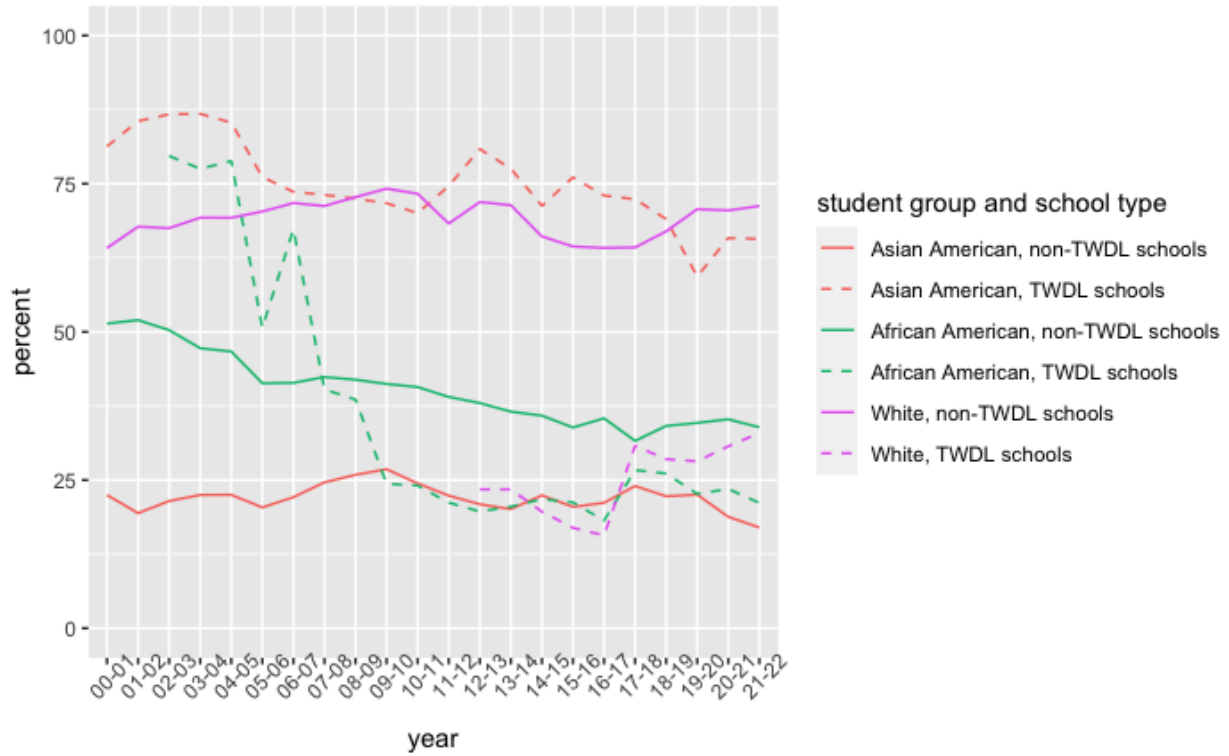
Figure 12: Percentage of students attending absolutely concentrated schools (>90% one group)



Note: Groups not included here do not have any students in absolutely concentrated schools.

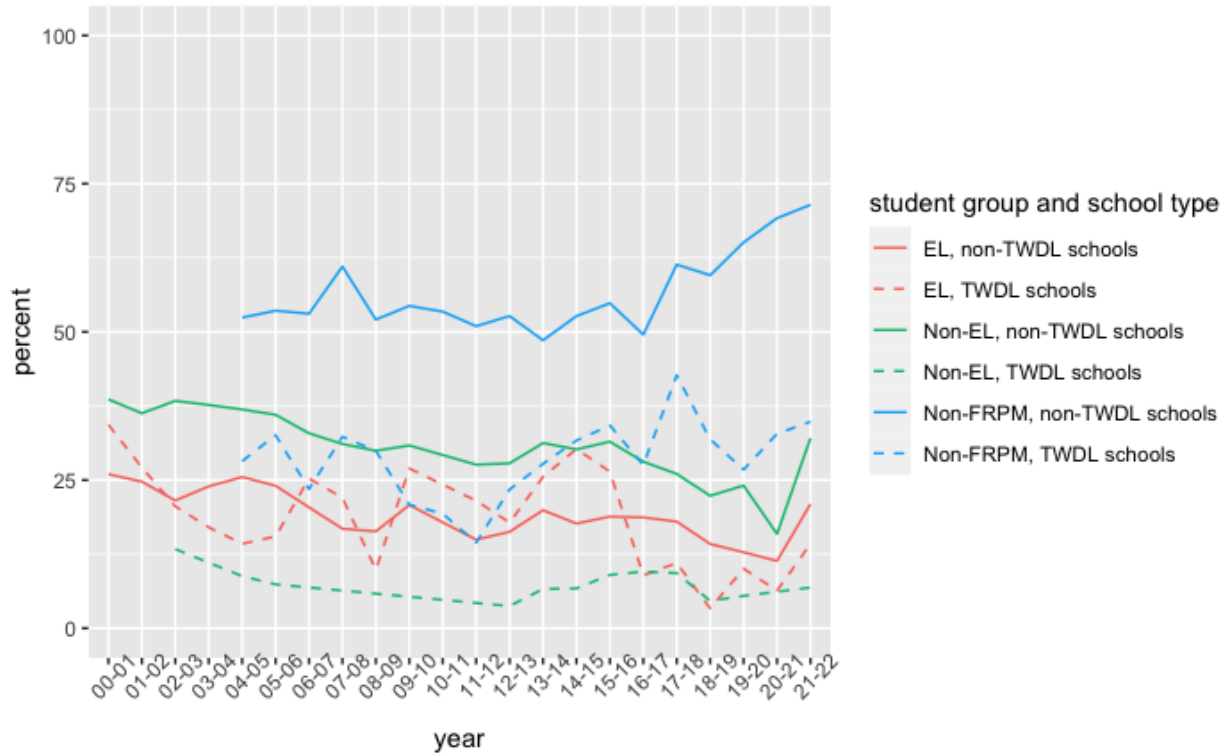


Figure 13: Percentage of students attending racially identifiable schools (group's share in school is greater than 20 percentage points above districtwide share)



Note: Students from other racial groups also attend identifiable schools, but are excluded from this graph to improve legibility.

Figure 14: Percentage of students attending economically or linguistically identifiable schools  
 (group's share in school is greater than 20 percentage points above districtwide share)



Notes: Enrollment counts by EL status are not available from CDE website for 2010-11; values are continuously estimated through that year. Because FRPM students comprise 80% of LAUSD overall, there cannot be schools in which FRPM students are identifiably overrepresented (>100% FRPM).

Table 1. Districtwide multiracial, linguistic, and economic segregation among elementary schools as measured by Theil’s *H*, selected years

	<b>Racial H</b>	<b>Linguistic H</b>	<b>Economic H</b>
<b>2004-05</b>	0.391	0.159	0.300
<b>2012-13</b>	0.393	0.112	0.277
<b>2017-18</b>	0.356	0.107	0.335
<b>2021-22</b>	0.364	0.115	0.378

Note: Total and decomposed H values for all years are presented in Appendix table A2. We also calculate multiracial H using all available racial/ethnic groups (Asian American, African American, Latinx, white, American Indian/Alaska Native, Filipino, Pacific Islander, and Multiracial) and find that H values are higher, but overall trends are consistent.

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## Appendix

Table A1: Number of LAUSD elementary schools in sample

	Number of elementary schools with a two-way TWDL program	Number of elementary schools without a two-way TWDL program	Total number of elementary schools in sample
2000-01	4	424	428
2001-02	6	423	429
2002-03	8	423	431
2003-04	10	422	432
2004-05	13	425	438
2005-06	18	446	464
2006-07	20	450	470
2007-08	22	450	472
2008-09	23	452	475
2009-10	23	452	475
2010-11	25	458	483
2011-12	34	449	483
2012-13	36	457	493
2013-14	43	452	495
2014-15	44	451	495
2015-16	46	449	495
2016-17	53	443	496
2017-18	64	432	496
2018-19	103	393	496
2019-20	130	366	496
2020-21	138	358	496
2021-22	146	349	495

Table A2: Decomposed multiracial, linguistic, and economic segregation among elementary schools as measured by Theil's  $H$ , all years

<b>year</b>	<b>Total H</b>	<b>H between schools with TWDL &amp; schools without TWDL</b>	<b>H among schools without TWDL</b>	<b>H among schools with TWDL</b>	<b>Percent of students enrolled in schools with TWDL</b>
		<b>(percent of total H)</b>	<b>(percent of total H)</b>	<b>(percent of total H)</b>	
<b>Multiracial</b>					
2000-01	0.384	0.005 (1.4%)	0.377 (98.2%)	0.001 (0.4%)	1.2%
2001-02	0.387	0.008 (2.1%)	0.375 (96.9%)	0.004 (1.0%)	1.8%
2002-03	0.388	0.008 (2.1%)	0.370 (95.4%)	0.010 (2.5%)	2.5%
2003-04	0.389	0.007 (1.8%)	0.370 (95.1%)	0.012 (3.2%)	3.0%
2004-05	0.391	0.007 (1.7%)	0.369 (94.3%)	0.015 (4.0%)	3.9%
2005-06	0.391	0.006 (1.5%)	0.367 (94.0%)	0.018 (4.5%)	4.9%
2006-07	0.393	0.005 (1.2%)	0.369 (93.9%)	0.019 (4.9%)	5.5%
2007-08	0.398	0.005 (1.2%)	0.373 (93.6%)	0.021 (5.2%)	6.2%
2008-09	0.400	0.006 (1.4%)	0.374 (93.5%)	0.02 (5.1%)	6.4%
2009-10	0.397	0.006 (1.4%)	0.372 (93.8%)	0.019 (4.8%)	6.3%
2010-11	0.396	0.005 (1.3%)	0.372 (93.9%)	0.019 (4.8%)	6.5%
2011-12	0.368	0.007	0.336	0.025	8.7%

2012-13	0.393	(1.8%) 0.008	(91.3%) 0.355	(6.8%) 0.03	
2013-14	0.389	(2.0%) 0.009	(90.3%) 0.346	(7.7%) 0.034	8.8%
2014-15	0.371	(2.2%) 0.007	(88.9%) 0.331	(8.9%) 0.033	10.3%
2015-16	0.362	(1.9%) 0.007	(89.3%) 0.322	(8.8%) 0.033	10.6%
2016-17	0.353	(2.0%) 0.005	(89.0%) 0.311	(9.1%) 0.037	10.9%
2017-18	0.356	(1.4%) 0.004	(88.2%) 0.301	(10.4%) 0.051	12.4%
2018-19	0.351	(1.1%) 0.010	(84.6%) 0.274	(14.2%) 0.067	15.2%
2019-20	0.358	(2.9%) 0.014	(78.0%) 0.269	(19.1%) 0.074	24.2%
2020-21	0.364	(4.0%) 0.017	(75.2%) 0.267	(20.8%) 0.081	29.6%
2021-22	0.364	(4.6%) 0.017	(73.2%) 0.260	(22.2%) 0.087	31.1%
		(4.7%)	(71.4%)	(23.9%)	33.0%
<b>year</b>	<b>Total H</b>	<b>H between schools with TWDL &amp; schools without TWDL</b>	<b>H among schools without TWDL</b>	<b>H among schools with TWDL</b>	<b>Percent of students enrolled in schools with TWDL</b>
		<b>(percent of total H)</b>	<b>(percent of total H)</b>	<b>(percent of total H)</b>	
<b>EL</b>					
2000-01	0.171	0.000	0.17	0.001	
		(0.1%)	(99.4%)	(0.4%)	1.2%
2001-02	0.161	0.000	0.16	0.001	
		(0.1%)	(99.4%)	(0.7%)	1.8%
2002-03	0.164	0.000	0.162	0.002	
		(0.1%)	(99.1%)	(1.1%)	2.5%



2003-04	0.163	0.000 (0.1%)	0.161 (99.1%)	0.002 (1.0%)	3.0%
2004-05	0.159	0.000 (0.1%)	0.156 (98.4%)	0.002 (1.5%)	3.9%
2005-06	0.150	0.000 (0.2%)	0.147 (98.2%)	0.002 (1.6%)	4.9%
2006-07	0.135	0.000 (0.3%)	0.132 (97.5%)	0.003 (2.2%)	5.5%
2007-08	0.124	0.001 (0.8%)	0.121 (97.3%)	0.002 (1.9%)	6.2%
2008-09	0.117	0.002 (1.3%)	0.113 (96.8%)	0.002 (1.9%)	6.4%
2009-10	0.122	0.001 (1.1%)	0.118 (96.9%)	0.002 (2.0%)	6.3%
2011-12	0.109	0.002 (1.9%)	0.104 (95.3%)	0.003 (2.8%)	8.7%
2012-13	0.112	0.002 (1.7%)	0.106 (94.7%)	0.004 (3.6%)	8.8%
2013-14	0.122	0.003 (2.3%)	0.114 (93.4%)	0.005 (4.3%)	10.3%
2014-15	0.116	0.002 (1.5%)	0.108 (93.4%)	0.006 (5.1%)	10.6%
2015-16	0.119	0.001 (1.0%)	0.112 (93.7%)	0.006 (5.3%)	10.9%
2016-17	0.112	0.000 (0.4%)	0.105 (94.2%)	0.006 (5.4%)	12.4%
2017-18	0.107	0.001 (0.8%)	0.097 (91.0%)	0.009 (8.2%)	15.2%
2018-19	0.099	0.002 (2.0%)	0.086 (87.3%)	0.011 (10.7%)	24.2%
2019-20	0.103	0.004 (4.1%)	0.085 (82.7%)	0.014 (13.2%)	29.6%
2020-21	0.097	0.004	0.079	0.014	

2021-22	0.115	(4.2%) 0.006 (4.9%)	(81.6%) 0.091 (79.2%)	(14.2%) 0.018 (15.9%)	31.1%  33.0%
<b>year</b>	<b>Total H</b>	<b>H between schools with TWDL &amp; schools without TWDL</b>	<b>H among schools without TWDL</b>	<b>H among schools with TWDL</b>	<b>Percent of students enrolled in schools with TWDL</b>
		<b>(percent of total H)</b>	<b>(percent of total H)</b>	<b>(percent of total H)</b>	
<b>FRPM</b>					
2004-05	0.300	0.000 (0.1%)	0.292 (97.2%)	0.009 (2.9%)	3.9%
2005-06	0.311	0.000 (0.1%)	0.300 (96.6%)	0.010 (3.3%)	4.9%
2006-07	0.295	0.001 (0.2%)	0.285 (96.7%)	0.009 (3.1%)	5.5%
2007-08	0.274	0.002 (0.7%)	0.262 (95.6%)	0.010 (3.7%)	6.2%
2008-09	0.29	0.001 (0.3%)	0.279 (96.4%)	0.010 (3.3%)	6.4%
2009-10	0.289	0.001 (0.2%)	0.279 (96.5%)	0.009 (3.2%)	6.3%
2010-11	0.281	0.001 (0.2%)	0.271 (96.4%)	0.009 (3.4%)	6.5%
2011-12	0.26	0.002 (0.7%)	0.251 (96.4%)	0.008 (2.9%)	8.7%
2012-13	0.277	0.001 (0.4%)	0.261 (94.3%)	0.015 (5.3%)	8.8%
2013-14	0.253	0.001 (0.3%)	0.234 (92.6%)	0.018 (7.1%)	10.3%
2014-15	0.286	0.001 (0.4%)	0.262 (91.6%)	0.023 (7.9%)	10.6%
2015-16	0.297	0.000 (0.1%)	0.272 (91.5%)	0.025 (8.4%)	10.9%

2016-17	0.25	0.001 (0.2%)	0.227 (90.7%)	0.023 (9.1%)	12.4%
2017-18	0.335	0.003 (0.7%)	0.297 (88.7%)	0.035 (10.5%)	15.2%
2018-19	0.302	0.010 (3.4%)	0.254 (84.2%)	0.037 (12.4%)	24.2%
2019-20	0.34	0.021 (6.2%)	0.273 (80.3%)	0.046 (13.5%)	29.6%
2020-21	0.373	0.025 (6.6%)	0.292 (78.3%)	0.056 (15.1%)	31.1%
2021-22	0.378	0.027 (7.1%)	0.290 (76.8%)	0.061 (16.1%)	33.0%

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Note: Enrollment counts by EL status are not available for 2010-11. Enrollment counts by FRPM eligibility are not available prior to 2004-05.

Table A3: Decomposed multiracial and language segregation among 1<sup>st</sup> graders as measured by Theil's  $H$ , all years

<b>year</b>	<b>Total H</b>	<b>H between schools with TWDL &amp; schools without TWDL</b>	<b>H among schools without TWDL</b>	<b>H among schools with TWDL</b>	<b>Percent of students enrolled in schools with TWDL</b>
		<b>(percent of total H)</b>	<b>(percent of total H)</b>	<b>(percent of total H)</b>	
<b>Multiracial</b>					
2000-01	0.399	0.007 (1.6%)	0.391 (98.0%)	0.002 (0.4%)	1.3%
2001-02	0.401	0.009 (2.4%)	0.387 (96.6%)	0.004 (1.0%)	1.8%
2002-03	0.401	0.008 (2.1%)	0.382 (95.5%)	0.010 (2.5%)	2.5%
2003-04	0.406	0.008 (2.1%)	0.384 (94.7%)	0.013 (3.3%)	3.1%
2004-05	0.407	0.007 (1.7%)	0.383 (94.2%)	0.017 (4.1%)	4.1%
2005-06	0.412	0.007 (1.6%)	0.387 (94.0%)	0.018 (4.3%)	5.0%
2006-07	0.416	0.005 (1.2%)	0.390 (93.8%)	0.021 (5.0%)	5.6%
2007-08	0.417	0.005 (1.3%)	0.391 (93.7%)	0.021 (5.1%)	6.3%
2008-09	0.424	0.006 (1.3%)	0.396 (93.4%)	0.022 (5.2%)	6.5%
2009-10	0.417	0.006 (1.5%)	0.390 (93.5%)	0.021 (4.9%)	6.5%
2010-11	0.415	0.006 (1.6%)	0.385 (92.9%)	0.023 (5.6%)	6.6%
2011-12	0.384	0.006 (1.7%)	0.356 (92.5%)	0.022 (5.9%)	8.3%

2012-13	0.417	0.008 (2.0%)	0.375 (90.0%)	0.033 (7.9%)	9.0%
2013-14	0.406	0.007 (1.7%)	0.360 (88.8%)	0.038 (9.5%)	10.6%
2014-15	0.401	0.008 (1.9%)	0.355 (88.5%)	0.039 (9.7%)	10.9%
2015-16	0.362	0.007 (2.0%)	0.320 (88.4%)	0.035 (9.6%)	11.1%
2016-17	0.360	0.006 (1.5%)	0.318 (88.3%)	0.036 (10.1%)	12.5%
2017-18	0.384	0.005 (1.4%)	0.320 (83.3%)	0.059 (15.3%)	16.0%
2018-19	0.391	0.011 (2.8%)	0.303 (77.5%)	0.077 (19.7%)	24.5%
2019-20	0.410	0.016 (3.9%)	0.302 (73.6%)	0.092 (22.5%)	30.0%
2020-21	0.404	0.017 (4.2%)	0.291 (71.9%)	0.096 (23.8%)	31.1%
2021-22	0.403	0.019 (4.8%)	0.286 (71.0%)	0.097 (24.2%)	33.1%
<b>year</b>	<b>Total H</b>	<b>H between schools with TWDL &amp; schools without TWDL</b>	<b>H among schools without TWDL</b>	<b>H among schools with TWDL</b>	<b>Percent of students enrolled in schools with TWDL</b>
		<b>(percent of total H)</b>	<b>(percent of total H)</b>	<b>(percent of total H)</b>	
<b>EL</b>					
2000-01	0.197	0.001 (0.4%)	0.195 (99.2%)	0.001 (0.4%)	1.3%
2001-02	0.192	0.000 (0.1%)	0.191 (99.5%)	0.001 (0.5%)	1.9%
2002-03	0.192	0.000 (0.0%)	0.189 (98.8%)	0.002 (1.2%)	2.6%

2003-04	0.179	0.000 (0.0%)	0.177 (98.6%)	0.003 (1.4%)	3.1%
2004-05	0.165	0.000 (0.1%)	0.161 (98.0%)	0.003 (1.9%)	4.0%
2005-06	0.160	0.000 (0.2%)	0.157 (97.9%)	0.003 (1.9%)	5.0%
2006-07	0.165	0.001 (0.6%)	0.161 (97.6%)	0.003 (1.8%)	5.5%
2007-08	0.171	0.002 (1.0%)	0.167 (97.3%)	0.003 (1.7%)	6.2%
2008-09	0.160	0.002 (1.4%)	0.154 (96.3%)	0.004 (2.3%)	6.4%
2009-10	0.166	0.002 (1.3%)	0.160 (96.9%)	0.003 (1.8%)	6.4%
2011-12	0.178	0.004 (2.0%)	0.169 (94.6%)	0.006 (3.4%)	8.2%
2012-13	0.163	0.003 (1.7%)	0.152 (93.6%)	0.008 (4.7%)	9.0%
2013-14	0.165	0.002 (1.2%)	0.155 (93.7%)	0.008 (5.1%)	10.5%
2014-15	0.167	0.003 (1.8%)	0.154 (92.0%)	0.010 (6.2%)	10.8%
2015-16	0.156	0.002 (1.0%)	0.145 (92.6%)	0.010 (6.3%)	11.0%
2016-17	0.156	0.002 (1.0%)	0.143 (92.2%)	0.011 (6.8%)	12.4%
2017-18	0.155	0.002 (1.6%)	0.139 (90.0%)	0.013 (8.4%)	15.8%
2018-19	0.129	0.004 (2.7%)	0.109 (84.5%)	0.017 (12.8%)	24.3%
2019-20	0.125	0.007 (5.8%)	0.097 (77.6%)	0.021 (16.6%)	29.4%

2020-21	0.146	0.006 (4.1%)	0.118 (80.6%)	0.022 (15.3%)	30.5%
2021-22	0.151	0.007 (4.6%)	0.118 (77.9%)	0.027 (17.6%)	32.4%

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Figure A1: LAUSD total enrollment (all grades), by race/ethnicity

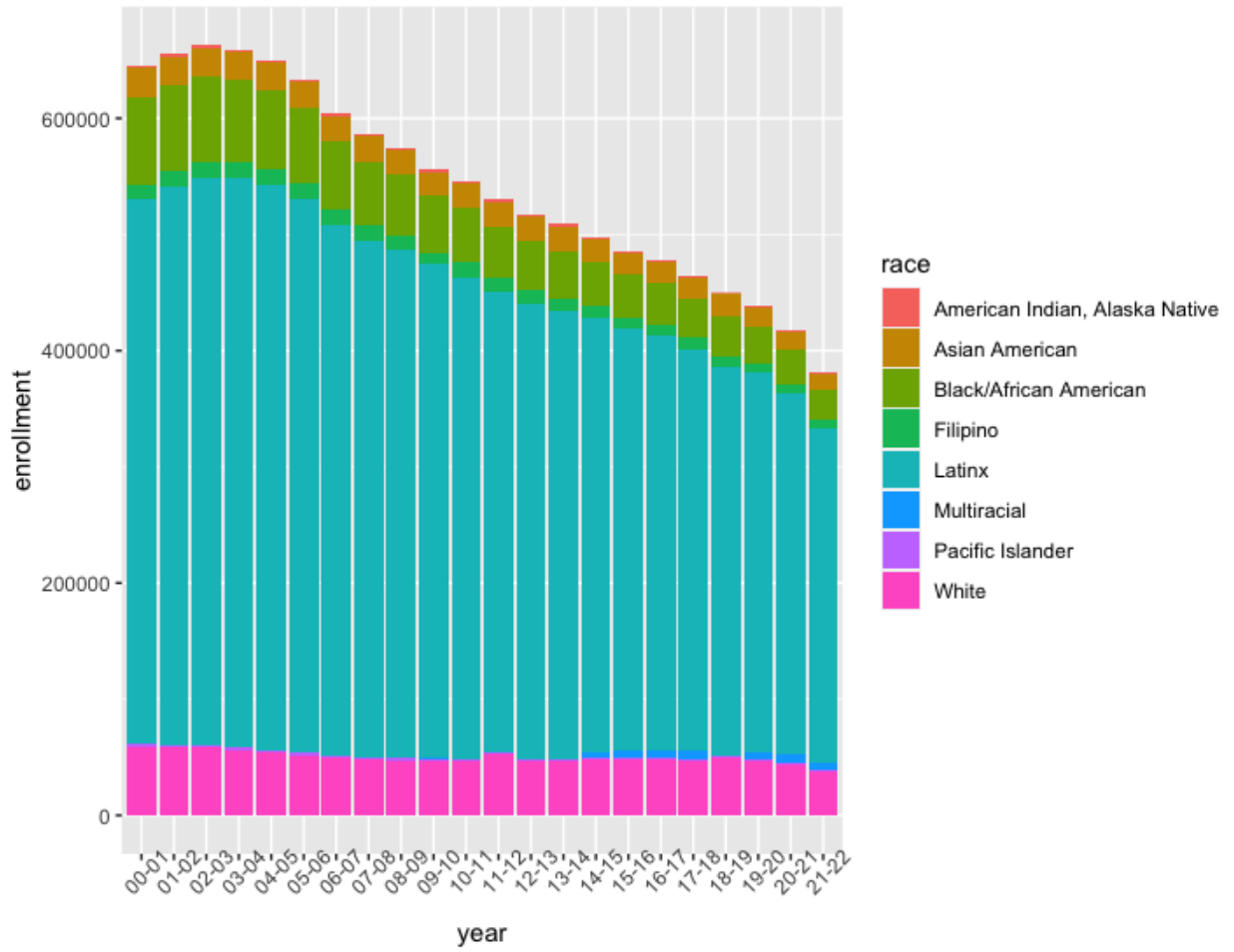




Figure A2: Elementary enrollment counts in schools with TWDL programs, by student race/ethnicity

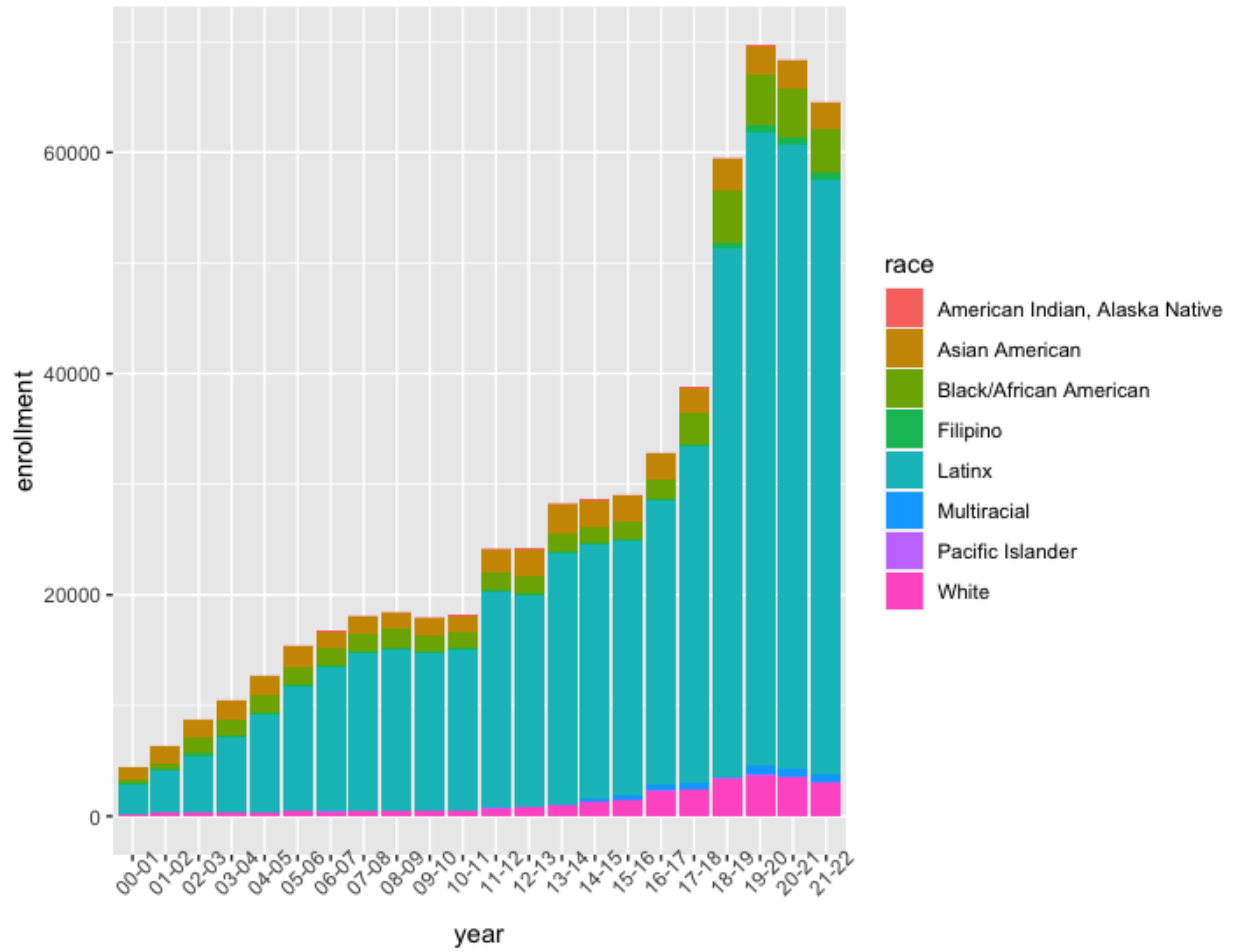
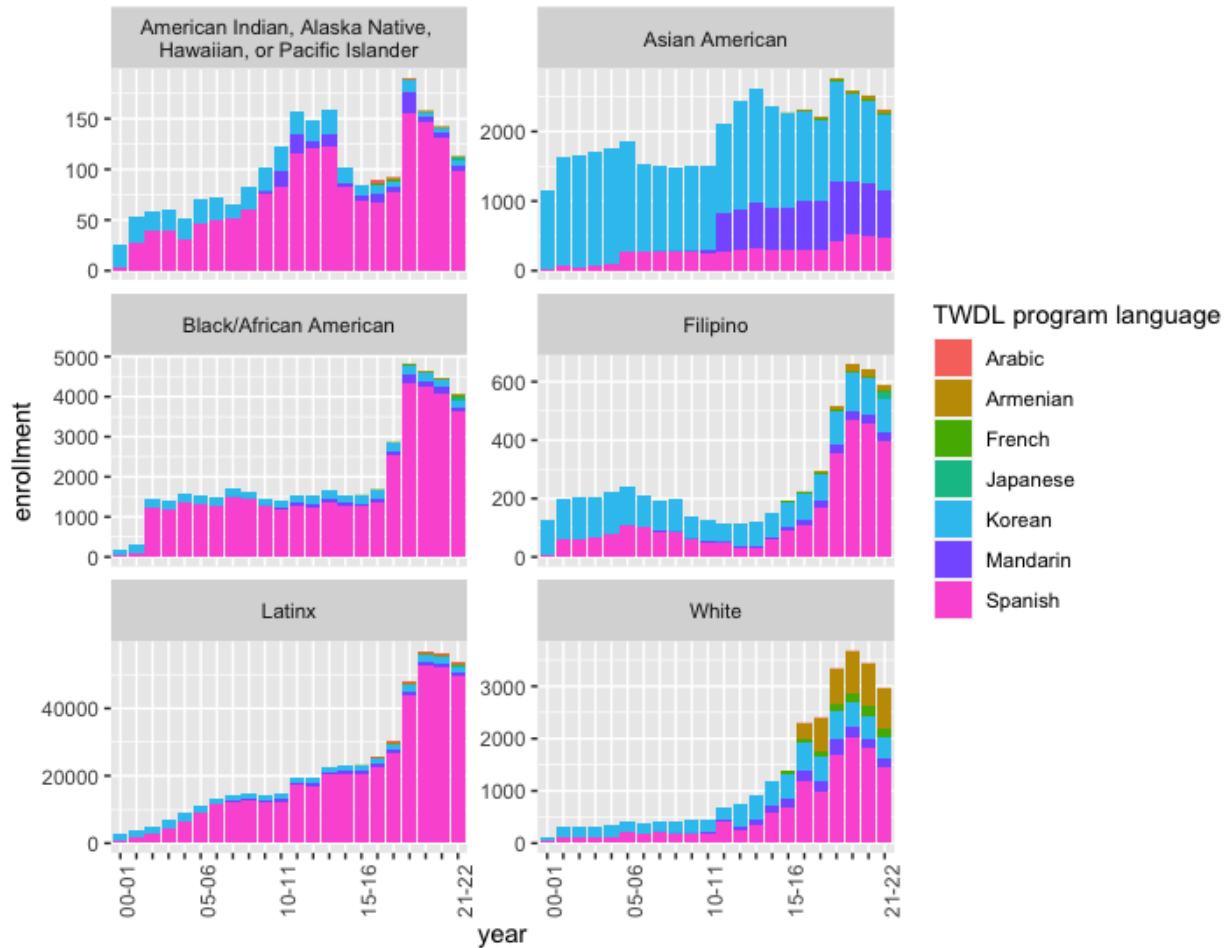
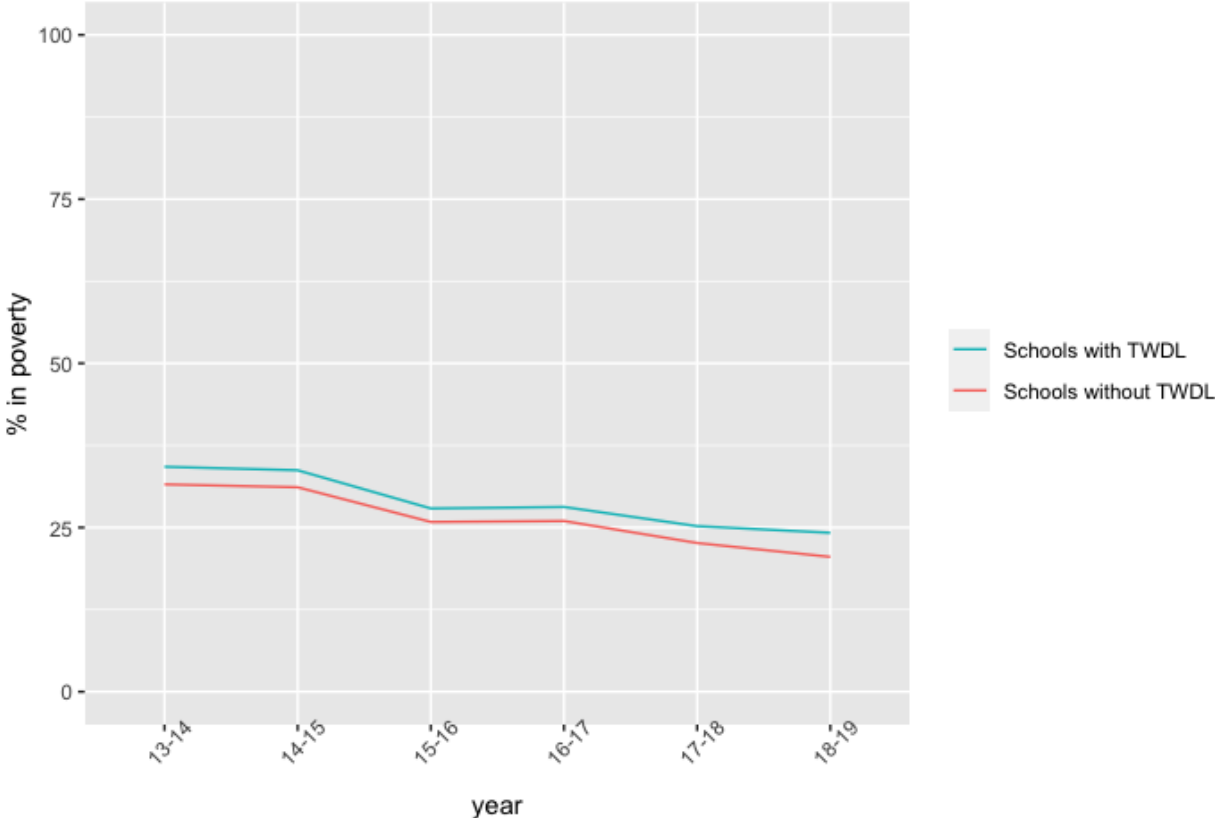


Figure A3: Enrollments in schools with TWDL programs, by student race/ethnicity and TWDL program language



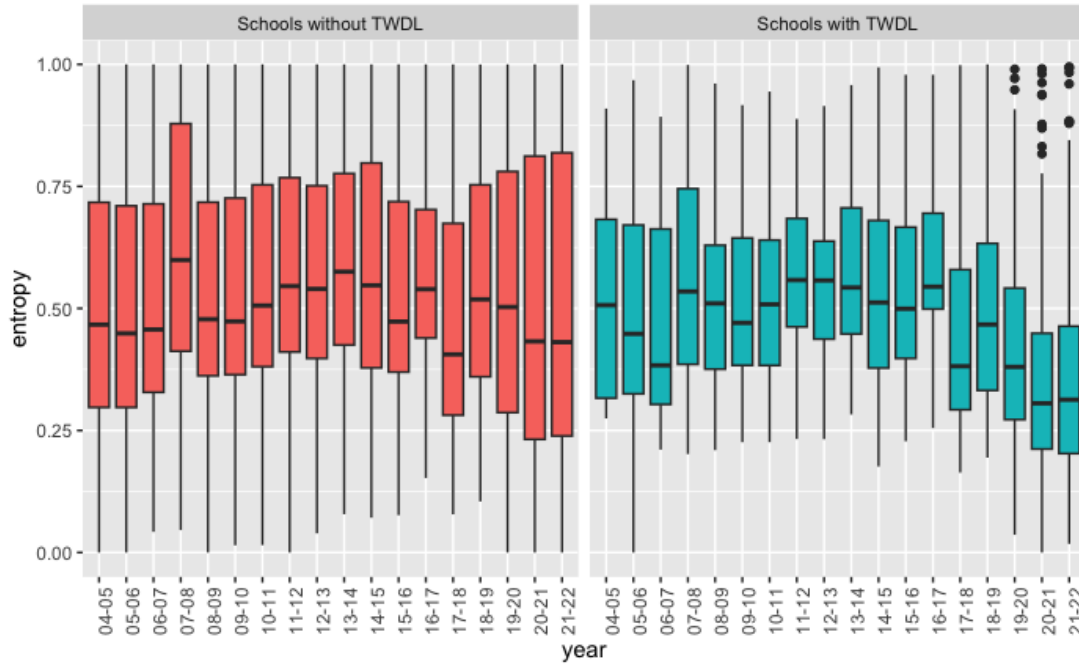
Notes: The scale of the y-axis varies by racial/ethnic subgroup. Four LAUSD elementary schools have two TWDL programs with different languages; this graph only includes enrollment counts for a school's oldest TWDL program so as not to double count students.

Figure A4: Modified estimated percentage of students living in poverty



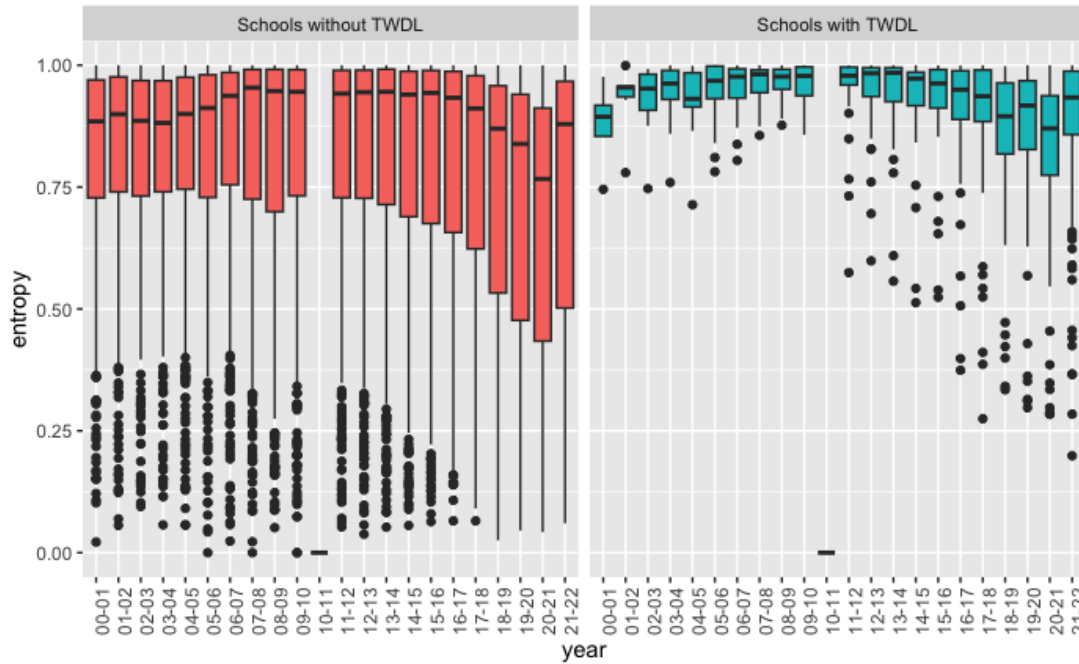
Note: Data come from the Urban Institute (Gutierrez et al., 2022).

Figure A5: Entropy values considering students' eligibility for FRPM, by school type



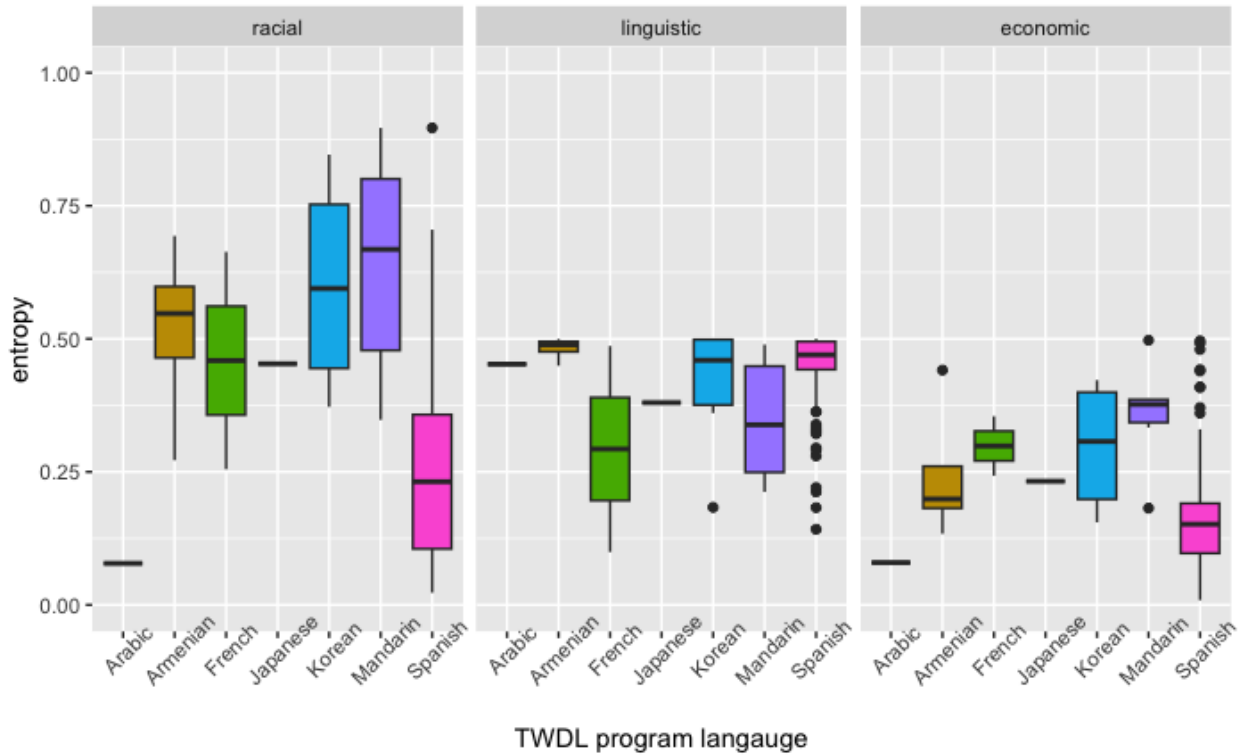
Notes: Counts of FRPM eligible students are not available prior to 2004-05. Dots represent outliers.

Figure A6: Entropy values considering students' EL status, by school type



Note: Enrollment counts by EL status are not available in 2010-11. Dots represent outliers.

Figure A7: Racial, linguistic, and economic entropy values for schools with TWDL programs in 2021-22, by program language



Note: Four LAUSD elementary schools have two TWDL programs with different languages; two of the schools have a Mandarin and a Spanish program, one has a Spanish and a Korean program, and one has a Spanish and an Armenian program. This figure includes enrollment counts from those schools towards both of the relevant languages.

Figure A8: Interracial exposure for students in schools with TWDL programs

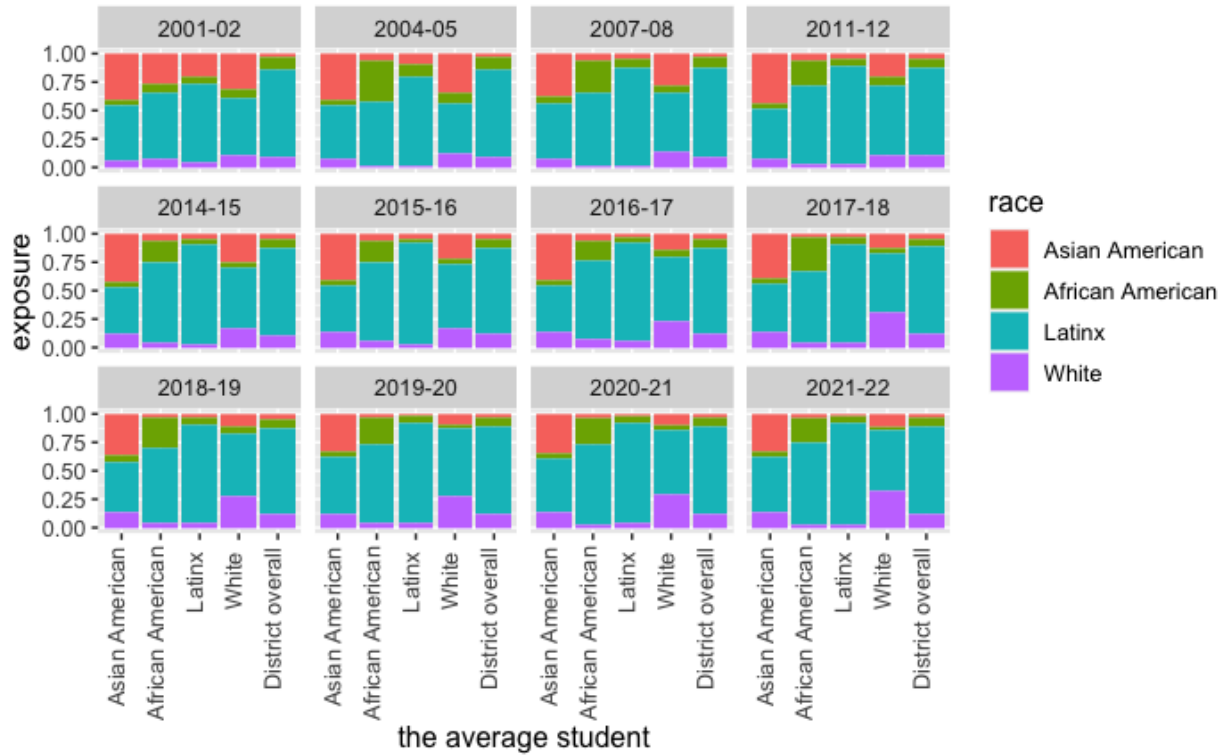


Figure A9: Interracial exposure for students in schools without TWDL programs

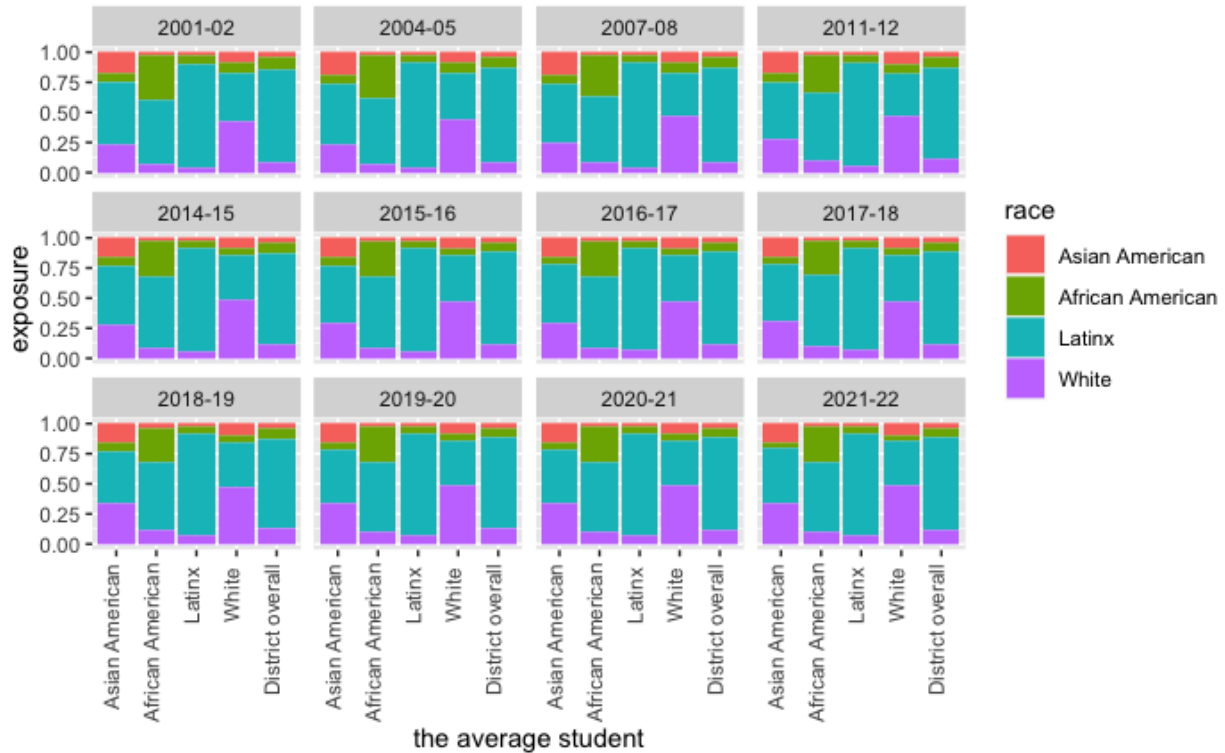


Figure A10: Interracial exposure for 1<sup>st</sup> grade students in schools with TWDL programs

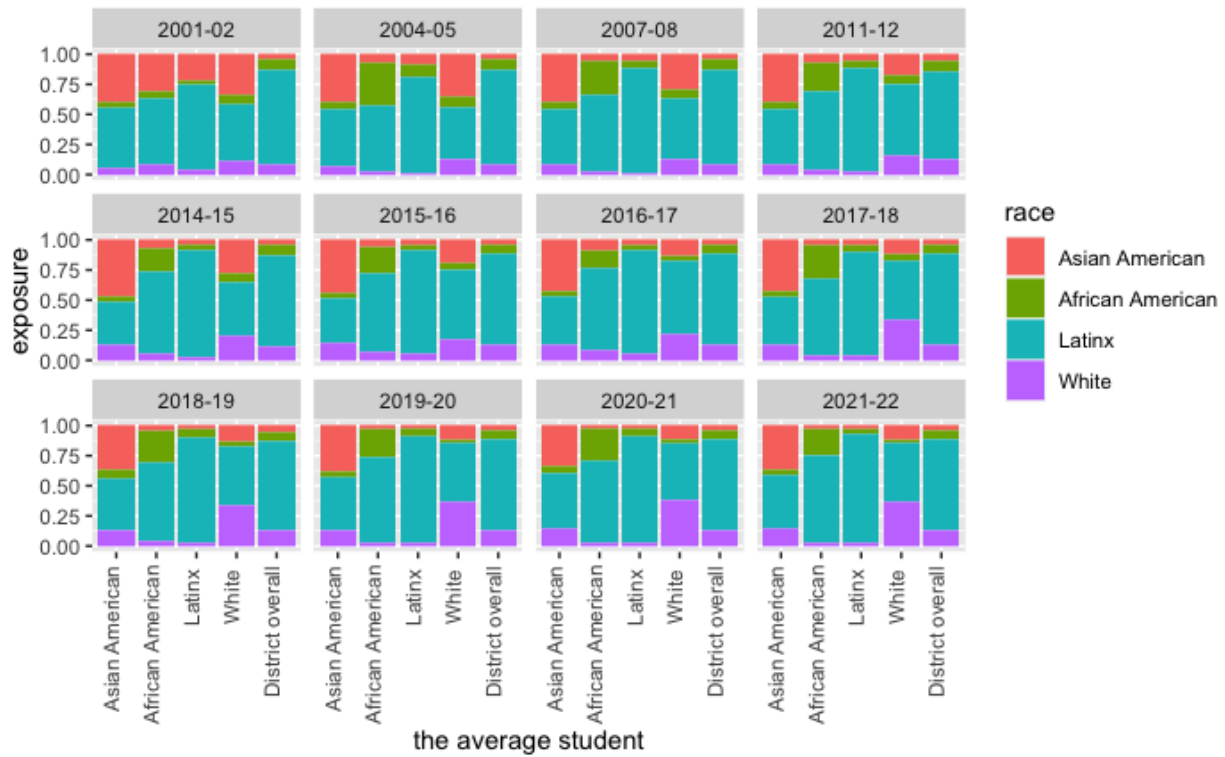


Figure A11: Interracial exposure for 1<sup>st</sup> grade students in schools without TWDL programs

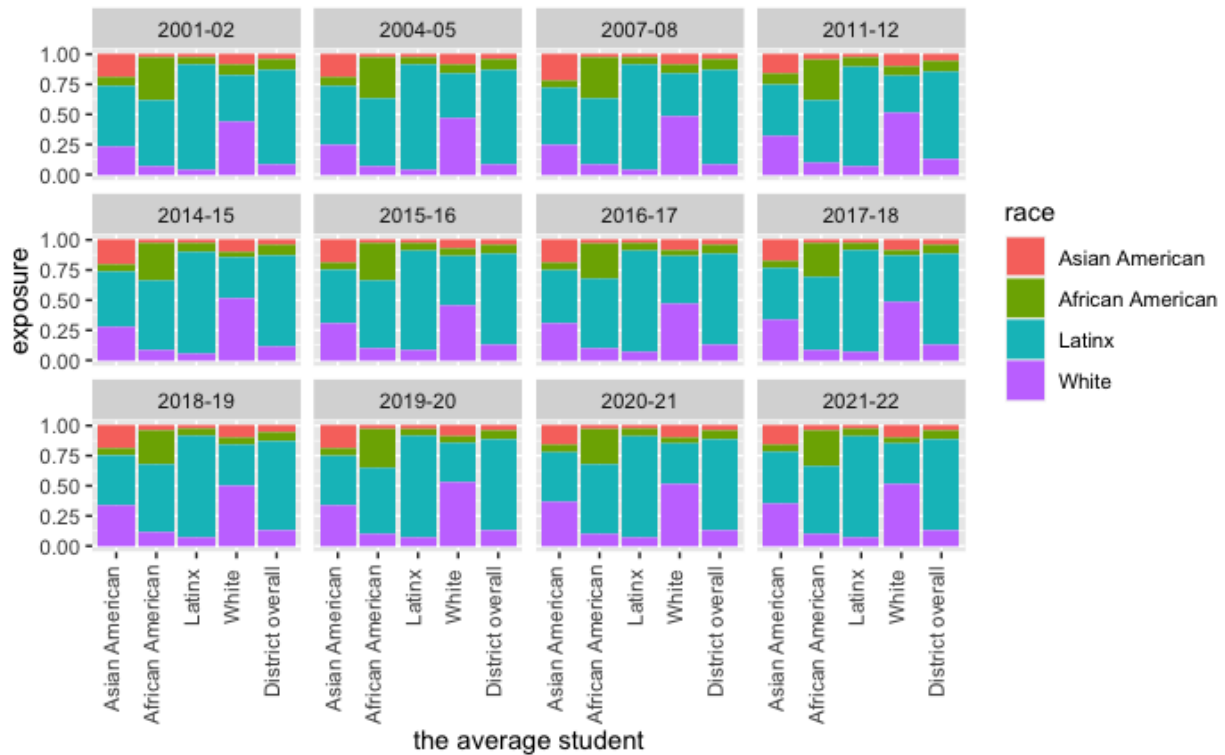
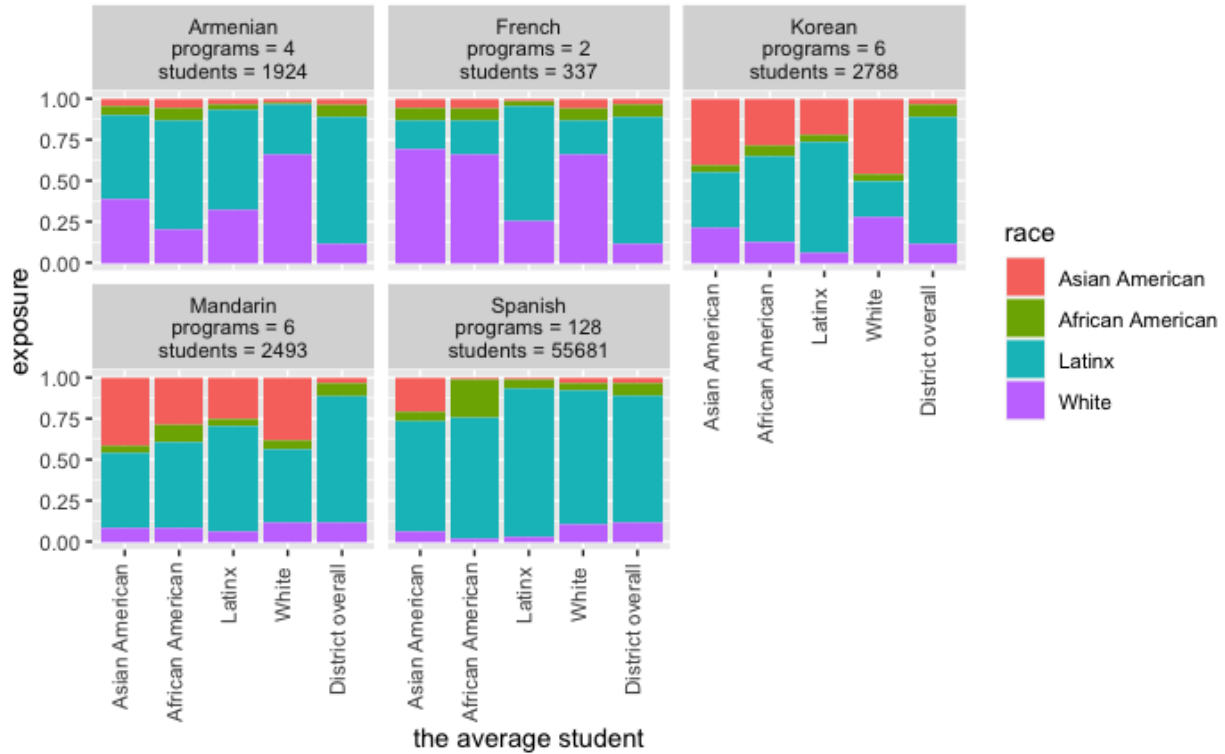


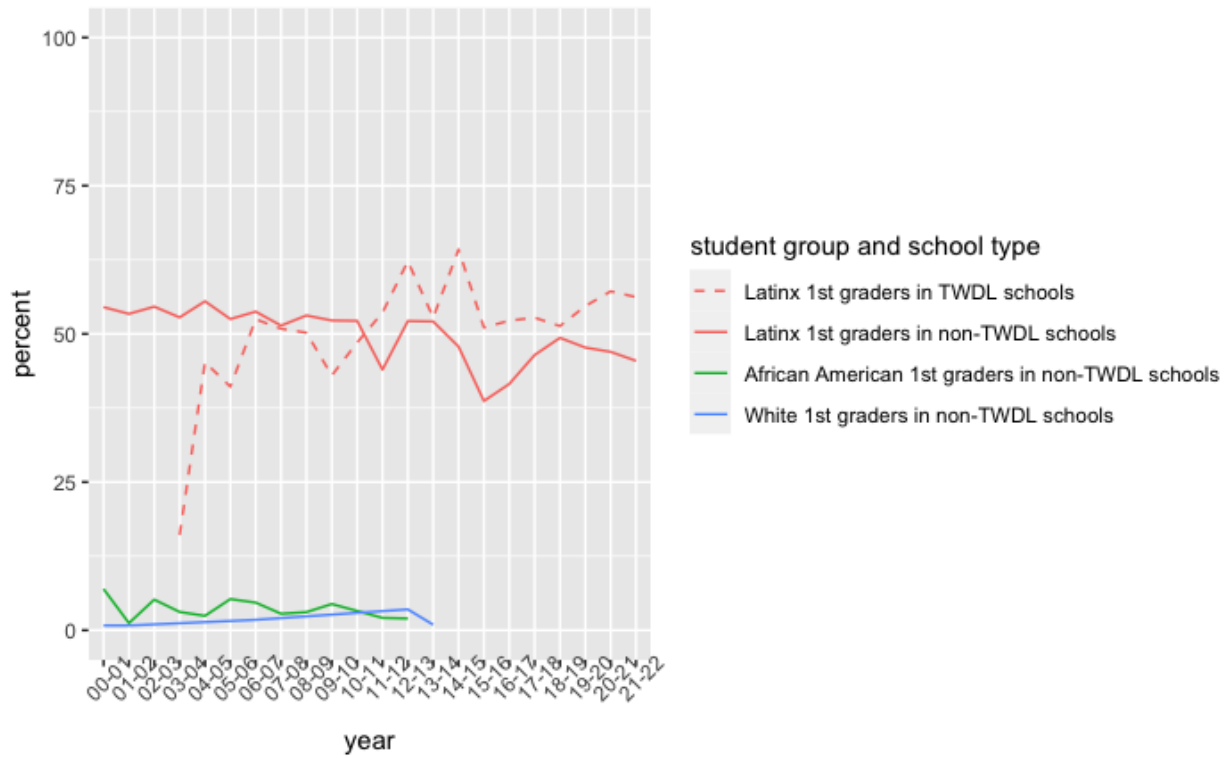
Figure A12: Interracial exposure in 2021-22 for students in schools with TWDL programs, by TWDL program language



Note: Arabic and Japanese are excluded from this figure because there is only one elementary two-way TWDL program serving each of those languages. Four LAUSD elementary schools have two TWDL programs with different languages; two of the schools have a Mandarin and a Spanish program, one has a Spanish and a Korean program, and one has a Spanish and an Armenian program. This figure includes enrollment counts from those schools towards both of the relevant languages.

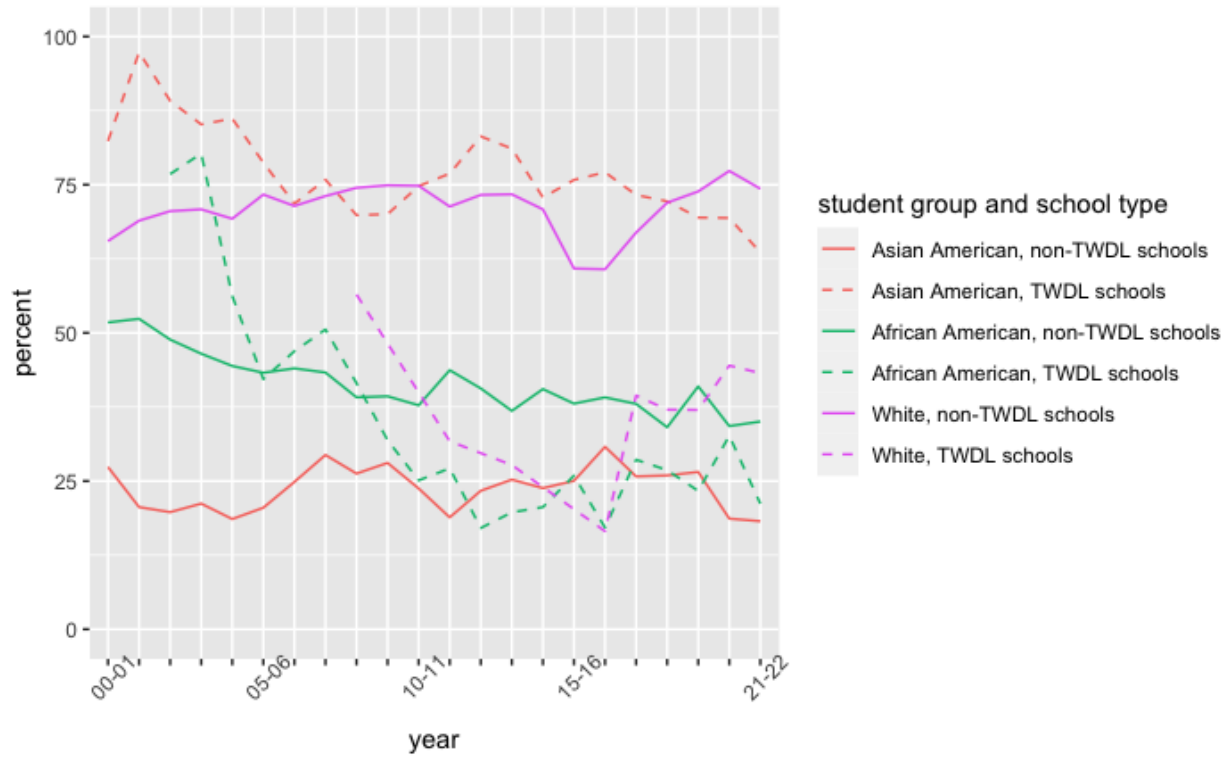


Figure A13: Percentage of 1<sup>st</sup> graders attending schools with absolutely concentrated 1<sup>st</sup> grade student bodies (>90% one group)



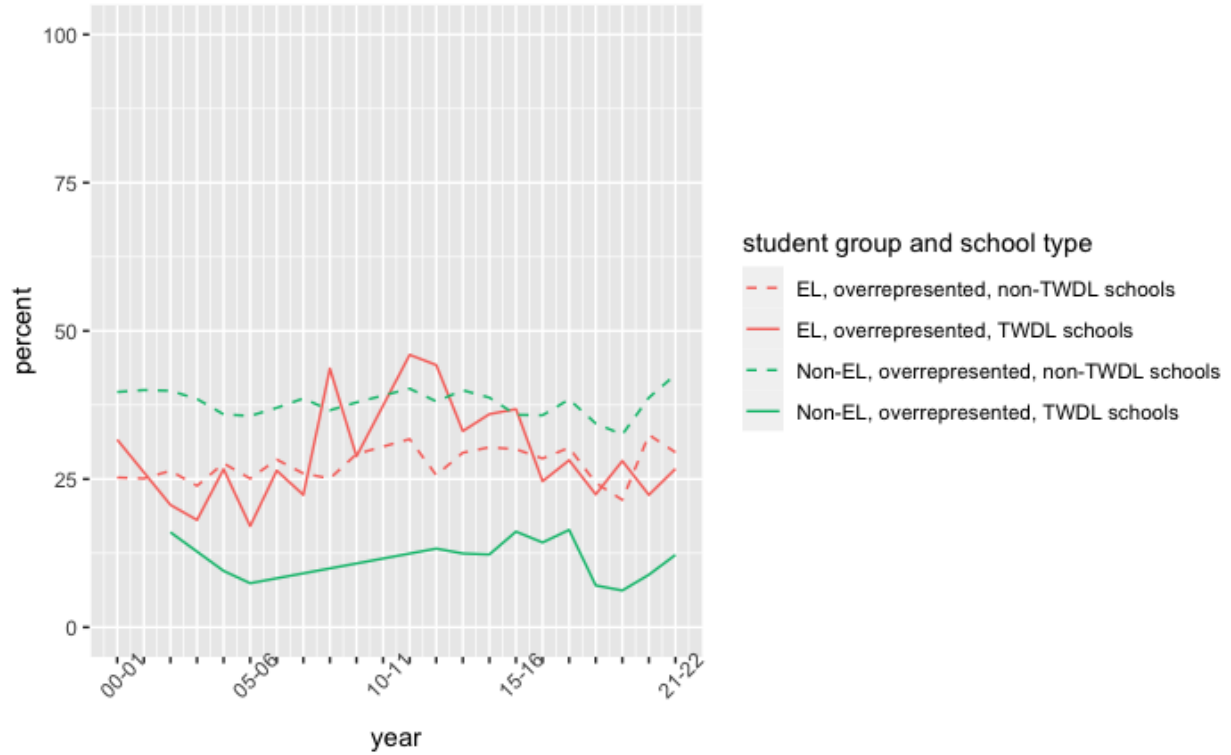
Note: Enrollment counts by FRPM eligibility are not available by grade level, so economic groups are not included here. Other racial and language groups not included here do not have any students in schools with absolutely concentrated 1<sup>st</sup> grade student bodies.

Figure A14: Percentage of 1<sup>st</sup> graders attending schools with racially identifiable 1<sup>st</sup> grade student bodies (group's share in school is greater than 20 percentage points above districtwide share)



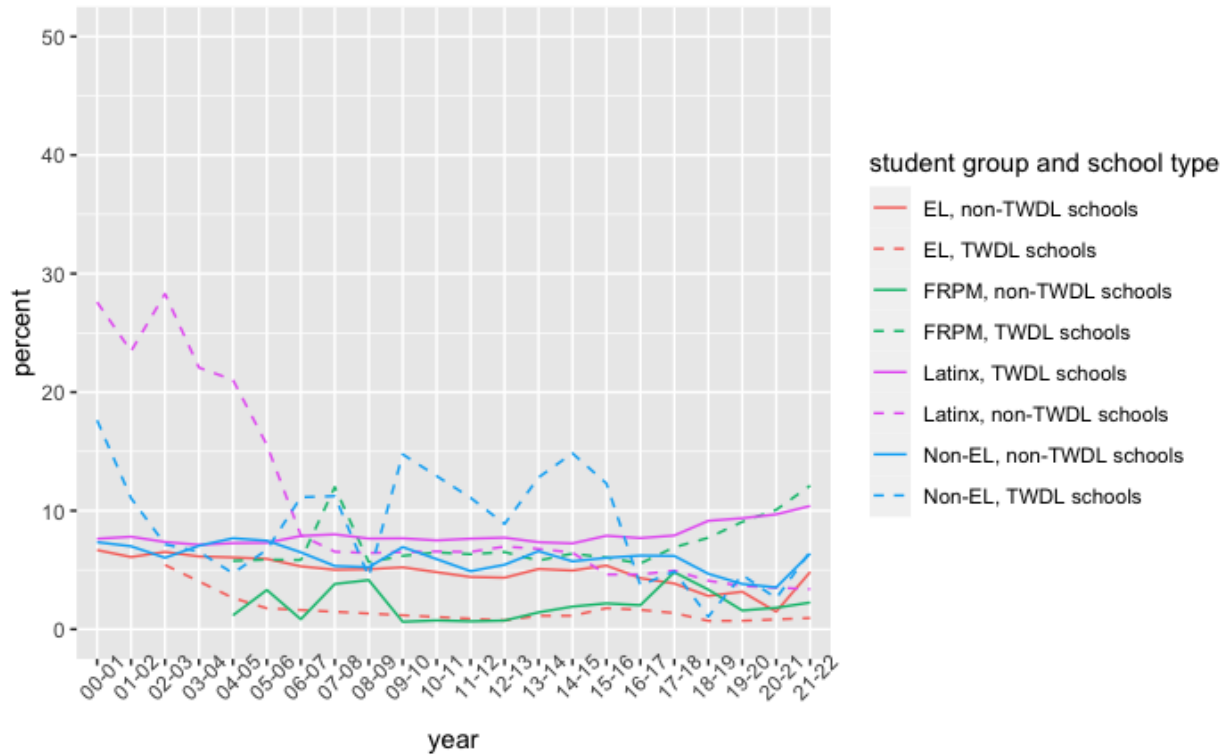
Note: 1<sup>st</sup> graders from other racial groups also attend identifiable schools, but are excluded from this graph to improve legibility.

Figure A15: Percentage of 1<sup>st</sup> graders attending schools with linguistically identifiable 1<sup>st</sup> grade student bodies (group's share in school is greater than 20 percentage points above districtwide share)



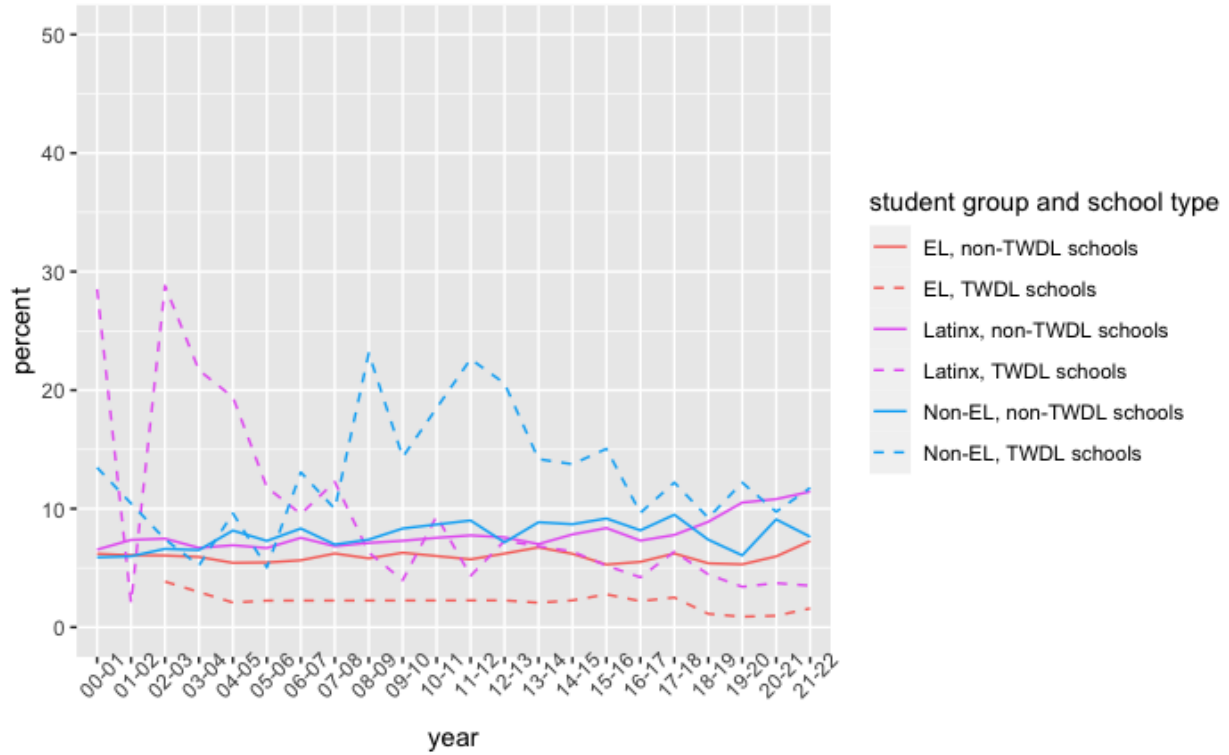
Note: Enrollment counts by EL status are not available in 2010-11; values are continuously estimated through that year. Enrollment counts by FRPM eligibility are not available by grade level, so economic groups are not included here.

Figure A16: Percentage of students attending identifiable schools in which their group is underrepresented (group's share in school is less than 20 percentage points below districtwide share)



Note: Other groups not included here, including non-FRPM students, comprise less than 20% of the districtwide enrollment and so cannot be in identifiable schools in which they are underrepresented.

Figure A17: Percentage of 1<sup>st</sup> attending schools with identifiable 1<sup>st</sup> grade student bodies in which their group is underrepresented (group's share in school is less than 20 percentage points below districtwide share)



Note: Other groups not included here, including non-FRPM students, comprise less than 20% of the districtwide enrollment and so cannot be in identifiable schools in which they are underrepresented.