

Exploring the Commodification of Language and Space:
The Relationship between Dual Language Programs and Neighborhood Gentrification

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To Nadine “Grandma Dean” Douglass

May you always find *Keeping Clean* and cold papayas when you least expect it

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CHAPTER 1

Introduction and Review of Literature

1.1 Introduction

Bilingual education¹ is often characterized in research as a means to provide English Learner (EL)-designated students with high quality instruction, superior to English-only methods, that leverages their entire linguistic toolkit and simultaneously grows their English proficiency while maintaining proficiency in their language other than English (LOTE) (e.g., Lindholm-Leary & Howard, 2008; Thomas & Collier, 2012). Studies also suggest that bilingual education is beneficial for all students, regardless of linguistic, racial, or socioeconomic background and has the potential to foster graduation rates, attendance, and the development of metalinguistic skills in ways that mainstream, English-only education does not (e.g., Alanis, 2000; Cazabon et al., 1998; De Jong, 2002; Ter Kuile et al., 2011; Thomas & Collier, 2002; Valdez et al., 2016). In recent years, dual language (DL) programs have increased in visibility and popularity among English-dominant families (e.g., Heiman & Murakami, 2019) and are a topic of interest in mainstream media outlets, such as PBS (García Matthewson, 2016), NPR (Johnson, 2017; Kamenetz, 2016), and *The New Yorker* (Larson, 2020). DL programs are a subset of bilingual education that offers the opportunity for students who are predominantly speakers of English (PSEs) and those who are predominantly speakers of languages other than English (PSLs)² to learn in the same bilingual classroom.

¹ In the context of this paper, I use bilingual education as a broad, overarching term that encompasses all forms of education that incorporates more than one language in instruction, regardless of its population's demographic makeup in terms of home language and language proficiency. This includes, but is not limited to, programs such as transitional, immersion, and two-way immersion programs. Unless specified otherwise, I discuss bilingual education in the context of the United States public school system. In the context of this paper, I do not consider foreign language courses in mainstream instruction as part of bilingual education. While it could be argued that these courses are bilingual, particularly at advanced levels, I am excluding them from my discussion for the sake of parsimony, as the circumstances surrounding these courses are different from dual language and English Learner-centered bilingual programs.

² While I'd prefer to follow the lead of critical scholars (e.g., García, 2009) in using "emerging bilingual" instead of EL to avoid privileging English speaker perspectives, this terminology can be confusing in the context of bilingual education, as all students are emerging as bilinguals. For the sake of clarity, I use PSL (Predominantly Speakers of Languages other than English) to refer to students who are learning English in bilingual programs and PSE (Predominantly Speakers of English) to refer to those who are learning the language other than English. When referring to students that schools classify as EL, which does not encompass all bilingual students who are fluent in a language other than English, I use the term "EL-designated students."

Although bilingual education has been a part of the public school system in the US for more than four decades and there is a robust body of literature that examines the quality, benefits, and efficacy of these programs and their related policies, not much is known about the state of bilingual education at a national level. A 2018 US Department of Education report found that of kindergarteners in the 2010-11 cohort participating in a program designed to teach English language skills to students with limited English proficiency, 27 percent were in a bilingual program and 8 percent were in a dual language program (Redford, 2018). A 2019 report from the Office of English Language Acquisition in the US Department of Education offered information on the number of states that self-reported having DL programs and the number of languages used in these programs nationally and in the five states with the largest EL-designated population that reported having DLE (Anand, 2019). Neither of these reports offered information on the number of districts or schools with these programs, and there was similarly no information about total enrollment or specifics about the type of program.

Due to bilingual programs not being regulated or reported on at a federal level, the U.S. Department of Education does not offer any comprehensive, nationwide datasets with a grain size smaller than state aggregates. Similarly, there is no consistency in the data or reporting that individual states collect. In fact, the clearest picture of how many bilingual programs exist in the US is a ballpark estimate of “at most around 3 percent of the elementary grades population (prekindergarten through grade 8)” enrolled in bilingual education (Goldenberg & Wagner, 2015, p. 29). Due to this lack of federal data, it is difficult to determine how many schools and districts offer these programs or who has access, and even less is known about which populations are targeted for enrollment.

This dearth of information related to the prevalence, enrollment and recruitment of these programs on a national scale is important to remedy: These programs have the potential to positively impact students, particularly the historically underserved population of EL-designated students, but it is difficult to argue in favor of expanding bilingual education opportunities throughout the United States when the current state of the national bilingual education programming is largely unknown.

It is particularly important to gain a stronger understanding of national trends in the subset of DL programs. Unlike traditional bilingual education programs, which primarily target EL-designated and other PSL students who are interested in learning English while maintaining

their LOTE, the pool of eligible applicants of DL programs also includes PSEs who are interested in learning the LOTE of instruction (LOTEI) of the program. On the one hand, the inclusion of PSEs in bilingual education classrooms is linked to benefits at both classroom and programmatic levels, such as attracting more qualified teachers, more enthusiastic administrative buy-in, and more material support (e.g., curriculum and classroom space; Fishman, 1982). On the other hand, the addition of PSEs creates greater opportunity for linguistic power inequalities to manifest in the classrooms, such as differential enforcement of language use that prioritizes English over the LOTEI and subconscious bias toward English-dominant speakers (Palmer, 2009). The inclusion of PSEs also raises questions about equitable access, since the pool of potential students includes a wider range of students, and it is unclear whether DL programs are being offered in addition to or in place of traditional bilingual programs.

Extant research suggests that DL programs favor a higher-SES, native-English-speaking population in both policy and in classroom linguistic power dynamics (see, e.g., Dumas, 2013; Flores & García, 2017; Freire et al., 2017; Palmer, 2009). This has led researchers, such as Valdéz and colleagues (2016) to call this “a kind of gentrification, that is, an influx of more privileged inhabitants into a ghettoized neighborhood while less privileged residents are priced or pushed out” (p. 604). Research at a Texan school located in a gentrifying neighborhood describes how the school was able to keep from closing by becoming a DL school, thus attracting higher SES PSEs who were interested in learning a second language and able to afford a long daily commute to school (Heiman & Murakami, 2019; Heiman & Yanes, 2018). The researchers describe this process as “a dual gentrification process [that] pushed in new customers thirsting for bilingualism and pushed out Spanish-speaking families due to rapidly rising rents” (Heiman & Murakami, 2019, p. 454).

However, while there is ample research to support the idea that these programs cater to dominant populations in policy and practice, as well as qualitative case studies that describe the understanding of stakeholders about the connection between gentrification and their DL program, there is yet to be a quantitative or mixed-methods study that measures the relationship between gentrification and dual language education (DLE) on a nationwide scale. The promising outcomes for DLE and other bilingual programs described in the research, coupled with the potential pitfalls that even well-run programs may encounter, suggest that research on DL programs, particularly research that addresses issues of equity and equitable access, has

important implications for students, teachers, and administrators. If these programs offer benefits for all students, despite current concerns, there is great potential to increase these benefits by addressing the concerns. This dissertation intends to examine gentrification patterns in local contexts and how they impact the landscape of DL programs, in order to establish a statistical correlation between the two and lay the groundwork for future conversations about and considerations of nationwide trends.

1.1.1 Purpose and Significance

This study will 1) illuminate the state of DL education through a snapshot of programs existing during the 2019-20 school year and 2) investigate the yet unexplored relationship between gentrification and districts that offer DLE to address theoretical and practical issues of the relationship between demographic change and programmatic offerings. Although restrictions related to the lack of longitudinal, program-specific data limit the ability of this study to examine changes in access to DL programs in terms of location, expansions or declines, and demographic trends in enrollment, this study offers a baseline for future research on DLE and findings that can inform policy reform, program design, and the restructuring of program recruitment and enrollment procedures.

Beyond providing an existence proof of this educational problem, this study seeks to lay the groundwork for future research that can leverage longitudinal data to consider the relationship between gentrification and DLE from a causal perspective and gain more insight on whether gentrification expands or restricts PSL access to DLE (i.e., gentrification is linked to school districts creating DL programs in addition to existing bilingual programs versus replacing existing bilingual programs with DLE).

1.1.2 Position Statement

My experience with bilingualism and gentrification has shaped the analytical lens with which I approach this research. My parents met in Sacramento, CA, in the 1960s as international students from Vietnam on academic scholarships. During the 1970s, they were granted political asylum, became U.S. citizens, and got married. Shortly after, they moved to the California Bay Area so that my father could pursue a career in the newly emerging field of computer science. Money was tight as they were trying to build savings to start a family while sending funds to family in

Vietnam to mitigate the fallout from the war and ultimately help their siblings flee the country. While they were happy to own a home in an area that had a large Vietnamese community, my parents were dissatisfied with the educational opportunities offered by the local school and dreamt of moving to a neighborhood with better-funded schools. Education was important to them, as that was what had kept them out of Vietnam during the war and gave them the opportunity to help their families.

By the early 1990s, everyone in my family who would ever make it out of Vietnam had come to the US, and my parents had saved enough to move to a neighborhood where schools had access to more physical, social, and economic resources. The area was just on the cusp of gentrification. While the town was historically inhabited by middle-class white families that transformed the area from rolling apricot orchards to a small, sleepy town with a two-street downtown, this population was retiring and dying, making room for young professionals moving in to capitalize on the Silicon Valley tech boom. My hometown has recently gentrified to the point where the only realistic way I could own a house is if my parents died and I inherited their property. Even my parents' previous house, which their co-workers refused to visit because it was in a "bad" part of town, is now worth about \$1 million.

Growing up, my friends were almost all white. I always felt a sense of otherness, since I didn't look like them and my parents spoke with heavy Vietnamese accents. I never felt that my English-Vietnamese bilingualism was a point of pride, and I actively resisted attempts by my parents to formally teach me Vietnamese. In retrospect, I suspect that my parents did not push too hard because they wanted to reject the narrative of 'Vietnam War refugees' and raise me as 'American' as possible (in their eyes, American was synonymous with white). Nevertheless, I acquired a conversational level of the Vietnamese language and later went on to become fluent in French and conversational in Georgian. Still, I considered my language skills more like odd hobbies than useful multilingual competencies. My complex linguistic toolkit had never been valued or leveraged in academic contexts, and my peers and teachers seemed to attribute my linguistic dexterity either to the model minority myth of overachieving Asians or, in the case of French, some intrinsic skill in learning the language of my people's colonizers.

Twenty years later, I was in an MA program at Stanford, a mere 20 minutes away from my hometown, which had fully gentrified by that time. I noticed that all my professors and colleagues with school-age children said that if you wanted to send your child to a "good

school,” you needed to send them to the nearby school that had Mandarin and Spanish immersion programs. And if you could not get your child in there, they should go to the private Jewish school, because at least there was a Hebrew component. This was fascinating to me because 1) there is a huge Latinx community in the Bay Area whose bilingualism is not valued the way Spanish immersion programs’ promise of bilingualism was valued, and 2) it was so different from my own experience growing up bilingual, as my LOTE was never leveraged or even considered an asset in an academic setting. This sparked my interest in exploring the tension between valued and devalued bilingualism and how gentrification might play a role in the shifts in perspectives.

In considering the existing bodies of literature on bilingual education and gentrification and designing this study, I had the opportunity to interrogate the ways in which my social positions of both privilege and oppression provide insight into this research. On the one hand, I had the privilege of attending a well-funded school in a desirable neighborhood and benefitting from the increased access to resources and material improvements as my neighborhood and the surrounding areas gentrified. This gave me first-hand experience with the perspective of students and parents who know how to “play the game” in education institutions. I was also able to develop metalinguistic skills from growing up in a bilingual household, and these skills helped me learn languages in academic settings, such as learning French and Latin and being able to guess the meaning of English words in standardized tests that I had not encountered previously. However, I had to navigate being one of the only POC in my school from kindergarten through junior high and contend with the monolingual learning environment that was emphasized through the California’s English-only policy.³ While I had access to rich linguistic resources in my home life, both my parents and my school environment emphasized English and ignored the importance of my Vietnamese proficiency and bilingualism. I saw how non-Vietnamese people treated my parents: Many made negative assumptions based on the accents of my parents or if they chose to speak to each other in Vietnamese while in public. I also saw how the attitudes of these people changed when I spoke in my Californian accent or when they learned about which universities I attended.

This duality uniquely positions my analytic gaze in my dissertation research: I have heard, experienced, and internalized the monolingual perspective of language, and I have worked

³ This English-only policy was repealed in 2016, but it was enforced throughout my K-12 years.

to unlearn that perspective and replace that ideology with bi/multilingual perspectives on language. By interrogating my internalized racism and former English-only mindset, I have become particularly aware of the ways that my prior experience might impart vestiges of the deficit-oriented perspective of bilingualism that was normalized throughout my formative years.

With this in mind, my dissertation research is particularly near and dear to my heart because I want my work to help students from minoritized linguistic and cultural backgrounds realize the value of their language experience outside of school and to elevate those experiences as ways to enrich and enhance what they learn in school. I was not given the tools to understand or interrogate my experience with and attitudes toward language until I was in graduate school, and I still grapple with the guilt of not speaking my heritage language well. It is my hope that this research will offer teachers, administrators, and policy makers insights that will help shape the future of bilingual education so that all students, regardless of their language background, recognize the richness of their linguistic knowledge.

1.2 Bilingual Education and Dual Language Programs

In this section, I first offer a general background on the history of bilingual education in the US and a discussion of the benefits that research suggests bilingual education offers students. Next, I focus on the subset of DL programs and consider the affordances and constraints of these programs' unique instructional approach and classroom composition. To conclude, I consider the importance of neighborhood demographic change in influencing demand for DLE.

1.2.1 Bilingual Education

The form of bilingual programs has evolved over the years, often in response to demands from and preferences of school and district administrators, as well as community members who are invested in these programs or wish to join them (Valdez et al., 2016). As interest in bilingual education programs grows, more PSEs are participating in these programs through DLE. While this is not necessarily negative, researchers such as Flores and García have identified a shift away from serving the needs of the EL populations that have traditionally been these programs' main participants, toward catering to higher-income PSEs at the cost of ELs. An examination of trends in bilingual education programming in the American public school system over the past three decades reveals a trend of “basements to boutiques” (Flores & García, 2017, p. 16). This

change over time in programmatic offerings for bilingual education and populations served is the foundation of my argument, that there are parallel trends in bilingual education and gentrification and the factors that would motivate a family to become gentrifiers would similarly motivate them to participate in a DL program. Case studies of schools with DL programs support this argument (e.g., Heiman & Murakami, 2019; Heiman & Yanes, 2018).

From its inception, bilingual education has had a contentious history, facing strong opposition from those who believe that monolingual education is in the better interest of students and of the country as a whole. Crawford (1989) attributes this controversy to four broad reasons: 1) a lack of clarity over whether bilingual education ought to be treated as a remedial course aiming to mainstream students as soon as possible or as a potentially long-term enrichment program that would develop both of the students' languages and sustain their cultural heritage; 2) anti-immigration mindsets that leveraged monolingual policies as a proxy for racist politics; 3) the disruption of established school logistics, routines, and expectations due to the introduction of new programs that required bilingual texts, curricula, and assessments; and 4) contradictions of "peculiarly American notions about language" (p. 14) that are rooted in ignorance of how bilingualism is acquired and how it functions.

At its conception during the post-Civil Rights era, bilingual education for public schools was largely conceptualized as programming for non-native English speakers whose English language skills were not high enough to participate in a mainstream English-only classroom (Flores & García, 2017). Additionally, legislation that made provisions for bilingual education did little to clarify whether these programs were meant to transition students to English-only education as soon as possible or if they were intended for long-term education that would cultivate proficiency in both languages, leading to much debate in the field (Crawford, 2004; Gándara & Escamilla, 2017). Despite the low social capital and controversy associated with these programs, many still offered valuable academic resources and affirming learning environments for ELs. These programs were often taught by members of the students' local communities who shared their linguistic and cultural backgrounds (Flores & García, 2017) and had ambitions to both teach the school curriculum and instill a sense of pride for their heritage into lessons (Von Maltitz, 1975).

Still, these classrooms were far from ideal, and educators' ambitions were not always met: as Flores and García (2017) noted,

while bilingual educators have been able to create classrooms that affirm the bilingualism of their Latinx students in ways that instill cultural pride, they have been able to do little to challenge the structural barriers confronting their students in the broader society as reflected in their relegation to the basements of schools (p. 16).

These classrooms were often underfunded, under-resourced, and segregated from the rest of the school, despite the best intentions of their teachers, community, and supporters. In effect, most, if not all, of these programs were not implemented as many activists envisioned and did nothing to address larger social issues: “[T]he lingual basement became a place where students could be proud of who they were, while simultaneously being oppressed for who they were” (p. 19).

While educators could foster a positive, multicultural environment within their classroom, there was little that they could do to effect substantive change in the monolingual English mindset dominant in the larger school and district environments.

1.2.2 The Benefits of Bilingual Education

Despite the lack of resources and funding coupled with complicated linguistic, social, and political dynamics, bilingual programs have demonstrated beneficial outcomes for participating students. Over the years, research has continued to show that these programs contribute to students’ academic achievement. Researchers at the Center for Research on Education, Diversity, and Excellence have found that the more time ELs spend in bilingual programs, the higher their English achievement (Goldenberg, 2008), and bilingual programs are found to produce students with higher test scores, graduation rates, attendance, and positive attitudes toward education (e.g., Alanis, 2000; Cazabon, Nicoladis, & Lambert, 1998; De Jong, 2002; Thomas & Collier, 2002). Furthermore, studies show that “students who attend a well-implemented dual language program tend to academically surpass those who do not, and this holds true regardless of students’ race, class, or dominant language” (Valdez et al., 2016, p. 602).

Furthermore, Rolstad, Mahoney, and Glass’ (2005) meta-analysis of ELL program effectiveness research found “not only that bilingual education is superior to all-English approaches such as [English as a Second Language] or [Structured Immersion] but also that programs designed to develop children’s academic use of both languages [Developmental Bilingual Education] are superior to programs that aim to use children’s home language to transition them to all-English instruction [Transitional Bilingual Education]” (p. 589). Genesee

and colleagues' (2005) review of the literature echoes this point, finding that "most long-term studies report that the longer the students stayed in the program, the more positive the outcomes" (p. 375).

1.2.3 The Emergence of Dual Language Programs

Early proponents of DLE recognized that many of the shortcomings experienced by bilingual education could be addressed by opening these programs to PSE families, as this new target population might have more social and economic capital and could better advocate for these programs. After all, these programs offered academic benefits and language learning opportunities that were unavailable in mainstream, English-only classrooms; they just needed additional buy-in to help dispel misconceptions about the effect of bilingual instruction on academic achievement and English proficiency.

Indeed, shifting away from traditional bilingual education toward a DL model attracted more qualified teachers, more enthusiastic administrative buy-in, and more material support such as curriculum and classroom space (Fishman, 1982). However, advocates for traditional bilingual education have criticized this move, framing it as a benefit for the programs, but not necessarily for the minoritized students who have historically attended: "The result is a constant tension between bilingual education as tending toward instilling pride in Latinx and other minoritized students and tending toward the sale of a product that is desired by white middle-class parents" (Flores & García, 2017, p. 26). This tension, coupled with these programs' potential to increase students' academic outcomes, indicate that it is necessary to balance many complicated instructional, social, and political dynamics in order to implement an effective bilingual program. However, if programs can successfully navigate these issues, they can greatly benefit students, particularly those in historically underserved populations. Therefore, it is important that research continues to investigate and highlight factors that contribute to or mitigate instructional, social, or political inequities.

1.2.4 Complexities in Dual Language Program Implementation

As many of the early implementers of DLE found, adopting a DL model means more than simply inviting native English speakers to join the classroom. The biggest difference is that in order to be well-run, these programs must account for the fact that both languages will be a

“foreign” language to some portion of the students, as some students will be learning English, while others will be learning the LOTEI.⁴ Thus, it becomes necessary to find a balance between tailoring instruction for those who are learning the language as well as for those who are maintaining that language. Research has shown that treating one or both languages as “foreign” languages is a disservice to the students, as “[s]ubsuming immigrant languages within curricula designed originally for foreign languages means that all learners are considered as monolinguals, that their linguistic and cultural background is ignored, and their specific learning needs forgotten” (Hélot & De Mejía, 2008, p. 21).

Furthermore, DL differs from bilingual programs in that class time is divided by language, often assigning subjects a specific language, and cross-use of language is not often encouraged (García, 2011). Critics of DL point out that this partitioning of language is an artificial means of teaching bilingually. Indeed, researchers theorize that the use of multiple languages is fluid (García & Li Wei, 2014) and that bilingual education should reflect this. While speakers may make conscious decisions to utilize specific languages or forms of communication based on the situation, there is an underlying unifying theory of language (Cummins, 1980).

Compounding this issue, classrooms often have different teachers for each subject, or different teachers for each language, and not all speak both of the classroom’s languages (Palmer, 2009), thus further deepening the artificial divide between the two target languages. Successful programs target these issues by focusing more on the quality of instruction, not the amount of time spent using specific languages (Genesee, 2004; Lindholm-Leary, 2012); hiring greater numbers of fully bilingual, qualified teachers (Alanís & Rodriguez, 2008); having administrators who understand both the research on DLE as well as the community’s needs (Montague, 1997); selecting and adapting appropriate materials (Cloud et al., 2000); and building connections with the community to involve parents and other stakeholders (Alanís & Rodriguez, 2008).

However, even for programs that successfully navigate the curricular linguistic conundrum, and perhaps more so for those that do not, systemic linguistic and power inequalities that exist outside of the classroom inevitably find their way into them. As Flores and García

⁴ To be fair, many DL programs avoid this issue by serving students from the same linguistic background (e.g., only heritage language speakers of the LOTE or only monolingual English speakers, etc.). However, I argue that a well-run program should be equipped to handle linguistic diversity.

(2017) discuss in their research on Spanish-English programs: “While dual language/two-way immersion programs have moved bilingual education programs out of the basements, teachers in those programs can do little to challenge the vast inequities that exist between low-income Latinx students and their white middle class counterparts in the broader society” (p. 16). While there is a growing body of literature that examines instruction and interactions in DL classrooms, as well as the impact of education policy on DL programs, there is not as much research on ways language ideologies in the broader society impact the conceptualization of DL programs. This dissertation aims to add to the body of literature that examines how demographic characteristics of outside-of-school communities are related to the existence of these programs.

1.2.5 Unequal Linguistic Power in Dual Language Classrooms

Further complicating DL programs (and bilingual education as a whole) is the continuation and perpetuation of monolingualistic, English-only ideology in the US and in its education system. Even with the additional support from non-minoritized communities, bilingual education continues to face strong resistance, often—but not always—from politically conservative groups (Goldenberg & Wagner, 2015). Crawford’s (1989) four rationales for opposition to bilingual education largely hold true today: in a document published almost 20 years later, he wrote, “English Only [education policy] has always been about fear. Fear of demographic and cultural change, as American communities are transformed by immigrants...Fear among Anglos about losing their majority status and, with it, their political dominance” (2006, p. 1). It is worth mentioning that this English-only mindset does not mean a total lack of other languages (as evidenced by the ubiquitous world language elective courses in high schools). In short, it’s less “English Only” and more “English only, but only if English isn’t your first language.”

This sentiment continues to be confirmed through other research, such as the work Hempel, Dowling, Boardman, and Ellison (2013) that finds statistical support for a “minority threat” hypothesis. Specifically, their analysis suggests that non-Hispanic whites are more likely to have anti-bilingual education perspectives in regions of Texas that have historically large Hispanic populations that are experiencing growth, compared to regions with similar increases that have had historically smaller Hispanic populations. This minority threat hypothesis has direct implications for DL programs, given that commonly-held beliefs in a community are often manifested in the schools of that community. This would suggest that a community’s attitude

toward minoritized populations, and, by extension, the languages and multilingualism that are part of these populations' identities, would be reflected in schools' programmatic decisions. This could be evidenced in the lack of any type of bilingual education program, or it could be evidenced in the specific ways that DL programs are marketed to English-dominant populations. This would further support claims in the research that the rise in popularity of DL programs does not necessarily mean that these programs prioritize the inclusion of minoritized populations.

While there are many programs that successfully navigate the curricular complexities of DLE, it is much more difficult to modulate the unconscious biases and socially-engrained attitudes that stem from linguistic power differentials and asymmetrical attitudes and motivations related to bilingualism. The introduction of PSEs, who are often white and middle-class, creates a differential power dynamic that reproduces hegemonic power structures where non-native English speakers from minoritized ethnic backgrounds are considered through a deficit mindset and as having less cultural capital than native English speakers (Flores & García, 2017; Palmer, 2009; Valdez et al., 2016). This manifests in a number of ways, most notably in unequal values assigned to the languages and how those valuations are reproduced in both conscious and subconscious student and teacher attitudes.

Palmer's (2009) study of a second grade Spanish-English DL classroom in California found that the incorporation of middle-class PSE children to the bilingual learning environment also introduced a symbolic dominance (Bourdieu, 1991) to classroom interactions, where students "claim[ed] power as native English speakers despite programmatic emphasis on Spanish" (p. 189), dominating conversations and tending to be the voices that get heard, despite participation from Spanish-dominant speakers. Additionally, Palmer's observations revealed that the English-only specialists tended to favor native English speakers, giving them more talk time. Furthermore, across subjects and teachers, "English-speaking students tended to end up with more turns of talk and more opportunities for interaction than Spanish-speaking students" (p. 194) regardless of the language being used. Additionally, there was an imbalance in non-sanctioned language use (i.e., using Spanish during English time or vice versa), particularly in the ways that students participated in this behavior. English-dominant speakers used English with all students during Spanish time, but Spanish speakers only used Spanish with Spanish-dominant students during English time. In other words, English-dominant speakers assumed universal comprehension and appropriateness of their home language, tending to ignore Spanish-

dominant speakers who did not understand them, while Spanish-dominant speakers did not. While some of the teachers Palmer observed made explicit pedagogical decisions in order to promote equal talk time, others (mostly monolingual, English-speaking teachers) seemed to be unaware of this power imbalance in their classroom and participated in “unaware collusion” (p. 191) by giving English-dominant students more talk time.

Palmer concluded that “white students need to learn to share the power they come into [the] classroom with” (p. 179). What should be noted when applying these findings to future research, and is underscored through Palmer’s interviews with Ms. Melanie, one of the Spanish-instructing teachers in her study, is that elementary-age students that participate in DL programs should not be expected to educate themselves about the systemic power that accompanies English or how to appropriately share this power. Rather, since children learn these hierarchies of power from the adults around them, it is similarly the responsibility of adults to teach them how to identify and break down these hegemonic structures. The importance of research in this relationship is to build our understanding of practices in classroom instruction that foster these types of critical conversations.

While my review of the literature did not reveal any studies that could be compared to Palmer’s, and she specifically states that her study is not generalizable due to it being a single-case study, her findings (that the normative, English-dominant mindset that exists outside the classroom is reproduced within DL programs and leads to asymmetrical linguistic power distributions) are consistent with other studies that examine other aspects of bilingual education. For example, the normative English/symbolic dominance mindset is supported by Freire et al.’s (2017) findings that Utah’s bilingual education policy and associated literature caters to the state’s higher-SES, native-English-speaking demographic. Specifically, they identified a “pattern of centering the interests of the white, English-dominant majority and those without an ethnic connection to the target language, while marginalizing or silencing Latina/o interests” (p. 276). This manifested in the analyzed documents in two main ways. First, through strictly enforcing the definition of DL programs as having a 50:50 distribution of languages, thus denying funding to pre-existing DL programs with higher Latinx populations that choose to devote more instruction time to Spanish. Second, by mandating that DL programs be based on a foreign/second language immersion model. This implies catering to the English-dominant,

world-language constituency, rather than allowing for DL programs based on bilingual education models, which would better serve students wishing to maintain or recover their Spanish skills.

Furthermore, while Utah policy does not require the English-speaking DL teachers to have an ESL endorsement, the Spanish-speaking DL teachers are required to have both a “world language endorsement in the immersion language and a dual language immersion endorsement” (p. 283). Therefore, while the Spanish DL teacher must show proficiency in skills related to teaching a language to both PSLs and PSEs, there is no guarantee that the English DL teacher will have the same competency in teaching both groups of students, which may be disadvantageous for PSLs, particularly those that are EL-designated. Overall, the asymmetry in these policy documents that positions English as the norm and defines DL in a way that puts Latinx-serving DL programs at a disadvantage, dovetails with Palmer’s (2009) findings and suggests that, from a policy perspective, there is a great deal of influence from the normative English-dominant mindset.

It is also important to consider this mindset’s influence in terms of what languages students are exposed to outside of the classrooms, and the extent to which this exposure reinforces language learning. Palmer (2009) notes that when teachers modify their Spanish to help English-dominant students’ comprehension, “they may be watering down the language for Spanish-speaking students, or undermining Spanish speakers’ own varieties of Spanish” (p. 182). Palmer explains that an implication of this practice is that Spanish-speaking students’ Spanish skills become threatened in a way that English speakers’ English would not, were the roles reversed, since there is limited access to Spanish-language environments in the United States that would provide more complex and varied language use to supplement the classroom Spanish.

Overall, research suggests that it is very likely that the normative English-dominant mindset that has been embedded in American society has quietly seeped into DL classrooms and may not be immediately apparent to educators. This indicates that there are very important issues of equity that need to be addressed in socially-conscious forms of teacher training in bilingual education, particularly for DL programs. However, this is not to say that these programs should be eliminated completely: given the body of literature that consistently shows that bilingual education produces positive academic outcomes (e.g., Genesee, 2004; Genesee et al., 2005; Goldenberg, 2008; Lindholm-Leary & Howard, 2008; Rolstad et al., 2005; Thomas & Collier, 2002; Valdez et al., 2016), it is likely that addressing these linguistic power concerns,

specifically by helping educators and administrators challenge normative English-dominant mindsets, will lead to even greater educational outcomes for students.

I argue that the first step toward developing equity-oriented instructional practices in DL classrooms is having a better understanding of neighborhood communities surrounding these schools, particularly the ways that changes in neighborhood communities can impact schools and districts in terms of student demographics and demands from families and stakeholders. Since both students and teachers tend to come from areas within a short radius of the school sites, understanding these surrounding communities' demographic makeup can build a stronger awareness of the motivations that drive DL program enrollment (e.g., heritage language maintenance vs. prestige addition to college résumé) and common language ideology that may manifest in DL classrooms. In turn, this can inform the development of more meaningful training for educators.

To further explore this idea, the next chapter of this dissertation focuses on gentrification, a specific type of neighborhood change that is characterized by the creation of affluent space in historically minoritized and undervalued spaces. In the chapter on gentrification, I discuss the ways that this phenomenon has been conceptualized and extant research that would support a connection between gentrification and DLE.

1.3 Gentrification

One of the few consensuses in the body of literature on gentrification is that the definition of gentrification is continuously expanding and evolving due to its complex nature. Ruth Glass (1964) is credited with coining the term in *London: Aspects of Change*. In this early work that only briefly touches on gentrification, Glass defines this phenomenon as the upper- and lower-middle classes moving into working-class neighborhoods of London, thus displacing the working-class residents and changing the “social character” of the neighborhood. At its inception, gentrification was intended as a tongue-in-cheek term for “a narrow and quixotic oddity in the housing market” (N. Smith, 1996, p. 39).

Throughout the last half of the 20th century, instances of gentrification arose with greater frequency, perhaps due to shifts in housing trends, or perhaps because the naming of a phenomenon makes it more visible, until it became “the leading remake of the central urban landscape” (N. Smith, 1996, p. 39). Although definitions of gentrification were written without

mention of race, it was tacitly understood that this term was specifically used to describe the phenomenon of white, middle-class, professional people moving into inner-city neighborhoods inhabited by poor, minoritized populations, often assumed to be Black, and displacing the historic residents. For example, in Neil Smith's (1996) foundational work in gentrification literature, *The New Urban Frontier*, he writes, "Gentrification is the process...by which poor and working-class neighborhoods in the inner city are refurbished via an influx of private capital and middle-class homebuyers and renters—neighborhoods that had previously experienced disinvestment and a middle-class exodus" (p. 32). While class is prominent in Smith's definition, there is no explicit mention of race or ethnicity. This is underscored in the examples he provides, of yuppies, women, and gay men as types of gentrifiers, concluding that "it is likely that the social explanation of gentrification involves some imbrication of class and gender constitution" (p. 101), but makes no mention of race, or of the intersection of race, class, gender, and sexual orientation.

Instead, N. Smith's work, along with much of the research during the 1980s and 1990s, did not consider racially minoritized groups, particularly Black populations, as having the ability to be full-fledged gentrifiers. For example, in an examination of reinvestment in Harlem, Schaffer and N. Smith (1986) concluded that African Americans did not have the financial means or stability to be gentrifiers: "the process might well begin as [B]lack gentrification, but any wholesale rehabilitation of Central Harlem properties would necessarily involve a considerable influx of middle- and upper-class whites" (p. 359). This, along with other similar studies, constructed an understanding that led to the exclusion of People of Color (POCs) from the definition of gentrifiers and resulted in a conceptualization of this phenomenon that exclusively positioned white people as gentrifiers and People of Color as the displaced.

The last 50 years of gentrification research have "push[ed] the definition of the term towards a broader concept of an upward class transformation and the creation of affluent space" (Doucet, 2014, p. 125). The definition of gentrification has been expanded in terms of the locations, race, ethnicity, and socioeconomic status (SES). In particular, the last 20 to 30 years have brought forth more nuanced and varied definitions, particularly those that challenge reductive notions of gentrification being a phenomenon exclusively performed by white people in Black and Brown neighborhoods. As Lees, Slater, and Wyly (2007) noted, "Gentrification is no longer confined to the inner city or to First World metropolises" (p. xv). The expanded

definition of gentrification includes, but is not limited to non-white gentrifiers (e.g., Chronopoulos, 2016; Freeman, 2006; Jackson, 2003; Pattillo, 2008), non-middle-class gentrifiers (e.g., Butler & Lees, 2006; Lees, 2003), similar patterns of devaluation, reinvestment, and displacement that occur outside of the inner city (e.g., D. P. Smith & Higley, 2012) and critical considerations of the negative effects of gentrification for the displaced (e.g., Glynn, 2008; Paton, 2012), those who remain (Freeman, 2005), and those who are excluded from the gentrified neighborhood (e.g., Chronopoulos, 2016).

In this growing body of literature, there is a broad tendency to follow one of two explanations of the mechanisms behind gentrification. In one, gentrification is considered as a “rational market response” (N. Smith, 1996, p. 67) to cyclical economic conditions and patterns of urban development. As N. Smith describes, “Gentrification occurs when the [rent] gap is sufficiently wide that developers can purchase structures cheaply, can pay interest on mortgage and construction loads, and can then sell the end product for a sale price that leaves a satisfactory return to the developer” (p. 68). N. Smith concludes, “Gentrification is thereby part of the social agenda of a larger restructuring of the economy” (p. 89). Of particular note in this type of explanation is the marked lack of human actors being the ones who make gentrification happen—rather, the gentrifiers are simply responding to the neoliberal market when it offers beneficial economic opportunities.

In the other explanation, gentrification is attributed to institutionalized racism. Specifically, this phenomenon is driven by housing and home loan policies that discriminated against POCs, forced them to live in undesirable neighborhoods, and ultimately devalued these areas, thus making the properties prime neighborhoods for gentrification. For example, Estrada (2017) explains the historical roots of gentrification in East Los Angeles through homeowner associations prohibiting POCs from living in certain areas. Deed restrictions kept these minoritized populations from purchasing or living in homes in white neighborhoods (except as servants), and consequently, the neighborhoods where minoritized populations were able to find housing had lower property value and higher concentrations of non-white residents. These neighborhoods were often redlined, meaning that the homeowners loan corporation and the federal housing administration calculated that there was too much risk to lend money to these neighborhoods, thus making it harder to invest resources in rebuilding or restoring the area. In turn, this artificially inflated the value of property in white neighborhoods and deflated the value

of property in minoritized neighborhoods, thereby creating the devalued neighborhoods that serve as grounds for gentrification.

This dissertation ascribes to the latter explanation of gentrification, particularly in the understanding that gentrification is driven by individuals making calculated decisions based on factors that they believe benefit themselves and their family and that systemic racism restricts these beneficial opportunities as well as access to said opportunities for POCs. I build on this idea by including education opportunities, specifically bilingual or dual language programs, as an additional consideration that may draw gentrifiers to a devalued neighborhood.

1.3.1 Gentrification and Education

This idea of a link between gentrification and education is not a novel idea. However, while researchers have begun to examine this relationship, there is still much that we do not yet know. Most of the literature at this intersection is related to school choice and gentrification, finding that school choice weakens the bond between community and school, since residents are no longer tied to attending the neighborhood school, and increases the likelihood of white families gentrifying a less wealthy neighborhood of color (Candipan, 2020; Pearman & Swain, 2017).

Similarly, DeSena and Ansalone (2009) find that “[b]y choosing schools outside the local community, gentry families are ‘doing’ social class...and perpetuating the educational structure of tracking” (p. 61). Therefore, these families are able to live in gentrifying neighborhoods while still participating in normative behaviors, such as sending their children to the ‘right’ school. D. Smith and Higley’s (2012) research on rural gentrification found that in cases where school attendance is tied to residence location, middle-class families move specifically for schools, which often results in—or further contributes to—gentrification of those non-urban neighborhoods. Other studies on more traditional types of gentrification (e.g, Davis & Oakley, 2013; DeSena 2006) echo these findings, noting that even the creation of charter schools in underprivileged neighborhoods may not have fully altruistic motives:

charter schools may be a part of a benevolent urban revitalization agenda aimed at improving blighted communities, or they may be a conscious tactic on the part of the middle-class white newcomers entering revitalized neighborhoods...to separate their children from the ‘threat’ of bad schools and the poor and minority students who fill them. (Davis & Oakley, 2013, p. 83)

Thus, the incoming gentrifying families have the economic and social capital, as well as institutional knowledge of the school system, to obtain coveted spots in the charter schools, while long-time residents' children remain in the pre-existing school, unable to access the charter school.

Butler, Hamnett, and Ramsden (2013) find that “there is clear evidence of ‘exclusionary displacement’ and ‘displacement pressure’ in terms of education and specifically the choice of schooling” (p. 556), meaning that those who have the social and economic capital to position themselves to receive the most benefit from a school system tend to shut out those with less power and less capital from accessing good schooling. Butler et al. conclude that “displacement remains a key indicator of gentrification but we suggest that it manifests itself increasingly in the field of education, and in particular, over school choice” (p. 557).

De Sena's (2006) research presents evidence that gentrification leads to further stratification and segregation in terms of school selection, not a mixing of the higher-SES gentrifiers and the lower-SES historic residents. So, even though families of different income levels may live in the same gentrifying neighborhood, the children's educational experiences are unlikely to be similar due to the differences in parents' understanding of and ability to navigate the school system.

That being said, some research has found that gentrification does not have a direct impact on academic outcomes, as measured by achievement in math and reading. For example, Keels, Burdick-Will, and Keene (2013) find that schools do not gain aggregate academic benefits from SES changes due to gentrification. However, they note that this outcome may be due to the highly mobile low-income families, as they do not stay in schools long enough to experience the benefits that come with gentrifying families. Additionally, it may not be possible to determine a more accurate calculation of academic benefits from SES changes, given the difficulties associated with tracking those who are displaced or have otherwise left the district.

1.3.2 The Intersection of Gentrification and Dual Language Programs

Overall, the fact that researchers have found relationships between gentrification and school choice and argue that “gentrification can also lead to manifestations of non-residential displacement” (Butler et al., 2013, p. 556) suggests that there is likely to be a meaningful correlation between bilingual education programming and gentrification. Given the academic

benefits of bilingual education, it would make sense that some subset of PSE families would consider schools and districts with DLE particularly desirable and leverage their capital to access this educational opportunity, potentially at the detriment of the PSLs historically served in bilingual programs. Given the increase in the demand for DLE among middle to upper-middle class populations, it is possible that the manifestation of gentrification through displacement is key to explaining its relationship to trends in bilingual education.

In a critical ethnographic study of a DL program⁵ in Texas, Heiman and Murakami (2019) found that gentrification in the neighborhood around an urban elementary school first caused a drastic drop in enrollment, as historic families were getting priced out of apartments and the new, higher-income residents' children opted to transfer to schools outside of the neighborhood, but when administrators ramped up their DL program, parents from across the district began vying for seats at the school. In short, the school was initially considered to have “too many bilingual kids” (p. 461), but once the DL program reframed Spanish as a resource that PSEs could obtain, the school experienced a reverse exodus where families from outside its neighborhood were willing to make the commute for the DLE opportunity.

Other research supports this idea, that the availability of DLE is unevenly distributed and more often accessed by those who have more resources (Flores & García, 2017; Morales & Rao, 2015; Palmer, 2009). Thus, many PSLs who would benefit from a bilingual learning environment are relegated to English-only EL-designated programs, while PSEs who can relocate to gain access to these programs or leverage capital in order to bring these programs to their local school are the ones who get access to these programs, potentially at the cost of historically served populations. Valdez et al. (2016) call this “a kind of gentrification, that is, an influx of more privileged inhabitants into a ghettoized neighborhood while less privileged residents are priced or pushed out” (p. 604). Heiman and Murakami (2019) echo this sentiment, describing the situation their school of study experienced as “a dual gentrification process” (p. 454) where neighborhood gentrification pushed out lower-income, Spanish-speaking families

⁵ Note that the authors use the term “two-way bilingual” instead of “dual language” in their publication. However, they define the term in the same way that dual language is, as bilingual programs where English-dominant students are integrated with students who primarily speak a language other than English. For the sake of continuity and clarity in this literature review, I use “dual language” or “DL” where the authors use “two-way bilingual” or “TWBE.”

through high rents and higher-income, English-dominant families who were better equipped to commute long distances for school filled the vacated seats.

In alignment with the Heiman and Murakami study, I hypothesize that there are more than just metaphorical connections between the trends of devaluation, reinvestment, and displacement that define gentrification (Lees et al., 2010) and are paralleled in bilingual education trends. However, while popular media (e.g., Larson, 2020) has drawn attention to issues of gentrification manifest in DL programs and largely echoes the findings of the qualitative studies discussed previously, there is no scholarly research as of 2023 that addresses the statistical relationship between DL programs and gentrification.

Drawing from my reading of bilingual education and gentrification research and my own personal experience with gentrification, I propose that these two phenomena impact each other in a significant, measurable way, based on three overarching ideas.

First, the question of whose bilingualism is valued: Research shows that the value assigned to an individual's bilingualism is dependent on their linguistic background and whether or not they present as a person belonging to a minoritized population (Freire et al., 2017). In short, the whiter and more English-oriented a person is, the more their bilingualism is valued, and the more desirable bilingual education is for parents of these children.

Second, there is the influence the community around a school has on decisions that school administrators make. Given that community members, particularly parents with social and economic capital, have the ability to lobby schools for programmatic opportunities that they believe will benefit their children the most, it stands to reason that offerings at a school reflect the preferences of its community (or at least, the preferences of those with the capital and sense of entitlement to make requests of the school).

Third, I hypothesize that gentrification may affect the view of bilingualism held by the general population in a neighborhood. Often, the population in the U.S. that gentrifies is the population whose bilingualism is valued and who value bilingualism for its social capital: they tend to be wealthier and display more white social markers. In having these attributes, they are also better positioned to make their voices heard by school and district administrators. Alternatively, these populations with more social and economic capital also have more mobility, thereby increasing their ability to relocate in order to gain access to desired resources, such as schools with bilingual programs.

In summary, it could be that gentrifiers bring a specific valuation of bilingualism, based on their linguistic and cultural backgrounds, to a neighborhood that drives the demand for bilingual programs, or it could be that gentrifiers specifically move to a neighborhood that already has a bilingual program and magnifies its desirability. A third option, as described in Heiman and Murakami's ethnography (2019), is that gentrification prices out historic, bilingual populations and schools rebrand their bilingual programs to appeal to higher-income, English-dominant populations within the school district (but not necessarily residents of the school's neighborhood). Through this process, the school experiences a sort of gentrification within the school that mirrors the neighborhood demographic shift.

In the next chapter, I expand on this idea of asymmetrical motivations for bilingualism and use it as a lens to relate a theoretical framework of Interest Convergence (Bell, 1980) and Racial Capitalism (Leong, 2013) to this dissertation study.

CHAPTER 2

Current Study

2.1 Theoretical Framework and Theory-Based Hypotheses

In both gentrification and trends in bilingual education programming, there is an element of societally-devalued capital belonging to disenfranchised, marginalized populations⁶ that is an extension of their identities, and of this capital increasing in social value when it is obtained by people with more social and economic capital. In order to better unpack these similarities and highlight mechanisms that support a correlation between the two phenomena, I propose a theoretical framework that uses asymmetrical motivations for bilingualism as a lens to put Interest Convergence (Bell, 1980) in conversation with Racial Capitalism (Leong, 2013) and form a theoretical connection between gentrification and trends in DLE. I also offer hypotheses based on each section of this theoretical framework that inform this study's research questions and statistical models.

In the context of this study, I define race as a non-scientific, socially constructed, constantly evolving way of categorizing people based on a number of factors that include, but are not limited to, phenotypic characteristics, cultural affiliation, and geographic ancestry. I differentiate ethnicity from race in that ethnicity is centered around the countries and cultures individuals consider as part of their heritage. I define nationality as the status of being a member of a particular country or sovereign state. In recognition of those who identify as belonging to a country but are not legally documented, I do not consider legal citizenship a synonym for nationality. Lastly, I define racism as any form of discrimination, prejudice, marginalization, and/or violence that is based on the perceived or self-identified race of an individual or group of individuals and seeks to establish and/or perpetuate a superior/inferior hierarchy of races.

2.1.1 Using Critical Race Theory in Quantitative Research and in Instances of Language

Before diving into each section of this theoretical framework, it is important to recognize that the two main theories in this framework, Interest Convergence and Racial Capitalism, come from

⁶ In the case of gentrification, I posit real estate as capital, and in the case of the bilingual education programming, I posit bilingualism (or the prospect thereof) as capital, as embodied through enrollment in a bilingual program.

Critical Race Theory (CRT). CRT promotes “studying and transforming the relationship among race, racism, and power” (Delgado & Stefancic, 2017, p. 3) and also stresses the importance of qualitative research’s ability to examine stories and counter-stories as well as counter the racist history of quantitative research.

2.1.1.1 Critical Race Theory and Quantitative Research

Given that this dissertation is a quantitative study that leverages nation-wide datasets, it may initially seem poorly aligned with the spirit of CRT. However, I draw on the QuantCrit body of literature to support my usage of a theoretical framework that is largely informed by CRT.

Gillborn, Warmington, and Demack (2018) offer a framework of five principles to guide the practice of quantitative CRT:

- (1) the centrality of racism
- (2) numbers are not neutral
- (3) categories are neither ‘natural’ nor given: for ‘race’ read ‘racism’
- (4) voice and insight: data cannot ‘speak for itself’
- (5) using numbers for social justice (p. 175)

Building on the idea that racism is a central idea in our society that is not easily quantifiable, this framework urges quantitative researchers to push back on the idea that numbers are a neutral and definitive answer to research questions. Rather, this framework encourages a critical understanding of the mechanisms behind the statistical models that interrogates normative attitudes toward math as free from racial bias. In particular, it urges quantitative researchers to interrogate the way that categories, particularly those related to race and dis/ability, are incorporated into the explanation of findings, as “[w]here ‘race’ is associated with an unequal outcome it is likely to indicate the operation of racism but mainstream interpretations may erroneously impute ‘race’ as a cause in its own right as if the minoritized group is inherently deficient somehow” (p. 171). Additionally, this framework tasks quantitative researchers with emphasizing the experiential knowledge of minoritized populations in data interpretation and challenging dominant assumptions that lead to misunderstanding and misrepresentation of the data.

In my dissertation study’s framing, modeling, analysis, and discussion, I have endeavored to adhere to Gillborn, Warmington, and Demack’s five principles by adopting a perspective that

runs counter to the English-only mindset that is dominant at many levels of the US education system. My goal in this work is to offer equity-oriented research that offers a baseline picture of the current state of DLE in the US as well as how neighborhood demographic change is related to the existence of (and, by extension, access to) these programs. While this study was not able to gather novel qualitative data to capture the experiential knowledge of minoritized populations involved in DLE and use those data to contextualize my quantitative findings, this study was designed with the stories of racially and linguistically minoritized populations in mind. Additionally, its findings will provide support for existing qualitative research that foregrounds individual experiences of PSLs in DLE and also provide important new information for future studies.

2.1.1.2 Applying Critical Race Theory to Language Research

I acknowledge that race and language are two very different concepts, and in the US there is a particular tendency to conflate race, ethnicity, and language. However, I argue that this tendency to conflate race, ethnicity, and language is what makes the use of CRT so salient in research that examines the different ways in which society values languages, depending on who is speaking.

To support this idea, I draw on LangCrit,⁷ which considers the intersection of CRT and Critical Language Studies. Crump (2014b) defines LangCrit as an ecosocial lens that: 1) acknowledges that racism is a real part of everyday society; 2) accounts for socially constructed and negotiated hierarchies and boundaries among social categories, such as language, identity, and race, which constitute a continuum of possibilities from fixed to fluid; 3) embraces and seeks out the intersectionality of different dimensions of identity; and 4) emphasizes how local language practices and individual stories are connected to broader social, political, and historical practices and discourses through nested relationships that are woven together through webs of social relations. In short, LangCrit is a framework for theorizing how the axes of seen and heard intersect to shape individual possibilities for becoming (220).

LangCrit proposes that language and race are socially mediated and located at the intersection of the subject-as-heard and the subject-as seen informs the identities that are imposed on, assumed

⁷ While other critical theories of language and race, such as LatCrit, include similar ideas, I specifically draw on LangCrit because its scope is not limited to just one LOTE and is inclusive of multilingualism.

by, and/or negotiated by an individual (Crump, 2014a, 2014b). In many cases, people’s multiple and intersecting linguistic and racial identity markers do not fall neatly within normative institutional definitions, thus causing a tension between the identity that society imposes on a person based on their physical appearance and/or dominant language(s) and that a person assumes for themselves, based on the way they choose to perform their own identity. This results in a negotiated identity, which merges aspects of their institutionally and individually constructed identities.

Most salient to this study is the concept of an imposed identity, or the identity that is assigned to an individual by those around them. Pavlenko and Blackledge (2004) propose that “in some settings languages function as markers of national or ethnic identities, in others as a form of symbolic capital or as a means of social control, and yet in others these multiple roles may be interconnected, while multilingualism is appropriated to construct transnational consumer identities” (2). I argue that this is not a monodirectional relationship. For example, as a woman of Asian heritage who has similar facial features as others with roots in Southeast and East Asia, I am frequently asked by strangers or casual acquaintances if I speak Chinese.⁸ Parsing this interaction, we can see that there are three main confluences happening simultaneously: 1) race with physical appearance; 2) race with ethnicity or ethnic background; and 3) language knowledge with race and/or ethnicity. In short, the conflation can be conceptualized as physical appearance = race = ethnicity = language knowledge. This is supported in the literature on both educators’ and students’ racialized experiences in school related to how they look, how they speak, and their use of non-Westernized names (e.g., Huo, 2020; Kubota et al., 2021)

Building on the four ideas central to LangCrit, I propose that when considering motivations for bilingualism, and by extension, for joining a DL classroom, Given that this research is trying to better understand who potentially has access to DLE, in order to expand on extant research as well as set up future research into why people are motivated to enroll in a DL program, I propose that it is also important to consider individuals as those who are imposing identities on others, as well as being those who have identities imposed on them (Tenets 2 and 3

⁸ Occasionally, the person will specify Mandarin or Cantonese, but most of the time the person specifically uses the term “Chinese.” This is unsurprising, as a person who assumes that all Asians speak the same language would probably not think to make a distinction between the languages, dialects, and forms spoken in China.

of LangCrit). When students join a DL classroom, they are simultaneously navigating their personal identity and their imposed identity, as well as imposing identities on others as they work to make meaning of their surroundings and their relationship with others as well as position their bi/multilingualism in respect to broader practices and discourses surrounding language (Tenet 4 of LangCrit). While many people understand the difference between race, ethnicity, and language knowledge, the institutionalized ways of conceptualizing race, ethnicity, and language mean that everyday interactions still must contend with this conflation and with the racism embedded in our socially constructed understanding of language and language use (Tenet 1 of LangCrit). In the subsections for each element of this theoretical framework, I offer a rationale for applying each theory to the case of gentrification and DL programmatic offerings.

2.1.2 Asymmetrical Motivations for Bilingualism

Asymmetrical motivations for bilingualism stem from the interaction of a speaker's linguistic and cultural background with the social prestige assigned to the language(s) spoken and societal expectations of speakers based on their background and physical appearance. These factors involve a complicated dynamic, as “[d]ifferent racial and ethnic positions produce vastly different power relationships between learner and language” (Freire et al., 2017, p. 278). As Hélot and De Mejía (2008) put it:

While bilingualism in internationally prestigious languages is generally considered worthy of investment of considerable sums of money, as it provides access to a highly ‘visible,’ socially accepted form of bilingualism, ...bilingualism in minority language leads, in many cases, to an ‘invisible’ form of bilingualism in which the native language is undervalued and associated with underdevelopment, poverty, and backwardness. (p.1)

Consequently, bilingualism is considered a commodity or extra cultural capital for native English speakers, and more so for those who are white and upper or middle class (Block, 2015), but non-native English speakers' deficiency in English is often highlighted over their multilingual competencies (e.g., Marshall, 2009; Valenzuela & Rubio, 2018). Conversely, speakers of languages other than English also must navigate the positionality associated with the specific dialect that they speak, whereas English speakers learning these languages in schools tend to be taught the dialect that is most accepted in international contexts. Additionally, a person's background and physical appearance invite different expectations and reactions from others:

[B]ecause of intersectionality with normative whiteness, a) someone classified as a person of color who acquires a prestigious language variety through formal schooling may not be awarded the full privileges of elite multilingualism and b) someone classified as white who acquires a stigmatized language variety through contact with a local community might be able to display this knowledge without receiving the same stigma. (Valdez et al., 2016, p. 607)

The bilingual skills that students learn in these programs are often considered differently, based on the speaker's background. For example, Freire, Valdez, and Delavan (2017) point out, "In the case of DL programs, the adding of bilingualism to someone with the property of white racial privilege is seen as increasing their economic resources and privilege...while the fostering of bilingualism in Latinas/os is seen as a problem or threat" (p. 277). Similarly, in instances where a person not of Asian heritage may be considered educated and worldly for being able to speak Mandarin, people of Asian heritage might be admonished for speaking Mandarin in public and 'alienating' those who do not understand the language.

In the context of bilingual classrooms, these asymmetrical outsider perspectives and internalized attitudes impact the reasons why parents send their children to these programs and how students understand the significance and relevance of these classes. In the case of DL programs, many PSE families view the program as a way to acquire a language other than English as an extracurricular or to increase their social capital (Freire et al., 2017). Other PSEs are interested in the program because the language other than English is a part of their own cultural heritage and wish to strengthen linguistic ties to their family roots (De Mejía, 2002). On the other hand, PSLs and their parents could want to maintain their home language while learning English, or they may view the program as simply a way to fulfill the necessity of learning English (Valdéz et al., 2016).

The social, racial/ethnic, and linguistic dynamics at play in asymmetrical motivations for bilingualism have implications for gentrification as well. Given that residents of a neighborhood tend to attend a school within their local school district, if not the specific school zoned for their location, community newcomers who move in order to access specific academic opportunities will choose a location based on their own specific set of motivations and conceptualization of what constitutes high-quality instruction. Since gentrifiers are often characterized as being richer and whiter populations—the same that would reap higher social capital and prestige from elite

bilingualism—it is not unlikely that they might be attracted to a neighborhood because of its access to a bilingual program, and that the neighborhood might have previously belonged to populations of the lower-SES, minoritized language speakers that bilingual programs have historically served.

2.1.2.1 Hypotheses Stemming from Asymmetrical Motivations for Bilingualism

Hypothesis 1: Gentrified neighborhoods are more likely to have DL programs because gentrifiers tend to be of the population that is more likely to be in a position of linguistic power and would not only be able to lobby for these programs, but also gain more social capital and prestige from these programs due to elite bilingualism.

Hypothesis 2: However, if PSE’s motivation for bilingualism is purely for prestige and social capital, they may also be interested in pursuing other educational opportunities for resume-building. Since charter schools can be leveraged to make public education more exclusive and research suggests that they are linked with gentrification, the existence of these schools will impact the relationship between gentrification and DLE.

2.1.3 Interest Convergence

Interest convergence posits that societal changes and evolutions that are beneficial to racially minoritized groups actually result “from the self-interest of elite whites” (Delgado & Stefancic, 2017, p. 9). It was most notably used in Derrick Bell’s (1980) publication in the *Harvard Law Journal* on *Brown v. Board of Education*, explaining the failure of school desegregation post-*Brown v. Board of Education* in that

the decision in *Brown* to break with the Court's long-held position on these issues cannot be understood without some consideration of the decision's value to whites, not simply those concerned about the immorality of racial inequality, but also those whites in policymaking positions able to see the economic and political advances at home and abroad that would follow abandonment of segregation. (p. 524)

Thus, post-*Brown* desegregation efforts were largely unsuccessful from the perspective of Civil Rights activists because this landmark decision was not made with African Americans’ interests in mind. Rather, changes were enacted with the mindset of benefiting white people, not moving

closer to racial equality, and Black children continued to experience unequal and inequitable learning conditions.

2.1.3.1 Support for Using Interest Convergence in Cases of Language

In alignment with other scholars who have extended the use of this theory beyond Black and white populations (e.g., Delgado, 2006; Kelly, 2018), I propose that the same concept is just as meaningful reframed as a dominant culture-minoritized culture dichotomy. Similar to Bell's (1980) publication, Delgado (2006) uses Interest Convergence to unpack *Hernandez v. Texas*. This case can be considered as the Latinx community's corollary to *Brown v. Board of Education*, in that it set a precedent for Mexican-Americans to sue for civil rights violations, per the Fourteenth Amendment. Kelly (2018) expands on Delgado's extension of Interest Convergence to the Latinx population by using it to analyze California and Arizona legislation related to dual language program expansion.

Given that Delgado is one of the founders of CRT, I argue that his expansion of Interest Convergence beyond Black-white race relations supports a reframing Interest Convergence as a dominant culture-minoritized culture dichotomy. Although Kelly is not directly tied to the creation of CRT, her study offers support for applying Interest Convergence to cases of language and the particular context of DLE.

2.1.3.2 Interest Convergence, Gentrification, and Dual Language Education

In the context of gentrification, Interest Convergence is at play in the emphasis that is placed on the neighborhood's material and social improvements, at the expense of the historic, largely minoritized populations that are mostly displaced from that neighborhood (and those that manage to remain often do not have as much access to the new benefits as the gentrifiers). Research in the area of social mix policies, or policies that aim to deconcentrate areas of high poverty by supporting development efforts that encourage middle-class settlement in order to achieve socially diverse communities in a policy-led form of gentrification, finds that integration is not sufficient to create meaningful social or economic improvements for the historic residents (Bridge et al., 2012). While the theory behind mixed communities is that socially diverse communities would promote cultural and social tolerance and offer educational and work role models, research suggests that even though people of differing SES may live in close proximity

to each other, those from the lower economic group receive little, if any, added social benefit from interacting with their higher SES counterparts (Joseph, 2006). This aligns with the critique of DLE discussed in Chapter 1, where researchers question whether PSLs are able to fully benefit from the increased access to resources associated with the inclusion of PSEs.

Similarly, research suggests that bilingual programmatic offerings are trending in directions that benefit the wealthier and whiter (but not always white; also elite members of minority groups) populations (Flores & García, 2017; Morales & Rao, 2015; Palmer, 2009). Interest Convergence can help explain the rising popularity of DLE in conjunction with the displacement of lower-income ELs from DL programs: as demand for spots increases with PSEs from socially, linguistically, and economically dominant families who recognize the benefits of bilingualism and have the resources to secure seats when there is a shortage, minoritized families are less able to hold on to seats traditionally filled by ELs. So, when DL programs expand in number and scope, Interest Convergence would explain the growth as motivated by PSEs who want more access to these programs, not by a drive to provide ELs access to instruction in their LOTE or to provide EL-designated students with opportunities for programs shown to have better outcomes than English-only instruction.

2.1.3.3 Interest Convergence through the Lens of Asymmetrical Motivations for Bilingualism

Interest Convergence helps tie language learning to the idea of neoliberal globalization embedded in asymmetrical motivations for bilingualism—that is, when languages are learned for reasons related to economic gain rather than one’s heritage or equity. Given the social capital afforded to PSEs who learn other languages, DL programs become more prevalent and of higher demand due to “the economic globalization benefits multilingualism promises to those in power” (Freire et al., 2017, p. 278). This differential, which contributes greatly to asymmetrical motivations for bilingualism, can also be considered as the driving force behind the interest convergence of increased resources for DLE and richer, whiter populations.

2.1.3.5 Hypotheses Stemming from Interest Convergence

Hypothesis 3: While bilingual education may have been initially implemented to serve EL populations, DL programs' expansion is due to the benefits they offer to dominant populations and their shift from serving minoritized populations to catering to dominant populations.

Hypothesis 4: If DL programs' expansion is driven by their benefits to dominant populations, programmatic decisions, such as LOTEI and recruitment, will likely reflect a catering to this population's linguistic, and educational goals, rather than the historically served, linguistically minoritized populations.

2.1.4 Racial Capitalism

Racial Capitalism is “the process of deriving social and economic value from the racial identity of another person” (Leong, 2013, p. 2152), particularly when white individuals and predominantly white institutions derive social and economic value from nonwhite racial identities. This process “relies upon and reinforces commodification of racial identity, thereby degrading that identity by reducing it to another thing to be bought and sold” (p. 2152). The phenomenon of Racial Capitalism came to be because

[w]e have internalized the idea that racial diversity is a social good, and as a result, we assign value to the inclusion of nonwhite individuals in our social milieu, our educational institutions, and our workplaces. ...Nonwhiteness has therefore become something desirable, and for many, it has become a commodity to be pursued, captured, possessed and used. (p. 2155)

The crux of Racial Capitalism's critique is not the pursuit of racial diversity, but rather, a lack of consideration of the motives and practices behind achieving diversity and the consequent reduction of minoritized people's identities to a commodity from which others profit. Failing to interrogate why diversity or nonwhiteness is desirable in a specific context (or in general, for that matter), as well as the ways that diversity is achieved and enacted, can lead to situations where the diversity exists in a superficial manner or is achieved at the expense of the minoritized people. As Leong explains, “Affiliation with non-white individuals thus becomes merely a useful means for white individuals and predominantly white institutions to acquire social and economic benefits while deflecting potential charges of racism and avoiding more difficult questions of racial equality” (p. 2155). Similar to the common trope of people accused of racism absolving themselves because they know people belonging to minoritized racial and ethnic groups, the

“diversity” achieved through Racial Capitalism is solely for the benefit of the dominant group. This not only puts racially and ethnically minoritized populations at an even greater disadvantage, it also “inhibits efforts at genuine racial inclusiveness and cross-racial understanding” (p. 2155). An important consequence of Racial Capitalism is that it “instantiates the commodification of race and intensifies its harms” (p. 2157). Its concerning repercussions include: damage to integrity of individual identity, demands for certain types of identity performance, impoverishment of discourse around race, fostering racial resentment via inhibiting reparative work, and prioritizing racial representation at thinnest and most tokenistic state, thereby detracting from antidiscrimination goals.

2.1.4.1 Rationale for Using Racial Capitalism in Cases of Language

While Leong’s theory draws a distinction between the racial capitalists and the racial capitalized based on the actors’ race (i.e., white vs. racially minoritized), I extend Leong’s conceptualization of who holds the power to assign value to others. Similar to how gentrification has expanded beyond the idea that only white people can be gentrifiers, I propose that while white people and predominantly white institutions are emblematic of the dominant cultural power in the United States, racial capitalism can be performed by non-white people and non-predominantly white institutions who are acting in ways that align with and perpetuate the dominant culture. I also propose that the diversity valued by the dominant culture extends beyond racial diversity, particularly when considering the case of institutions. For example, in institutions of higher education, which Leong discusses while explaining Racial Capitalism, departments of diversity and inclusion often cover race, ethnicity, sexual orientation, socioeconomic background, and religious beliefs. I argue that minoritized populations in each of these groups can be viewed and treated as capital in the same way that racially minoritized populations are.

2.1.4.2 Racial Capitalism through the Lens of Asymmetrical Motivations for Bilingualism

With this understanding, Racial Capitalism can also be extended to bilingualism and bilingual education programs, especially DLE, when considering what motivates students to participate in these programs and what they ‘get’ from participating in these programs.⁹ While many PSLs

⁹ It is worth noting that the reality of these DL programs is not as clearly dichotomous as Leong’s theory and much of the research would suggest. For example, there are families that do not easily fit into the PSE or PSL category,

may be participating as a way to maintain their heritage language and ensure that they are able to communicate with family and community members, PSEs may see these programs simply as stepping stones to their future academic and career goals. As Flores and García (2017) bluntly state, “Latinx children are treated as a commodity to boost the résumés of white middle-class children” (p. 26). As universities gain capital from the presence of racially minoritized students, PSEs gain capital from being in the same classroom as PSLs.

DeMejia (2002) helps to further connect Racial Capitalism with bilingual education through her discussion of elite bilingualism, where learning a second language is viewed as “part of an ethos of social, cultural, and economic advantage” (41) and “prized symbolic capital” (42) related to that advantage, but is not essential to their ability to function in society. In other words, PSEs may join bilingual programs in order to benefit from the educational opportunities and associated cultural capital without being cognizant of the history of racism, discrimination, and marginalization at their foundation, and institutions will promote these programs not because of the demand from and benefits for the PSL population, but rather, for the PSE population.

2.1.4.3 Racial Capitalism and Gentrification

The theory of Racial Capitalism has been used to analyze the appeal of Chinatowns in major cities, such as San Francisco and New York City, to gentrifiers. These neighborhoods were once the only place where people of Chinese descent could live, due to racist and discriminatory housing policies (Takaki, 1998). However, developers and real estate agents market this space to would-be gentrifiers as “an exotic yet chic neighborhood on the cusp of a major transformation” (Naram, 2017, p. 51), erasing the area’s history so that “the distinctive features that were a result of discriminatory pressures are now an attraction for more affluent residents” (p. 51). Racial Capitalism “degrades nonwhiteness by commodifying it and that relegates nonwhite individuals to the status of ‘trophies’ or ‘passive emblems’” (Leong, 2013, p. 2156), as illustrated by the historic residents and residences of Chinatowns being exoticized for the purpose of selling real estate and offered as a token of the buyers’ cultured and eclectic sensibilities. Through the lens

having some characteristics of each group, and there are students whose cultural and linguistic affiliations do not align with society’s expected phenotypical associations. Additionally, there is not yet any published literature that asks PSE students and parents about their motivations for enrolling in a DL program. However, these theoretical connections, which paint the relationship between minoritized and majority actors in somewhat broad strokes, provide a starting point for the exploration of new connections between bilingual education programming and gentrification that can generate findings that will inform adjustments to the model, to better reflect reality.

of Racial Capitalism it becomes clear that the cultural and racial identity imbued in these spaces, that are a testament to these people's historic perseverance through discriminatory pressures and racist legislation like the Chinese Exclusion Act, become an "exotic commodity" that is attractive to more affluent residents who do not belong to the historic community and may not be fully aware of the space's history.

More broadly speaking, gentrifiers can be of any race or ethnicity; their impact on underserved neighborhoods and the historic residents remains the same. Similarly, bilingual people do not necessarily have to be white in order to reap benefits that are asymmetrically in their favor. This interpretation of dominance helps extend the theory of Racial Capitalism to gentrification through the idea of the "racial fix," which is "a consensus-building process to inflate value in a speculative market reliant on the historical legacies of racism" (p. 102). Mumm posits that "The racial fix relies on an overarching narrative of increased value associated with white people, white space, white symbols, and white public consumption—framed against local others" (p. 108). That is, the juxtaposition of whiteness—whether performed by white people or by people of color who adopt white social markers—against the backdrop of the historic minority residents makes a space seem like it has a higher value.

2.1.4.4 Hypotheses Stemming from Racial Capitalism

Hypothesis 5: Gentrification and DL programs share a link because populations that gentrify tend to be of dominant populations that would view DL programs and bilingualism as valuable commodities, due to the power differential between whiteness and nonwhiteness.

Hypothesis 6: For dominant populations, the match between DL programs' LOTE of instruction and their linguistic heritage does not factor as heavily into LOTE preference as it would to minoritized populations because the motivations are more likely to be driven by a commodification of bilingualism.

2.1.5 A Unified Theory

Through the dual lenses of Racial Capitalism and Interest Convergence, united by the concept of asymmetrical motivations for bilingualism, it is possible to discern a common social mechanism that has the potential to drive both gentrification and programmatic trends in bilingual education. Interest Convergence helps unwrap the positive benefits: the minoritized, former inhabitants of

these spaces are able to benefit, at least to some degree, from the increased resources and other offerings by the dominant, more privileged newcomers attract, but it is still evident that these improvements were not made with the minoritized population's interests in mind. Racial Capitalism offers an explanation for why these minoritized spaces have become desirable to dominant populations and are reinvested in, but at the expense of the minority populations. Asymmetrical motivations for bilingualism connects Interest Convergence and Racial Capitalism to issues of language and power, particularly the ways in which society values people's bilingualism differently, based on their racial, ethnic, and cultural background. Due to this differential valuation of bilingualism, PSLs and PSEs are differently motivated to participate in DLE and may treat the program, the languages of instruction, and their peers differently, based on these issues of language and power.

Thus, I propose that parallel trends in DL programs and gentrification are connected because both are centered on spaces that are devalued and under-resourced when inhabited by minoritized people, but increase in value and access to resources when more culturally and economically dominant groups, often (but not always) white and middle or upper class, join those spaces. Consequently, the already-privileged group become the beneficiaries of the increased value and resources while the historic residents are edged out. PSEs who join bilingual education programs because they recognize the benefits may not be aware of the exclusion and marginalization that linguistic minorities experience in the United States education system and that are further complicated by language/learner power relationships. Instead, PSEs' parents focus on these programs' potential to provide their children with valued linguistic capital useful for exchange within global markets.

While it is true that two phenomena that can be explained through the same theory are not necessarily connected, it is highly possible that gentrification and bilingual education programming trends are. Given that the intersection of gentrification and education research has shown that gentrification is often driven by education choices (Pearman & Swain, 2017; D. P. Smith & Higley, 2012) and that schools and districts are, in turn, impacted by their neighborhoods' gentrification (Davis & Oakley, 2013; DeSena, 2006), it is not so much of a leap in logic to imagine that the programmatic offerings at schools may be a factor in this relationship. This is particularly apt in the case of bilingual education programming when considering asymmetrical motivations for bilingualism and that gentrifiers are usually of the

population whose acquisition of a language other than English would be viewed as an enrichment of their social capital.

Asymmetrical motivations for bilingualism, Interest Convergence, and Racial Capitalism suggest that a regression model examining the relationship between gentrification and DL programmatic offerings should include variables that express 1) the existence of DL programs; 2) the student population's language program needs, in order to capture the dominant/minoritized dichotomy expressed in each component of my theoretical framework; 3) the languages involved in the DL programs, as asymmetrical motivations for bilingualism highlights the need to consider the power dynamics between learner and language; 4) the (mis)match between languages used in the DL programs and languages used by residents of the neighborhood; and 5) whether or not a neighborhood went through gentrification. In addition, the model should control for change in districts' per capita spending, in case districts simply add more programs as their funding increases.¹⁰ It is also important to account for charter status, as charter schools may influence the relationship between gentrification and DL programs.

In Appendix A, I offer a table that connects the three theories of my theoretical framework with my five hypotheses and five model components. To answer these research questions, I propose two regression analyses, using the aforementioned variable constructs, in order to examine the correlations expressed in my research questions.¹¹

2.2 Research Questions

Thus, my dissertation study seeks to answer the following research questions:

- 1a. How many schools and districts had DL programs during the 2019-20 school year?
- 1b. What are the similarities and differences in the types, amount, and specificity of dual language programmatic information publicly available online at the Department of Education, District, and School levels?

¹⁰ To be fair, given the connection between property value and school funding, it is quite possible that gentrification can be driving increases in district funding, which impacts per capita spending. I discuss my rationale for using district finances as a control variable in the Control Variable: District Finances subsection.

¹¹ A cross-time component would certainly make this analysis even more interesting, as we would be able to track which came first, gentrification or these DL programs. I would argue that while DL programs may exist in a limited sense pre-gentrification, the program does not expand in number or scope in the district until after gentrification. However, there is not enough extant data on DL programs to test this hypothesis, as my novel dataset, which only captures programs in existence during the 2019-20 SY, is the only data of its kind. Nevertheless, I am eager to test a cross-time in future iterations of this data, when I am able to gather data longitudinally.

- 2a. How strongly does having a dual language program correlate with neighborhood gentrification, controlling for the pre-gentrification percentage of EL-designated students and district spending per student?
- 2b. Does the level of gentrification that a neighborhood experiences impact the correlation between gentrification and having a dual language program?
- 2c. Do different levels of access to DL programs change the ability of a DL measure to predict gentrification?
3. How does charter school status impact the relationship in RQ2?

CHAPTER 3

Methods and Analysis

3.1 Data Sources

In alignment with much of the research on gentrification, I use data from the US Census Bureau to measure economic and demographic change in neighborhoods. The Census Bureau collects nationwide economic and demographic data through its Decennial Census and the ongoing American Community Survey (ACS). While the Decennial Census surveys every household in the country, ACS data is collected from a sample of approximately 3.5 million addresses, every month of every year. From these responses, the Census Bureau calculates estimates for the entire country, based on one-year and five-year ranges of data. This study uses data from the 2000 Decennial Census as well as the 2011-2015 and 2015-19 ACS five-year estimates.

One difficulty in using census data for longitudinal analyses of geographic areas is that the boundaries for its geographical units of analysis (e.g., blocks, block groups, and tracts) are redrawn for every decennial census. This means that while a tract may have the same GeoID over multiple decennial censuses, the land it encompasses may not necessarily be exactly the same. Given that I define neighborhoods in a geographic sense, it is important that my measure of gentrification operationalize census data in a way that is longitudinally consistent and can account for these changes. Therefore, I used Geolytics' Neighborhood Change Database (NCDB) to compare census tracts over time. Geolytics leverages a proprietary algorithm to norm

data to 2010 census tracts. This accounts for the boundary re-drawing that occurs prior to every decennial census and allows for an apples-to-apples comparison of census data.

The Census Bureau and the National Center for Education Statistics (NCES) have collaborated through the Education Demographic and Geographic Estimates (EDGE) program, which puts census data in conversation with school and district geospatial data. This study leverages the EDGE dataset that aggregates census data to school district catchment areas as well as EDGE's GIS (Geographic Information System) data that geolocate schools and districts and link them to census tracts. Using Census Bureau, NCES, and NCDB data, I am able to link school districts to census tracts, and thereby determine whether or not a district's census tracts experienced gentrification.

For data related to school district enrollment and finances, I use NCES' Common Core of Data (CCD) Local Education Agency (School District) Universe Survey data. These data are collected annually from all public schools and districts in the US.¹²

Lastly, there is no publicly available dataset for DL programs nationwide, so I collected my own data for this. I offer more details on the data collection process in the next section of this chapter.

3.2 Novel Data Collection

While the US Census Bureau and NCES offer access to most of the data necessary to create a regression model that relates neighborhood gentrification with school districts and DLE, DL programmatic data simply is not available at the national level and is not consistently available at the state or district levels. In this section, I present the data collection protocol I used for collecting my own, novel data on DL programs in all 50 states and Washington, D.C. in order to answer RQ1 and create a DL variable for regression models to answer RQs 2 and 3. Appendix C offers a discussion of extant DLE/bilingual education directories and organizations that I reviewed for possible use in this study and my reasoning for ultimately deciding against their inclusion, in favor of collecting my own data.

¹² In specific, these types of school districts were not included in this analysis: state agencies providing elementary and/or secondary level instruction; federal agencies providing elementary and/or secondary level instruction, other education agencies, and specialized public school districts. In the case of independent charter districts, the schools are included in this analysis, but they are associated with the non-charter school district in whose catchment area the school is located. The protocol for simplifying the NCES school and district directories to this study's scope is available in Appendix B.

3.2.1 Novel Data Sources

In order to create my own dataset of DL programs extant in the US, I performed a systematic search of Washington, D.C., and state Department of Education (DOE), district, and school websites for information that would evidence 1) the existence of DL programs and 2) specify which schools (or other sites) house them. Data were collected in two rounds (March-June 2020 and August-September 2020) and only included programs in session during the 2019-2020 school year. The Texas data were anomalous and required additional data verification, which took place in October-December 2020. This dataset contains 4,395 schools and 1,035 districts with DL programs. Appendix D details the data search protocol as well as exceptions to the protocol. More information about Texas' unique situation can be found in Appendices E (data verification protocol) and F (data cleaning protocol and errata).

Data collection proceeded state by state in each round of data collection, with the second round largely serving to ensure uniformity of data collection methodology, due to the steep learning curve in understanding how DOEs, districts, and schools present and store information related to DL programs on their websites. For each state, data collection started at the DOE level by using Google and the DOE website's embedded search bar to search for the keywords "dual language," "dual immersion," and "bilingual education." I also searched the DOE's data page for relevant datasets. If the DOE site did not offer data or listed under 250 schools, data collection proceeded to the district and school levels (in the case of under 250 schools, this was done to verify that the list was accurate). I decided on the cutoff at 250 schools based on 1) the amount of time I was able to spend on each state and meet dissertation deadlines and 2) the fact that DOEs that listed over 250 schools tended to list hundreds more than 250, and checking that many schools simply wasn't feasible, given time constraints. The only two states impacted by the 250 cutoff were California and Texas; Texas ended up being a special case and is specifically discussed later in this section.

The decision to not double check DL data from DOEs that listed over 250 schools may impact my findings because these states are more likely to have incomplete or outdated data that omits newer program sites and contains defunct program sites. Consequently, this raises the likelihood that my analysis would be capturing inaccurate relationships between DL program existence and neighborhood demographic change. However, I decided that this was a reasonable

risk, as missing a handful of schools out of 250 or more would be a proportionately lower impact than missing 2 or 3 schools out of a list of 10. Additionally, it could be argued that having over 250 schools with DL programs suggests a well-established, large-scale implementation of DLE that is likely to have institutional structures that track these programs and keep their data up-to-date.

I searched districts and schools simultaneously, first through Google searches and then within links offered on the sites that appeared to be relevant matches, given the preview. If a school's webpage was a positive match, I searched its associated district website to see if there were other schools with programs. If a district reported 20 or more programs, I did not check school sites for confirmation. If the Google search returned a news article, blog, or organization's webpage that listed or otherwise named schools with DL programs, I searched the relevant school and district sites for corroborating evidence.

I counted programs if they either A) self-described as dual language, dual language immersion, dual immersion, two-way dual language immersion, one-way dual language immersion, two-way immersion, and/or one-way immersion or B) self-described as language immersion and using a DL instructional model. In the first round of data collection, I found that DL terminology was not used uniformly, sometimes even within the same webpage. I decided that it would be better to err on the side of including too many programs—that is, to include some programs that might not technically be DL, rather than exclude DL programs due to an issue of terminology usage.

I recorded schools as having a DL program if there were any sort of information to substantiate the program's existence at a specific site, such as teacher websites, staff directories, and school handbooks. If there were evidence of a district having a DL program but no mention of which school(s) housed the program, I recorded data for the district and coded the school site as missing. The only exception to this rule was if the district site stated the program's grade range and there was only one school (or sequence of schools) for that range. I only surveyed portions of websites available to the general public (i.e., not behind a password-protected portal or requiring special permission to access). As noted previously, my data collection protocol is available in Appendix D.

From these online sources, I collected data on program site, grade range, LOTE used for instruction, the term that the program uses to describe itself, the instructional model (specifically,

the time distribution for each language of instruction), whether or not there is information at the DOE and/or district level, URLs for relevant websites, and notes related to finding and deciphering the information available online. More detailed descriptions and decision rules on each of these items can be found in Appendix D. The protocol used to clean these hand-collected data and link them, using a fuzzy merge algorithm, to NCES identification (ID) numbers for analyses is available in Appendix G. A log of updates to my DL dataset over the course of the data cleaning process can be found in Appendix H.

The Texas data were gathered differently from the data from other states used in this study. Given the large number of districts and schools in Texas, it was simply not feasible to use the same Google search methodology implemented for other, smaller states. Fortunately, Texas' DOE offers a dataset that names schools with bilingual education programs in the 2019-20 SY, but it does not name the specific type of program. I was able to supplement these data with a second DOE dataset, from the Texas Academic Performance Report, that indicates the specific type of bilingual program implemented in schools, but only for schools with grades that participate in standardized testing. (Texas data errata are discussed more in Appendix F).

Instead of starting Google searches from scratch, I only searched for districts and schools listed in the Texas DOE's dataset as having students enrolled in bilingual education. The data verification protocol in Appendix E was used by the author and a hired research assistant. (Assistance was necessary due to the already-narrowed list of districts and schools having over 2000 entries). During this process, it became apparent that DL programs that exclusively enrolled PSEs (sometimes called dual language immersion, dual immersion, or language immersion) were not always included in this dataset. Therefore, I performed a final Google search, following the standard data collection protocol described in Appendix D, for dual language immersion, dual immersion, and language immersion programs that were in session during the 2019-20 SY. These additional sites were added to the list created from the data verification process.

In addition to the data collected from these websites, I also saved the websites as pdfs or screenshots (favoring pdfs but using screenshots if the website's formatting or layout would not save properly as a pdf) and downloaded materials from the DOE, district, and school websites that evidenced these DL programs' existence. Over the course of the data collection period, I amassed around 2,000 digital artifacts that amount to approximately 4.5 GB of data. To

aggregate these school-level DL data to the district level, in order to merge with the NCES and census data, I followed the protocol detailed in Appendix I. In the specific case of charter schools, I decided to associate them with the non-charter district in whose catchment area they are located. This was largely motivated by the fact that EDGE data only extend to non-charter, public school districts. A more detailed problematizing of this data situation, as well as the way I used geospatial data to match charter schools' locations with district catchment areas, is offered in Appendix J.

3.2.2 Novel Data Limitations

While the data I have collected are more comprehensive than any publicly available dataset or directory, they are not complete. Short of contacting schools individually, there is no guarantee that every DL program in the US public school system is included. In general, the completeness of my data is limited by 1) the availability of online data and 2) the terminology used by districts and schools to define programs.

The biggest limitation is that there is strong evidence that not all DL programs are represented online, but there is no way to know exactly how many are not. North Carolina's DOE data, which include programs' date of inception, suggest that a lack of DL program evidence on a school or district website does not necessarily mean that a program does not exist. Their 2019-20 list of programs includes some that reported beginning in Fall 2019, indicating that the school had to have reported the program that year and that the program existed that year. Despite this, there was no evidence of said program on the associated school or district website. Given that over 70% of DOEs did not offer DL information, it is possible that other states have this issue, but it would be impossible to discern the extent of the missing data through online means.

Beyond the simple evidence of a program's existence online, there was also a wide variety in the level of detail available about individual programs. In extreme cases, the district has online evidence that a program exists, but does not say which schools have DL classrooms, and none of the school websites have any evidence. This variable availability of information online also limits the analyses that can be performed.

As I discuss more in depth in the findings section, the data collection process revealed inconsistencies in the terms used to name DL programs and the manners in which specific terms

were employed. Since I decided to err on the side of inclusivity, it is possible that my dataset includes programs that do not follow DL instructional approaches but use the associated terminology.

3.3 Qualitative Methodology

In order to answer both parts of RQ1, identifying the number of DL programs extant during the 2019-20 school year and characterizing state and nation-wide trends in DL programs based on the information available online, I used grounded theory (Strauss & Corbin, 1997) to analyze the programs' website data through an emergent coding method (Lincoln & Guba, 1985).

Subsequent rounds of coding were broadly guided by themes related to a) the institutional level at which this information was available, b) the types of information available, and c) how accessible the information was.

3.4 Quantitative Methodology

In order to explore the relationship between the constructs of interest, I use a logarithmic regression analysis which positions whether or not a neighborhood experienced gentrification as the outcome variable and uses existence of DL program, language match, pre-gentrification district finances, pre-gentrification proportion of EL designated students, and charter status as predictor variables.

Given the exploratory nature of this study, I used my theoretical framework in conversation with themes and findings from extant literature to develop iterations of measures to operationalize these constructs of interest in a logarithmic regression model. Table 1 summarizes the measure iterations described in this chapter and links them to the variable abbreviations used in the regression models. Appendix K offers an in-depth discussion of how these constructs of interest relate to my theoretical framework as well as the decision-making process of selecting specific measure iterations to test. Appendix L provides more background on difficulties in defining gentrification.

Table 1***Summary of Constructs and Variables Used***

Construct	Variable
G Binary: at least one/none of the tracts associated with the district catchment area gentrified in the 2000-2017 period	G ₁
G Binary: at least 25%/less than 25% of the gentrifiable tracts associated with the district catchment area gentrified in the 2000-2017 period	G ₂
G Binary: at least 50%/less than 50% of the gentrifiable tracts associated with the district catchment area gentrified in the 2000-2017 period	G ₃
G Binary: at least 50%/less than 50% of all tracts associated with the district catchment area gentrified in the 2000-2017 period	G ₄
DL Binary: has/does not have DL	DL ₁
Percent of schools in district that offer a DL program	DL ₂
Ratio of DL schools to students in LEA	DL ₃
Language Match Binary: at least one/none of the top three LOTES in district are included in the DL program	LM ₁
Percent of tracts where the top language selection is English only	LM ₂
District expenditure per capita, converted to Z-score	ZF
Percent of EL-designated students in district (1998-99 SY)	EL
Charter Binary: district has/does not have at least one charter school	C ₁
DL Charter Binary: district has/does not have DL charter schools	C ₂
Percent of schools in district that are charter schools	C ₃
Percent of charter schools in district that are DL	C ₄

The two general formats of models tested were

$$G_i = \beta_0 + \beta_1 DL_i + \beta_2 LM_1 + \beta_3 C_i + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_i = \beta_0 + \beta_1 DL_i + \beta_2 LM_1 + \beta_3 C_i + \beta_4 DL_i * \beta_5 LM_1 + \beta_6 DL_i * \beta_7 C_i + \beta_8 LM_1 * \beta_9 C_i + \beta_{10} DL_i * \beta_{11} LM_1 * \beta_{12} C_i + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

Where variables with the *i* subscript had measure iterations switched in, and when the charter status variable was linked to existence of DL program (i.e., C₂ and C₄), the charter status variable was incorporated as an interaction with the DL variable. Appendix M lists all the model equations. I used forward stepwise regression to gauge the benefit of adding each variable, stopping when either all variables are included or there are no more statistically significant variables to include in the model (based on Wald chi-square p value, $\alpha = 0.05$). Overall, I tested 72 iterations of the models.

First, I ran an exploratory set of regression models of all combinations of variables (36 models, listed in Appendix M, Set 1). This exploration used the full dataset as a proof of concept (to answer RQ2a) as well as to determine if any individual or set of measures were consistently non-significant. EL, the variable for percentage of EL-designated students in a district during the 1998-99 SY, was consistently non-significant across models, so it was dropped for all subsequent iterations.

After the preliminary models ran, I tested iterations of models without the EL variable (Appendix M, Set 2) in order to explore how different combinations of the constructs of interests' metrics, discussed in Appendix K, predicted whether or not a school district experienced gentrification. I analyzed the models that iterated on the gentrification measure to answer RQ2b, of whether there is an "amount of gentrification" beyond which having a DL program is no longer a reliable predictor. Similarly, I analyzed the models that iterated on the DL measure to answer RQ2c, of whether different levels of access to DLE impact the relationship between DL and gentrification. Lastly, I analyzed the iterations of the charter school variable to better understand the interplay of gentrification and school choice in the relationship between DLE and gentrification.

CHAPTER 4

Findings

4.1 RQ1: Identifying DL Programs and Exploring Similarities and Differences in the Types, Amount, and Specificity of Programmatic Information Publicly Available Online

Overall, I identified 1,034 districts and 4,395 schools that had a DL program in the 2019-20 school year.¹³ Eight districts did not offer information on which school(s) housed their DL program, so the count of 4,395 schools is an underestimate of the total number of schools with a DL program.

While there were 29 languages¹⁴ represented in DL programs nation-wide, 80.0% of districts offered one LOTEI for their DL program, 13.4% offered two choices, and 6.6% offered three or more.¹⁵ By far, Spanish was the most popular LOTEI, with 94.2% of districts' programs offering a Spanish DL strand. The second most popular language group was Mandarin, Cantonese, or other Chinese languages, with 15.3% of districts with a DL program offering at least one language in this group as the LOTEI.

Out of 50 states and the District of Columbia, 5 states (Alabama, Arkansas, New Hampshire, North Dakota, and West Virginia) did not have online evidence of DL programs on DOE, district, or school websites. In general, there were more DL programs at the elementary level than at the middle or high school levels. Information on elementary programs, particularly in kindergarten and first grade, was more often available and more easily accessible than information related to middle school or high school programs. Since acceptance into DL programs from second grade onward tends to be predicated on prior participation in a DL program, or at least level of language proficiency in the LOTE, it makes sense that higher grades

¹³ For the quantitative portion of this study, I forced charter districts into non-charter districts based on catchment areas, which resulted in 935 districts.

¹⁴ This count does not include programs' whose language is not specified (i.e., the language does not appear on any webpage or the language is categorized as "other").

¹⁵ Twenty-seven districts did not specify a LOTEI and are not included in the calculation of these percentages. It is, however, likely that these 27 districts only offer one LOTEI, as most programs only offered one LOTEI. One possible interpretation is that these programs are geared toward PSE populations, whose decision-making process may rank the concept of bilingualism higher than specific LOTEI in the decision-making process of whether or not to participate in a program.

would not have as much of a digital footprint, since they would be re-enrolling students as they progress through the program, rather than soliciting newcomers' applications.

Across the US, there is a wide spectrum of breadth and depth of DL programmatic information that public education institutions offer online. These can be broadly characterized as differences in 1) the institutional level at which this information is available; 2) the level of programmatic detail offered (e.g., target languages, grade levels served, program model, etc.); and 3) the treatment of LOTEs.

4.1.1 Institutional Level of Data Available

4.1.1.1 Department of Education

Out of 51 DOEs, 15 offered a list of DL programs. Some (e.g., North Carolina) offered a wide range of program-specific information such as individual sites' date of inception, programmatic choices, and current participation in research projects. Others (e.g., Louisiana) only included programs that met specific criteria. Some offered these data as a downloadable document or report (e.g., California), while others listed programs in the webpage's text (e.g., Nebraska). Of these 15, only five had 100% of programs that were evidenced on district and/or school webpages, but 11 had at least 90%. Having an accuracy under 90% could be explained by having data self-reported by schools and districts (e.g., Colorado and Illinois), information dated prior to 2019 year (e.g., Washington), or only state-certified DL programs (e.g., Louisiana). Four DOEs included DL programs that could not be verified on their district or school website.

4.1.1.2 District

Of non-charter school programs, 79.8% were reported at the district level. Overall, there was no discernible pattern to describe which of these programs had information at the district level and which ones did not. One possible interpretation is that 1) increased attention to DL programs at the DOE level is not necessarily reflected at the district level, and 2) districts with more DL programs are not more likely to offer more comprehensive information about which of their schools have DL programs.¹⁶ Furthermore, there was no apparent trend for districts with only one program, as 49.7% did not offer information at the district level, while 50.3% did.

¹⁶ Preliminary correlation analyses of a program having information at the district level and at the DOE level ($r=-.161$ $p<.001$) and the number of programs in a district and percentage of those programs being reported at the district level ($r=.231$ with $p<.001$, respectively), reveal statistically significant, negligible to low correlations which further supports this qualitative finding.

4.1.1.3 School

Of the three institutional levels, the school level was most likely to contain information about a DL program. This was partially due to having the most lenient criteria (see Section 3.2.1 for more information on the criteria used to determine whether or not a webpage contained information about a DL program), but also because school websites tended focus only on programs specific to the school, thus having a smaller set of information to share, in comparison to districts and DOEs.

4.1.2 Level of Programmatic Detail and Accessibility

4.1.2.1 Programmatic Detail and Uniformity

Most of the DL program websites contained information related to location, LOTEs used for instruction, application instructions, and people to contact for more information. Less frequently, these websites offered details about the program model or ratio of LOTE to English used in instruction, grade range of the program, possible continuation programs, and/or rationales for bilingual education.

Although the most noticeable form of information conflict between institutional levels was whether or not a program existed, there were also varying degrees of information overlap. Generally, schools' pages offered the most information, followed by the district's, and lastly the DOE's. Sometimes, schools within the same district would offer different amounts of information, despite being part of the same DL program.

Additionally, the terminology used for DL programs was not consistent. The terms "dual language," "dual language immersion," "dual immersion," and "language immersion" were all used to describe programs that instructed in English and a LOTE and included both PSEs and native speakers of the LOTE. Sometimes different terms would be used at the DOE, district, and state levels; occasionally, multiple terms would be used interchangeably on the same webpage.

Also, there were conflicting usages of "one-way" and "two-way" as program modifiers. "One-way" could indicate that the program caters only to PSEs, or it could indicate that the program caters only to native speakers of the LOTE. Other times, it seemed to indicate that more instruction would be in the LOTE, but the program was open to all linguistic backgrounds. "Two-way" generally indicated that the program was designed for both PSEs and PSLs, but sometimes it seemed to indicate simply that two languages were used for instruction.

4.1.2.2 Accessibility

While many DL pages were easily accessible and highly visible, many were not. The sources of difficulty can be distilled down to 1) variety in the categorization of DL programs, 2) unconventional forms of program evidence, and 3) multiple website hosts.

There is no federal standard for categorizing DL programs, and this is reflected in the unpredictable ways that DOEs, districts, and schools nested their DL program webpage within the larger departments' pages. For the most part, DL program webpages were linked through pages dedicated to EL-designated student education or world languages, or they appeared as separate pages linked through a prominently placed icon on the home page. However, not finding a DL webpage in one of these locations was not necessarily indicative of no DL program.

At the district level, DL information was frequently nested in curriculum-related pages, linked through a page of notable programs available to students, or mentioned in district-wide announcements when soliciting applications for the upcoming school year. Sometimes, the only mention of DL programs was in unexpected places, such as a search option embedded in a district-wide school locator map, within a tab titled "Honors," or in archived Powerpoint presentations or handouts. Alternatively, some districts had a webpage for the DL program that did not list school sites. In these cases, school-level evidence came from sources such as staff directories, program applications that listed site options, and district or school meeting minutes.

In general, it was easier to sift through results from the website's search bar, rather than to attempt to navigate the website. However, if schools were hosted separately from the district (e.g., on Weebly or Google Sites), this greatly limited the functionality of the district's search bar as it could not search pages outside of its web domain. In short, finding information on DL programs often was difficult and frustrating. Indeed, the second round of data collection described in Section 3.2 was largely intended to ensure data collection uniformity, given the steep learning curve for navigating these websites.

4.1.3 Treatment of LOTEs

In general, the English text was prioritized on the DL webpages. All webpages had information in English, but no webpage had information exclusively in a LOTE. DOE websites were least likely to offer information in LOTEs beyond mandatory translation options. Districts with a

variety of languages in their DL programs tended to use English only. On multilingual sites, English text was almost always placed at the top of the page and/or in the left column. This is most likely where people would start reading, as US public schools' websites prime viewers to expect left-to-right and top-to-bottom reading conventions. If the website offered separate pages for each language (i.e., two webpages with the same information, but one in English and the other in a LOTE), the link for the English version was almost always placed above or to the left of the link for the other version. Again, this order positioned the English information to be first, according to left-to-right and top-to-bottom reading conventions.

While there were many examples of program websites that expressed value of bilingualism regardless of the speaker's English language proficiency, there were also many English-centric attitudes toward LOTEs. The most conspicuous was the treatment of Mandarin and Cantonese DL programs. Out of 221 programs, 168 described the LOTE as "Chinese," with no further specificity. While the use of "Chinese" may be helpful in a bureaucratic sense, in that it offers a tidy way to signal that the program offers instruction in a language that is spoken in China, it is reductive to categorize language programs as such. Not only can this cause confusion through lack of specificity, one possible interpretation is that this tacitly implies that all forms, dialects, and/or¹⁷ languages spoken in China are the same, or that the difference wouldn't matter to potential applicants or participants.

4.1.4 Describing the State of DL Programs in the 2019-20 School Year

Given the spectrum of findings and the overall heterogeneity of the data, it is difficult to characterize DL programs as a nation-wide whole. As an additional complication, it is important to recognize that DL programs are only a small component within the larger institution of education, which is known to perpetuate the dominant group-minoritized group power dynamics. Even if participants and proponents of these programs do not agree with this mindset, they still have to find ways to operate within these limits. However, there are consistent themes of decentralized programs, a focus on elementary grades, and information that is English-centric and difficult to locate. One possible interpretation of these themes suggests underlying attitudes related to DL programs, particularly in the value of bilingualism, whose bilingualism is valued,

¹⁷ I purposefully use "and/or," given the difficulties in applying "dialect" and "language" to the way language is used and categorized in China (see: Mair, 1991; Norman, 2003).

and, consequently, the populations that schools, districts, and state departments of education target for enrollment.

The varying degrees of information offered at the three institutional levels suggest varying levels of import and support given to DL programs. In order for a DOE's or district's website to offer up-to-date, detailed information about a DL program, there needs to be ongoing communication and data sharing. The mere existence of a DL website indicates some level of attention, as someone had to consider the program important enough to include on the website and justify allocating the time and resources to create and upkeep the page, particularly because there is no federal regulation. If a program's website has incomplete, outdated, or linguistically one-sided information, it may be the case that fewer resources are directed toward the program, and thereby its webpage maintenance. On the other hand, it could be the case that these programs rely more on word-of-mouth or in-person information sessions to spread awareness and solicit new applications. For example, in circumstances where families may have limited access to the Internet, programs may find that person-to-person dissemination is more successful than pushing online content. In cases such as these, the online content may not be up-to-date because of resources being allocated to other forms of communication.

Furthermore, the categorization of DL websites is indicative of attitudes toward the program. For example, DL websites nested in the ELL/ESL department are more likely to target EL-designated students, while those nested in the world languages department are more likely to cater to PSEs. Students and parents of students in mainstream education may be less likely to think that a program under the ELL/ESL department's purview is open to them, while PSLs may think that a program run by one of the mainstream instructional departments would require a certain level of English proficiency or would otherwise not be geared toward their linguistic needs. DL programs linked in a prominent place on a website's front page or under a tab for "signature programs" signal being highly valued by that institutional level, whereas outdated webpages, those buried in hard-to-find locations, and ones without substantive information may be considered of lesser importance or are otherwise not notable enough for web administrators to monitor the pages' suggest being assigned a lesser importance. Conversely, a low online presence could be due to information being spread at the school level by word-of-mouth, flyers, etc., in order to better target populations that would be deterred by these websites.

Nevertheless, my data suggest that school, district, and DOE websites tend to cater to PSEs. Information can be very hard to find without knowledge of how these websites are organized or what the school and district call the program. Consequently, this online information is often gate-kept by English language proficiency, knowledge of terms often used to describe and categorize DL programs, and technology literacy. This disadvantages people who are more proficient in LOTEs: if people are unable to easily access information about DL programs, they are less likely to know how to access the programs. This could also imply the assumption that PSE families, not PSL families, are the ones leveraging online resources to learn more about the educational opportunities available, and thus it is unnecessary to make the websites LOTE-friendly.

This bias in favor of PSEs is further supported by the barriers to joining DL programs after first grade. In addition to the lack of evidence of DL programs in middle and high school, many websites explicitly stated that new students would not be accepted past first grade, except in special circumstances, due to the increasing bilingual proficiency required for higher grades. Additionally, programs for higher grades were less likely to have online information, perhaps because those who would need the information were assumed to already be in the program. While it is true that monolingual English speakers would have difficulty joining in later years, due to the LOTE prerequisite, this puts native speakers of the LOTE at a disadvantage. Those who were previously unable to participate due to limited enrollment or being a newcomer to the school are less likely to have access to grade-level-relevant program information and thereby less likely to apply, even if the programs have space. This policy, which positions PSEs as the norm, echoes the findings of Freire et al. (2017) that suggest that state-level policies and classroom practices position PSEs as the norm, to the detriment of PSEs.

My theoretical framework of Interest Convergence informed by asymmetrical motivations for bilingualism helps to further unpack these ideas: the value of these programs is augmented through the demonstration of benefits for the dominant population, particularly the prestige assigned to PSEs' bilingualism. Thus, if a program can attract PSE support, it is more likely to continue operating. This is consistent with the existing research. Early proponents of DL education found that the inclusion of PSEs attracted more qualified teachers, more enthusiastic administrative, and more material support such as curriculum and classroom space compared to

traditional bilingual models (Fishman, 1982); recent research on DL programs finds that they continue to cater to PSE populations (e.g., Palmer, 2009; Valdez et al., 2016).

Furthermore, the treatment and presentation of LOTEs on the websites and the extent to which the website foregrounds English text and a normative PSE mindset offers insight to the programs' and institutions' stance on motivations for bilingualism. It is possible that those that deemphasize LOTEs may promote bilingualism as a commodity for PSEs and consider their program's LOTEI as the means to an end. Those that offer truly bilingual websites may be more inclined to promote bilingualism regardless of the speaker's linguistic background and give equal value to both languages because their webpages demonstrate equal attention to information consumers in both languages.

4.2 RQ2: Exploring the Correlation between DL Programs and Gentrification based on Logarithmic Regression Models

When considering the relationship between DL programmatic offerings and gentrification for all districts and neighborhoods in my dataset, I performed two rounds of model testing. First, I tested 36 models, of which 24 models found that the iteration of the DL variable used was a statistically significant contributor (either as a main effect or part of an interaction) in predicting whether or not the neighborhood underwent gentrification. Second, I tested 27 of the aforementioned 36 models on a subset of my data that only included districts with charter schools within their catchment areas.¹⁸

Overall, I found statistically significant correlations between a district having a DL program and its neighborhood undergoing gentrification, though not all measure iterations of the DL variable were statistically significant predictors at all thresholds of gentrification. Specifically, at lower thresholds for gentrification, all iterations of my DL measure were statistically significant, while at the highest threshold for gentrification, only the DL measure that examined potential students per DL site was a significant predictor. This suggests that as the threshold rises for considering a neighborhood gentrified, the measure for DL needs to examine access at a smaller grain size in order to be statistically significant. Lastly, I found that when considering districts with charter schools, DL is only predictive at lower thresholds of

¹⁸ I left out the models that included a has/doesn't have at least one charter school variable, since I limited the dataset to only districts with charter schools.

gentrification and more frequently has an interaction effect with program-neighborhood language match.

Although these findings are logical and expected, particularly given the discourse in bilingual education research that suggests that affluent PSE families are attracted to these programs in increasing numbers (e.g., Heiman & Murakami, 2019; Valdéz et al., 2016), they have important implications for the programmatic access and educational outcomes of DL students. Having confirmation that the trends described in qualitative case studies and reflected in the amount and types of information available online are statistically significant at a national level sets the groundwork for conversations about these programs' admissions and curricular inclusivity as well as future research about how neighborhood demographic change can create—as well as problematize—access to bilingual education.

In this section, I expand on these major findings as they relate to RQ2a, RQ2b, and RQ2c and discuss how each finding builds our understanding of the interplay between DL programs and gentrification. As UCLA's Statistical Consulting Group notes, "When a binary outcome variable is modeled using logistic regression, it is assumed that the logit transformation of the outcome variable has a linear relationship with the predictor variables. This makes the interpretation of the regression coefficients somewhat tricky" (UCLA: Statistical Consulting Group, n.d.). In acknowledgement of the intricacies associated with interpreting these coefficients, I instead use odds ratios, which are a way to summarize the effect a specific variable has on predicting the outcome by dividing the probability of the outcome of interest occurring (in the case of this study, that a neighborhood has gentrified) by the probability that it does not occur. Given that these findings report on trends across models that iterate on measures that express the constructs of interest described in Appendix K, I report odds ratios as a range for the subset of models relevant to the discussion unless explicitly stated otherwise. Although these ranges only take into account the odds ratios calculated for each variable, not the 95% confidence interval for each odds ratio, none of the odds ratios reported included 1 in the confidence interval.¹⁹

¹⁹ While the full record of model testing outputs is not included as an appendix, these outputs can be made available upon request.

4.2.1 RQ2a: How strongly does having a dual language program correlate with neighborhood gentrification, controlling for the pre-gentrification Native English Speaker to English Learner percentage of EL-designated students enrollment ratio and district spending per student?

As a proof of concept, I used simple binary measures to capture gentrification (G_1 , which considers the school district neighborhood as having undergone gentrification if at least one affiliated census tract gentrified) and having a DL program (DL_1 , which captures if a district has at least one school with a DL program), and controlling for charter schools (C_1 , which codes 1 if there is at least one charter school within the school district's catchment area). I also included the non-iterative measures for program-neighborhood language match (LM_1), tracts where "English only" is not the most common linguistic descriptor selected (LM_2), and my control variables for pre-gentrification district finances (ZF) and EL-designated population (EL). This model yields:

$$G_1 = -1.575 + 1.119DL_1 + 1.246C_1 + 0.589LM_2 - 0.230ZF$$

DL_1 is statistically significant ($p < 0.001$) with an odds ratio of 3.302 (odds ratio 95% CI: 2.826 to 3.608). This indicates that having a DL program in the 2019-20 SY, as defined by a yes/no binary, made a school district's neighborhood about three times more likely to have experienced gentrification at some point during the 2000-2017 period. This confirms that there is a correlation between having a DL program and neighborhood gentrification.

Notably, LM_1 and EL were not significant at any step of the forward stepwise regression process. This could be due to the low variation in LM_1 , as most programs offered Spanish as the LOTEI and Spanish was in the top three LOTEs for the majority of census tracts, and high prevalence of missingness in the EL data. However, in the initial rounds of model exploration, LM_1 was statistically significant in many iterations, while EL continued to be non-significant. As noted in the methods section, EL was dropped from subsequent iterations, so the models discussed in the rest of this chapter do not include this variable in the stepwise regression. However, LM_2 , which captures the percentage of tracts associated with the school district where the most common language category is "English only," can help to illuminate the population's linguistic needs. In this model, as in all of the other models tested, LM_2 is statistically significant and has an odds ratio greater than 1 (ranging from 1.356 to 2.510). One possible interpretation is that at higher percentages of English-only-dominant tracts, there is an increased likelihood that the school district's neighborhood experienced gentrification. In turn, this may suggest that

gentrified neighborhoods are more likely to have larger English-only populations, and non-gentrified neighborhoods are more likely to have smaller English-only populations.

4.2.2 RQ2b and RQ2c: Does the level of gentrification that a neighborhood experiences impact the correlation between gentrification and having a dual language program? Do different levels of access to DL programs change the ability of a DL measure to predict gentrification?

At the lowest threshold for gentrification (G_1 , which classifies a neighborhood as having undergone gentrification if at least one census tract in the neighborhood gentrified), DL was statistically significant in all models tested. The binary indicator of having a DL program (DL_1) was consistently significant in all iterations of other measures. As a main effect, DL_1 had odds ratios ranging from 3.302 to 4.836, indicating that neighborhoods with at least one school with a DL program were around three to four times more likely to have experienced gentrification. The language match between the DL program and the neighborhood (LM_1) was not significant as a main effect or interaction with DL_1 . None of the charter school metrics linked to existence of DL program were statistically significant, and there were no charter school-DL program interactions to analyze.

The ratio of DL schools to the number of schools in the neighborhood (DL_2) was significant as an interaction with the binary match of neighborhood LOTE with DL program LOTEI (LM_1) but was not significant as a main effect in predicting G_1 . The odds ratios for this interaction were less than 1 (ranging from 0.848 to 0.885), while the odds ratio for LM_1 as a main effect was well over 1, ranging from 4.887 to 8.116. This suggests that there is an inverse relationship between the two constructs. While having the program's LOTEI match the neighborhood's LOTE match makes the neighborhood four to eight times more likely to have experienced gentrification, having program-neighborhood language match in a district with a higher ratio of DL to non-DL schools decreases the likelihood of that neighborhood experiencing gentrification by roughly 15%. One possible interpretation of the DL_2*LM_1 interaction is that when there is a program-neighborhood language match and a lower percentage of the district's schools house a DL program, the school district neighborhood is less likely to have experienced gentrification. The literature on the history and development of bilingual education and DL programs supports the idea that if more schools in a district have a DL program that matches the

linguistic needs of its neighborhood's PSLs, that neighborhood is less likely to have experienced any kind of gentrification and is largely motivated by maintaining cultural heritage (e.g., Valdez et al., 2016).

The ratio of students per school with a DL program (DL_3) was also significant across all iterations predicting G_1 . However, the main effect of DL_3 had odds ratios ranging from 1.177 to 1.290 and was not significant as an interaction with LM_1 . Having odds ratios close to 1 indicates that at this low threshold for gentrification, conceptualizing DL program access in a student grain size has a small predictive ability.

Overall, the different grain sizes of defining access to DLE have different ability to predict whether or not a neighborhood underwent gentrification. Considering program existence/access at larger grain sizes (i.e., binary having/not having and at the school level) contributed more to the odds of a neighborhood experiencing gentrification than the smallest grain size (i.e., students per DL site).

At my intermediate threshold for gentrification (G_2 , which considers a neighborhood gentrified if at least 25% of all gentrifiable tracts gentrified), DL_1 continued to be statistically significant, with odds ratios ranging from 2.436 to 3.237, thus indicating that having a DL program made a neighborhood more 2 to 3 times more likely to have experienced gentrification.

DL_2 continued to be statistically significant as an interaction with LM_1 , but only in three out of the four iterations tested at this level of gentrification. Its odds ratios were closer to 1 than in the models for the previous iteration of gentrification (ranging from 0.898 to 0.928). It may be the case that at this higher threshold of gentrification, the interaction of having more schools in the district with a DL program and matching LOTEI with the neighborhood's LOTE does not have as great of an impact on predicting whether or not gentrification occurred.

At this intermediate threshold for gentrification, DL_3 was statistically significant as an interaction with LM_1 , but not as a main effect. In this round of modeling, the odds ratios hovered near 1 (ranging from 1.074 to 1.097). The shift from main effect to interaction effect could be interpreted as the interaction of having less access to DL programs (i.e., more potential students per site) and having program-neighborhood LOTE match increasing the odds of that neighborhood having experienced gentrification by a factor of approximately 1.8. One possible interpretation is that as gentrification becomes established in a neighborhood, the area is considered more "desirable" and attracts more residents. As the number of new residents

increases, there is more potential competition for seats in a DL program, but these programs are still intended to serve the PSL population.

At my highest threshold for gentrification (G_3 , which considers a neighborhood gentrified if at least 50% of all gentrifiable tracts gentrified), DL_1 and DL_2 were no longer statistically significant as main effects or interaction effects. DL_3 was significant as a main effect, but only for the models that used iterations of the charter school variable that were independent of DL status (i.e., C_1 and C_3 , which measured charter status as a has/does not have a charter school in the district and the percentage of schools in the district that are charter schools, respectively).

Interestingly, the directionality of its impact switched, with odds ratios of 0.928 and 0.934 indicating that having a higher student to DL school ratio lowered the odds that at least 50% of census tracts in the neighborhood experienced gentrification. This suggests that at high levels of gentrification, there tends to be greater access to DL programs in terms of the number of potential students per site. One potential explanation, which is in line with literature on the gentrification and education, is that gentrifying families bring resources to their new neighborhood and are better positioned to ensure that their children benefit from these resources (e.g., Davis & Oakley, 2013; DeSena, 2006; DeSena & Ansalone, 2009; D. P. Smith & Higley, 2012) That is, schools can benefit from the property taxes generated by gentrifiers' more expensive homes, and gentrifier families are better equipped to advocate for program creation. On the other hand, it could be that the increase in access to DL programs is not due to self-serving motivations from the incoming gentrifiers. Rather, the influx of resources attributable to rising property taxes may allow administrators to finally fund their wish list of programs to better serve specific populations of students.

While the DL measures were statistically significant in fewer model iterations at this highest level of gentrification, the variable for percentage of tracts where the most commonly spoken language was not "English only" (LM_2) was statistically significant across models (odds ratios ranging from 1.372 to 1.435), as was LM_1 as a main effect (odds ratios ranging from 1.443 to 1.733).

In a way, LM_1 is also a measure of DL, as a district must have a DL program in order for there to be a language-program match. However, it is more difficult to tease out how the language match component on its own characterizes the relationship between DL and high levels of gentrification. This difficulty can largely be attributed to the blunt nature of its binary

calculation and the construction of this measure resulting in a lower sensitivity to changes in raw population numbers, as long as the comparative ranking of the LOTE's remains the same. Therefore, it could be that this language match is only picking up on the fact that some percentage of the historic PSEs whose community started the neighborhood's DL program have not yet been displaced from the neighborhood. Alternatively, this language match could be indicative of gentrified school districts being mindful of PSE's linguistic needs and using increased funding from higher property taxes to support this population. A third interpretation is that these DL programs are a way to stratify the students, similar to charter school's hypothesized utility in gentrifying neighborhoods (e.g., Davis & Oakley, 2013), thereby separating the gentrifiers from the historic residents.

There are several possible explanations for why the relationship between DL programs and gentrification is so different at the highest threshold of gentrification, compared to the lowest and intermediate thresholds. For example, this could be an issue with the arbitrary, but not capricious, thresholds I set to capture different levels of gentrification: only 1,826 districts (including both districts with and without DL programs) had at least 50% of gentrifiable tracts gentrify, compared to 2,812 districts with at least 1 gentrified tract and 2,461 districts where at least 25% of gentrifiable tracts gentrified. As the number of districts meeting these thresholds—and by extension, the number of districts with DL meeting these thresholds—decrease, it becomes more difficult to discern a correlation. This might be remedied in future research by employing different modeling techniques, or even using machine learning algorithms.

On the other hand, it could be that this highest threshold of gentrification is unintentionally capturing a more specific subset of school district neighborhoods than I intended. While I conceptualized this metric as a proxy for level of gentrification, it may also be conflating district size with some aspect of this measure, particularly since so few school district neighborhoods meet the highest threshold's criteria. Given that this threshold is proportionate to the number of tracts identified as "gentrifiable" at the beginning of the gentrification period, a district affiliated with 2 gentrifiable census tracts would only need one tract to gentrify to reach this threshold, whereas a district affiliated with 20 gentrifiable tracts would need at least 10 tracts to gentrify. This would create an additional barrier for districts with higher numbers of gentrifiable tracts to meet this threshold. Still, while school districts affiliated with more census tracts may have a higher barrier to meet a 50% gentrification threshold, they also have a higher

probability of being affiliated with at least 1 gentrifiable tract, so it would require additional analyses to parse the relationship between the number of tracts a district is affiliated with and its ability to meet specific thresholds of gentrification.

A third possibility is that this change in relationship captured by my models may actually reflect the reality of the relationship between DL and high levels of gentrification. Given that existing research supports the idea that school choice increases the likelihood of white families gentrifying a less wealthy neighborhood of color (e.g., Candipan, 2020; Pearman & Swain, 2017) because this decoupling allows gentrifiers to send their children to the ‘right’ schools (e.g., DeSena & Ansalone, 2009), perhaps what constitutes a ‘good’ school is linked to neighborhood demographics. Thus, at lower thresholds of gentrification, there is a stronger link with opportunities to separate their children from non-gentrifier children in school, such as through DL programs or other limited occupancy programs that require applications. Conversely, when gentrification has permeated a community to such a large degree that at least half of the gentrifiable tracts have gentrified and the neighborhood has reached a level of saturation with higher income, higher social capital families, parents consider it a ‘good’ neighborhood with a ‘good’ local school. Thus, the issue of school choice and choosing schools based on educational opportunities that researchers posit encourages neighborhood gentrification is not as large of a factor in describing the relationship between education and gentrification.

4.2.3 Validation of Findings without California, Illinois, New York, or Texas Data

California, Illinois, New York, and Texas are all considered long-serving EL destinations where bilingual education has been implemented for a significant amount of time, which begins well before my gentrification period. In order to better explore this historical facet of bilingual education, and to determine whether or not the correlation between gentrification and DLE would hold without datapoints from these states, I created a subset of my data that excluded all schools in these four states and re-ran the 36 models I tested on the full dataset. From there, I compared pairs of outputs that used the same model but different datasets to see if there were striking differences between the two.

At the lowest threshold of gentrification, models from this subset behaved similarly to the models when run on the full dataset. While the coefficients and odds ratios were not identical, which is expected, given the differences in datasets used for each set of models, the same

variables appeared in each pair of outputs and the relative ranking of the variables by the magnitude of the odds ratio was also the same for each pair, regardless of dataset used.

At the middle threshold of gentrification, seven of the eight models that included either DL_2 or DL_3 had more or less the same outputs for each pair. Of the seven pairs, the only notable difference was that C_2 and C_4 , the charter school variables that consider DL charter schools, were significant in the full dataset but not significant in the subset. One possible explanation is that DL charter schools are less common outside of the four excluded states, and therefore are less able to be reliable predictive of gentrification. In the full dataset, there were 220 DL charter schools recorded, whereas in the subset without California, Illinois, Texas, or New York, there were only 93. Still, DL_2 and DL_3 behaved similarly in models run on both datasets, except for one instance of DL_2 which was a statistically significant main effect when considering the full dataset, but non-significant for the subset of data.

In contrast to the models leveraging DL_2 and DL_3 , in the four models that leveraged DL_1 to predict gentrification at the middle threshold, the full dataset found DL_1 to be a statistically significant main effect, while the subset included LM_1 in the place of DL_1 (LM_1 was not a statistically significant for the models run on the full dataset). In the full dataset's model outputs, DL_1 had a very close odds ratio to LM_1 in the subset's model outputs and there was a large overlap between the 95% confidence intervals for the odds ratios for these two variables. One possible interpretation is that outside of states with long-established bilingual education programs, the language match nuance to LM_1 , which is, in essence, another measure of the existence of DLE in the district, is more helpful in predicting whether or not the neighborhood has experienced gentrification. Another interpretation is that the language match variable is less meaningful in the four states excluded from the dataset due to Spanish being the most commonly used LOTEI and these states having some of the largest Hispanic populations in the US. Perhaps in states with lower concentration of Hispanic populations, the program's LOTEI being Spanish is more important to predicting gentrification.

At the highest level of gentrification, the outputs had even fewer similarities, though there were still some models in which the DL variable was statistically significant. Similar to the main dataset findings at the highest threshold of gentrification, one iteration of the DL variable was a statistically significant predictor of gentrification. However, for the full dataset, DL_3 was statistically significant as a main effect in 2 out of 12 models, and for this subset, DL_2 was

statistically significant as an interaction with LM₁ in 3 out of 12 models. Another notable difference was that LM₂, the percentage of tracts where "English only" was the most commonly selected language descriptor, was not statistically significant in any of the subset models, but it was statistically significant in all 12 models that used the entire dataset (odds ratios ranging from 1.356 to 1.435). One possible explanation is that in California, Illinois, New York, and Texas, higher densities of English-only populations are linked more strongly to those locations that have experienced gentrification.

These differences in model outcomes when comparing the full dataset's findings to this subset's findings underscores the importance of tailoring quantitative research to specific contexts and being clear and intentional about the grain size of trends examined in an analysis and how those findings are applied to real-world situations.

4.3 RQ 3: How does charter school status impact the relationship in RQ2?

As a whole, the charter school variables had an inverse relationship between the odds ratios and the level of gentrification: at the lowest threshold of gentrification, they had higher odds ratios, while at the highest threshold of gentrification, they either had lower odds ratios or were no longer statistically significant. This is consistent with the existing literature on gentrification and education that posits that charter schools are indicative of gentrification and can be used as a mechanism for families to be part of the public school district while keeping their children separate from less advantaged students (Davis & Oakley, 2013). One possible interpretation of my findings is that at earlier stages of gentrification, where there might be only one or two tracts gentrified, gentrifier parents may be more likely to opt for charter schools. Similarly, it may be the case that at later stages of gentrification, where more than half of the gentrifiable tracts have gentrified, the schools have had more time and more exposure to resources to make changes that appeal to gentrifier families.

C₁ (binary of has/does not have at least one charter school within the school district's catchment area) and C₃ (the percentage of schools associated with the school district's catchment area that are charter schools) were statistically significant in all models that included these measure iterations (C₁ odds ratios ranging from 1.430 to 3.198; C₃ odds ratios ranging from 4.022 to 23.003). This is in alignment with the literature that posits a relationship between school

choice and gentrification (e.g., Candipan, 2020; Pearman & Swain, 2017) as well as charter schools and gentrification (e.g., Davis & Oakley, 2013; DeSena, 2006).

C₂ (binary for if there was/was not at least one charter school with a DL program within the school district's catchment area) was statistically significant in 6 out of 9 models as a main effect (odds ratios ranging from 1.751 to 4.861, and nonsignificant for the highest level of gentrification). Similarly, C₄ (the percentage of charter schools within the school district's catchment area that offered a DL program) was statistically significant in 6 of 9 models (odds ratios ranging from 1.882 to 4.435, and was not significant at the highest level of gentrification).

Both of these iterations on the charter school variable were significant as a three-way interaction with DL₃ and LM₁ in predicting the lowest level of gentrification (C₂ odds ratio of 0.812; C₄ odds ratio of 0.792). One possible interpretation is that at low thresholds of gentrification, the interaction of language match and access to DLE in terms of potential students per DL program site differs based on whether or not there are DL charter schools. In the C₁ and C₃ model corollaries of these models, DL₃, LM₁, and C₁ and C₃ (depending on the model) all have significant main effects with odds ratios over 1, or increased likelihood of gentrification. So, the below-one odds ratios associated with the three-way interaction that emerges with DL-focused charter measure iterations suggest that when there are DL charter schools, program-neighborhood language match, and a larger ratio of students to DL program sites, the neighborhood is less likely to have experienced gentrification. While this may seem to be a very specific set of circumstances, this can help to expand on the gentrifier-charter school relationship described by Davis and Oakley (2013). While charter schools may be used as a mechanism to separate gentrifier families from historic residents, it may be the case that if the charter school is already catering to the historic residents, that school may not be an appealing alternative to mainstream schools. As Heiman and Murakami (2019) bluntly described a DL school as having “too many bilingual kids” (p. 461) to be attractive to English-dominant gentrifiers (that is, until the program was rebranded as a PSE commodity), perhaps this three-way interaction is capturing a similar phenomenon.

As an additional examination of how charter school status may mediate the relationship between DL programs and gentrification, I filtered my dataset to districts with charter schools and re-ran the 24 forward stepwise regression model tests that leveraged C₂, C₃, and C₄. With this subset of data, the DL measures behaved exactly the same between models using the charter

and full datasets, with one exception. In the model predicting the lowest threshold of gentrification using DL_2 , the percentage of DL schools in the district, and C_2 , a binary of whether or not the district has a DL charter school in its catchment area, along with LM_1 , LM_2 , and ZF, DL_2 was significant as an interaction with LM_1 when using the full dataset (odds ratio: 0.848), but DL_2 was significant as a main effect when using the charter subset of data (odds ratio: 0.881).

At the highest threshold of gentrification, the models behaved much more differently when comparing charter vs. full dataset pairs. When using the charter school subset of data, there was only one model at this threshold for gentrification that included the DL variable. Its odds ratio's 95% confidence interval included 1, which indicates that there is likely no association between DL and gentrification. Therefore, no models at the highest threshold of gentrification included the DL variable as a statistically significant predictor of whether or not a neighborhood experienced gentrification. This suggests that when considering districts that have at least one charter school within its catchment area, DL programs are not correlated with gentrification at high levels of gentrification.

Besides the DL variable iterations, there was one other striking difference between the charter set of model testing and the full dataset model testing: when examining districts with charter schools, the program-neighborhood language match variable (LM_1) was more frequently included in models at lower thresholds of gentrification.

In general, this subset analysis revealed similarities in odds ratios and interactions associated with the DL variable when comparing models run on the full data set and the charter school subset to predict the lowest and middle thresholds of gentrification. However, while the full dataset did find DL_3 to be a statistically significant main effect in two of the models predicting the highest threshold of gentrification, the charter school subset of data did not find any iterations of the DL variable statistically significant at this level. This suggests that, while districts with charter schools within their catchment areas may foster a similar relationship between DL programs and gentrification at lower levels of gentrification, that relationship does not hold at higher levels of gentrification.

4.4: Revisiting Six Hypotheses: Dual Language Programs and Gentrification Contextualized by Racial Capitalism, Interest Convergence, and Asymmetrical Motivations for Bilingualism

Overall, the quantitative portion of this analysis highlights the statistically significant relationship between gentrification and DL programs, as well as the way that considering different levels of gentrification and access to DLE can help to illuminate this correlation. The qualitative portion of this analysis interrogates access to information about DL programs, particularly the nonsystematic way that information is disseminated online and how those practices tend to favor English-dominant populations. In this final section of Chapter 4, I discuss these findings in tandem as a response to the six hypotheses laid out in my theoretical framework (Chapter 2).

Hypothesis 1: Gentrified neighborhoods are more likely to have DL programs because gentrifiers tend to be of the population that is more likely to be in a position of linguistic power and would not only be able to lobby for these programs, but also gain more social capital and prestige from these programs due to elite bilingualism.

The quantitative portion of my study supports this hypothesis. The odds ratio associated with DL variables indicates that having a DL program—and having greater access to DL programs—is related to higher odds of the school district’s neighborhood having experienced gentrification. While my qualitative analysis does not delve into the issue of gentrification, it does affirm that DL programs’ online information caters to English-dominant populations. This supports the idea that those with linguistic power whose bilingualism is valued are the ones who are the target audience for these programs.

Hypothesis 2: However, if PSE’s motivation for bilingualism is purely for prestige and social capital, they may also be interested in pursuing other educational opportunities for resume-building. Since charter schools can be leveraged to make public education more exclusive and research suggests that they are linked to gentrification, the existence of these schools will impact the relationship between gentrification and DLE.

The statistical significance of all iterations of the charter school variable in my model testing, coupled with their large odds ratios emphatically supports this hypothesis. My quantitative analysis expands on this hypothesis by adding new information about the interplay of DL charter schools, program-neighborhood language match, and students to DL program site

ratio in predicting gentrification. It is important to note, however, that neither part of my mixed-methods study is able to support or refute the part of this hypothesis related to what motivates specific populations to participate in bilingual education. Future research would benefit from an additional exploration of the relationship between DLE and charter schools.

Hypothesis 3: While bilingual education may have been initially implemented to serve EL populations, DL programs' expansion is due to the benefits they offer to dominant populations and their shift from serving minoritized populations to catering to dominant populations.

My qualitative analysis supports the idea that dominant populations tend to be the target for information and the information is catered to their linguistic needs. It bears noting that the lack of bilingual information on DL websites is not due to an inability to find capable translators. DL teachers could offer this service, or even frame it as a project for their students to apply their skills to a real-world situation. One possible interpretation of the English-only skew to this information is that it is an illustration of the shift (either intentional or subconscious) toward attending to language-dominant populations to the detriment of PSLs.

Hypothesis 4: If DL programs' expansion is driven by their benefits to dominant populations, programmatic decisions, such as LOTEI and recruitment, will likely reflect a catering to this population's linguistic, and educational goals, rather than the historically served, linguistically minoritized populations.

Although I included a program-neighborhood language match variable in my model testing, it is difficult to make a definitive statement about whose language needs drive the LOTEI choice. As my qualitative analysis showed, the overwhelming majority of DL programs used Spanish as the LOTEI. Since Spanish is also the most commonly spoken LOTE in the United States and appeared in the top three LOTEs associated with most census tracts, it is possible that these programs were catering to the needs of their PSL populations. On the other hand, since Spanish is one of the most common languages taught in mainstream language classes, this LOTEI decision could also be motivated by PSE populations who want to prepare their children for future success.

However, the English-dominant program webpages lend support to this hypothesis: if administrators and practitioners decided to offer information in a Westernized, English-centric manner, it is plausible that other decisions made for these programs would similarly be geared toward English-dominant populations.

Hypothesis 5: Gentrification and DL programs share a link because populations that gentrify tend to be of dominant populations that would view DL programs and bilingualism as valuable commodities, due to the power differential between whiteness and nonwhiteness.

My regression analysis did not find any statistically significant interaction between DL programs and linguistic dominance, as defined by percentage of tracts that were predominantly English-only. However, given that this analysis is not causal in nature, it is not correctly positioned to confirm or contradict this hypothesis. Future research would benefit from additional data collection to build a longitudinal dataset of DL programs, which would help uncover if DL programs drive gentrification or vice-versa.

Hypothesis 6: For dominant populations, the match between DL programs' LOTE of instruction and their linguistic heritage does not factor as heavily into LOTE preference as it would to minoritized populations because the motivations are more likely to be driven by a commodification of bilingualism.

My findings are unable to address this hypothesis well, largely due to the lack of variation in program LOTEIs. In gathering data on DL programs, I found that, in most cases, there is only one LOTEI option for a school district. Indeed, 80% of districts only offer one language choice, and 94% of all districts offer a Spanish track in their DL program. Given that this choice is more or less reduced to participating or not participating in a DL program, additional research is needed to adequately respond to this hypothesis.

CHAPTER 5

Discussion

5.1 Connection to Extant Literature

First and foremost, this study contributes to the extant body of literature a snapshot of DL programs in the 2019-20 SY as well as evidence of a statistically significant relationship between gentrification and DLE. While there are meaningful case studies and other qualitative research that capture the stories of bilingual schools, classrooms, and individuals who have experienced the impacts of neighborhood gentrification (e.g., Flores & García, 2017; Heiman & Murakami, 2019; Heiman & Yanes, 2018; Morales & Rao, 2015; Palmer, 2009)

This study also enters the conversation of gentrification and education through the idea of school choice: existing studies suggest that when families are decoupled from neighborhood schools, gentrification is more likely to occur because they are able to reap the social and economic benefits of living in a gentrifying neighborhood but still be able to adhere to normative behaviors such as sending their children to the “right” school or a “good” school, as defined by their social group (Candipan, 2020; DeSena & Ansalone, 2009; Pearman & Swain, 2017).

Moving forward, this study can inform future research that seeks to better understand factors that contribute to gentrification, particularly from an educational context. This study sets a precedent for including DL programmatic offerings when building predictive models that link neighborhood gentrification and schools. It also offers a starting point for future investigations of how programmatic offerings impact neighborhood and school demographic change: if there is a link between DL programs and gentrification, are other specialized programmatic offerings similarly related to gentrification? Lastly, this study provides a way to link the stories about DL programs and gentrification that individuals have shared and package the trends in findings in a way that is attractive to stakeholders outside of academia and research-heavy fields who have leverage to enact lasting policy change. The qualitative studies in my literature review provide a compelling argument for the relationship between gentrification and DL programming. This provides insight into the quantitative side of this relationship, particularly in that districts with a DL program are about three times more likely to have experienced gentrification than districts with no DL program. This national-level understanding underscores the idea that the stories we

hear are not one-off situations that occur in isolation. Rather, they connect to a shared experience across schools, districts, and states and call for policy change that protects access to these programs for all students.

5.2 Limitations

The main limitation of this study is that it does not afford the opportunity to examine individual stories or contextualize the statistical findings with the lived experiences and perspectives of these programs' participants, administrators, and stakeholders or the surrounding communities. While my analysis of online information and regression models sheds light on the dynamics of linguistic power at play in a broad sense, it lacks the ability to explore how the complex relationship of individuals with language and power impact enrollment. My theoretical framework posits that the commodification of bilingualism is driving PSE enrollment, but this cannot be definitively supported or refuted through the data gathered for this study. For example, there may be PSE parents who are interested in DL programs from a social justice standpoint and act as co-conspirators, rather than co-opters. Although the document analysis of DL programs' webpages can offer insight on administrators' and practitioners' valuation of bilingualism, it is not able to definitively characterize what motivates families to enroll their children in these programs.

Furthermore, the decision to enroll can be a conflicted choice for both PSL and PSE parents. Research suggests that students in bilingual education may initially lag behind English-only peers before surpassing them academically (e.g., Lindholm & Aclan, 1991). Thus, parents may find the future social and economic capital associated with bilingualism difficult to justify in face of students' adjustment period when entering a DL program. In addition, PSL parents may consider English only instruction a means to avoid further othering their children and better position them for future job opportunities in an English-dominant environment, thus having to choose between maintaining their heritage language and a potential path to economic security. So, while this study offers insights into macro-level trends related to demographic shift, dual language programs, and access to these programs, it is not well-equipped to offer counter-stories or detailed information about individual perspectives and motivations.

When conceptualizing this dissertation research, I was aware of these limitations and had initially planned to perform a mixed-methods study to ensure that individual voices were not lost

in the aggregation of nation-wide data. However, collecting qualitative data through interviews or observations during the COVID-19 pandemic was not feasible, given restrictions related to social distancing and virtual school as well as the incredible burden placed on educators during these unprecedented circumstances. Now that students have returned to in-person school and we are adjusting to our new normal, this type of research is much more feasible.

5.3 Future Directions

In terms of future research that would directly build on the findings of this study, I hope to further investigate Hypotheses 3, 4, and 6. As noted in the limitations previously discussed, this study did not have definitive answers for these three hypotheses because it was unable to make claims about what drives DL program expansion and what motivates PSE populations to enroll in a DL program. In continuing to update my DL database, I would have sufficient longitudinal data to perform a causal analysis. This would allow for an examination of the connection between program expansion (e.g., more LOTEs included in the program, additional schools with DL programs, more DL classrooms at school sites, etc.) and gentrification.

In addition to a longitudinal DL dataset, application and enrollment data for these programs would help to flesh out the issue of programmatic access. This study examined access to these programs in terms of who had the potential to enroll; having a better idea of who applies for these programs and who is admitted from that pool would offer more insight on to whom these programs cater.

A deeper dive into geospatial data to link schools, their neighborhoods, and census data could help supplement the data NCES collects about the students and families belonging to specific schools and districts. For example, geolocating all schools with DL programs to assess if their locations are correlated with higher income neighborhoods within the school district would build our understanding of access in terms of transportation costs to attend these programs. In addition, having a better understanding of the concentration of DL program sites within a school district can provide more insight into issues of access and barriers to participation. Furthermore, in a more detailed exploration of geospatial data at a nationwide level, it would be possible to look at the distribution of DL program sites across school district catchment areas. This would allow for a consideration of access in situations where students are allowed to apply to programs in neighboring districts.

Lastly, this research has implications for future studies that might be connected to the discussion of school choice and gentrification. Given the statistically significant correlation in Pearman and Swain's (2017) work between school choice and gentrification in conjunction with this study's findings related to DL programs and gentrification, future research on gentrification and education should consider models that account for both school choice and the programmatic offerings that may be driving this choice.

Overall, this study offers an important initial look at the relationship between gentrification and DL programming that lays the groundwork for future research on how asymmetrical motivations for bilingualism impacts and informs programmatic offerings in schools.

5.4 Implications for Education Systems, Policy, and Practitioners/Participants

Since research shows that bilingual education is beneficial for all students (Valdez et al. 2016) but raises questions of equity (e.g., Palmer, 2009), establishing the relationship between gentrification and DL programs can contribute to conversations on how to support the growth of these programs while considering educational and social impacts. My study is the first to explore this statistical correlation, so its main finding, that a district having a DL program is a statistically significant predictor of that district's neighborhood having undergone gentrification, has important implications for policy and schools.

At the policy level, this new knowledge highlights the fact that bilingual education does not exist in a vacuum and is neither a solely PSL nor PSE issue. Meaningful and inclusive policy must take into account both populations, as well as neighborhood demographic shifts. As qualitative case studies suggest that creating or re-marketing an extant DL program to appeal to PSE gentrifiers can bring economic benefits to struggling schools and districts (e.g., Heiman & Murakami, 2019), equity-oriented policy would benefit from thoughtfully considering the push-and-pull dynamic of making the most of new resources that come with changing populations and maintaining a commitment to meet the needs of historic, less privileged populations.

While gentrification is a phenomenon that school administrators and educators are not able to directly affect, administrators and educators should still work to mitigate the negative impacts of neighborhood demographic change that trickle down into schools and classrooms. At the school level, my findings can contribute to and expand the discussion about equity and access

to bilingual education resources, leading to better-informed decisions on what kinds of programming to offer and which populations to target. Program creators and administrators should be aware of asymmetric motivations and valuations of bilingualism. For example, administrators managing DL program enrollment should consider the proportion of PSEs and PSLs admitted to their program and interrogate how equitable access is to this educational opportunity. To be clear, this is not recommending that students be denied entry to a DL program based on their family backgrounds. Rather, DL programs should be encouraged to expand in scope to meet the needs and demands of students. Additionally, DL program administrators and creators should carefully craft the way that bilingualism is presented to students and emphasize the equal value of students' bilingualism, regardless of their linguistic background.

Although practitioners and participants may find themselves limited by policy and programmatic structures, the findings of this study still offer important insights on nationwide trends in DL programming in relation to demographic change in neighborhoods. Even though these findings do not have direct instructional implications, particularly since curricula and pedagogy should be responsive to district, school, and classroom contexts, they suggest that concerns about displacement and access may be a common theme in DL classrooms across the US. Regardless of whether their programs align or contrast with the findings of this study, practitioners and participants can use this research as a starting point for conversations about how to continue moving DLE in a direction that serves all linguistic populations and avoids mixed messaging that values the bilingual toolkits of certain students over others. If both PSE and PSLs are included in the program, practitioners should ensure that both languages are taught in a way that benefits both populations, rather than cater to one linguistic population to the detriment of the other. If the program serves predominantly English-only populations, it is essential to underscore the fact that language learning is more than just résumé building. This could be implemented in a number of different ways, such as finding or developing a learning curriculum that integrates a deeper understanding of the cultures affiliated with the LOTEI into the language learning process.

Overall, this study offers insights into access and displacement issues in DLE from a national perspective and suggests that there may be commonalities in access, enrollment, and displacement patterns.

Works Cited

- Alanis, I. (2000). A Texas two-way bilingual program: Its effects on linguistic and academic achievement. *Bilingual Research Journal*, 24(3), 225–248.
- Alanís, I., & Rodríguez, M. A. (2008). Sustaining a dual language immersion program: Features of success. *Journal of Latinos and Education*, 7(4), 305–319.
- Anand, S. (2019). *Dual Language Learning Programs and English Learners*. Office of English Language Acquisition.
- Baker, B. D. (2014). Evaluating the recession's impact on state school finance systems. *Education Policy Analysis Archives/Archivos Analíticos de Políticas Educativas*, 22, 1–30.
- Baker, B. D., & Corcoran, S. P. (2012). *The Stealth Inequities of School Funding: How State and Local School Finance Systems Perpetuate Inequitable Student Spending*. Center for American Progress.
- Barton, M. (2016). An exploration of the importance of the strategy used to identify gentrification. *Urban Studies*, 53(1), Article 1.
- Bell, D. (1980). Brown v. Board of Education and the interest-convergence dilemma. *Harvard Law Review*, 93(3), 518–533.
- Block, D. (2015). Social Class in Applied Linguistics. *Annual Review of Applied Linguistics; Cambridge*, 35, 1–19.
- <http://dx.doi.org.proxy.library.vanderbilt.edu/10.1017/S0267190514000221>
- Bourdieu, P. (1991). *Language and symbolic power*. Harvard University Press.

- Bridge, G., Butler, T., & Lees, L. (2012). *Mixed communities: Gentrification by stealth?* Policy Press.
- Butler, T., & Lees, L. (2006). Super-gentrification in Barnsbury, London: Globalization and gentrifying global elites at the neighbourhood level. *Transactions of the Institute of British Geographers*, 31(4), 467–487. <https://doi.org/10.1111/j.1475-5661.2006.00220.x>
- Candipan, J. (2020). Choosing schools in changing places: Examining school enrollment in gentrifying neighborhoods. *Sociology of Education*, 93(3), 215–237.
- Cazabon, M. T., Nicoladis, E., & Lambert, W. E. (1998). *Becoming Bilingual in the Amigos Two-Way Immersion Program* (No. 3). Center for Applied Linguistics.
- Chronopoulos, T. (2016). African Americans, gentrification, and neoliberal urbanization: The case of Fort Greene, Brooklyn. *Journal of African American Studies*, 20(3–4), 294–322.
- Cloud, N., Genesee, F., & Hamayan, E. (2000). *Dual language instruction: A handbook for enriched education*. Heinle & Heinle.
- Crawford, J. (1989). *Bilingual education: History, politics, theory, and practice*. Crane Pub. Co.
- Crawford, J. (2004). *Educating English learners: Language diversity in the classroom (5th edition)*. Los Angeles: Bilingual Educational Services.
- Crawford, J. (2006). *English as the “national language”? A political blunder by Republicans*. <http://users.rcn.com/crawj/langpol/NationalLanguage>
- Crump, A. (2014a). “*But your face, it looks like you’re English.*” *LangCrit and the experiences of multilingual Japanese-Canadian children in Montréal* [Doctoral Dissertation].
- Crump, A. (2014b). Introducing LangCrit: Critical Language and Race Theory. *Critical Inquiry in Language Studies*, 11(3), 207–224. <https://doi.org/10.1080/15427587.2014.936243>

- Cummins, J. (1980). The Cross-Lingual Dimensions of Language Proficiency: Implications for Bilingual Education and the Optimal Age Issue. *TESOL Quarterly*, 14(2), 175–187.
<https://doi.org/10.2307/3586312>
- Davis, T., & Oakley, D. (2013). Linking Charter School Emergence to Urban Revitalization and Gentrification: A Socio-Spatial Analysis of Three Cities. *Journal of Urban Affairs*, 35(1), 81–102. <http://dx.doi.org.proxy.library.vanderbilt.edu/10.1111/juaf.12002>
- De Jong, E. J. (2002). Effective bilingual education: From theory to academic achievement in a two-way bilingual program. *Bilingual Research Journal*, 26(1), 65–84.
- De Mejía, A.-M. (2002). *Power, prestige, and bilingualism: International perspectives on elite bilingual education* (Vol. 35). Multilingual Matters.
- Delgado, R. (2006). Rodrigo's roundelay: Hernandez v. Texas and the interest-convergence dilemma. *Harvard Civil Rights-Civil Liberties Law Review*, 41, 23–65.
- Delgado, R., & Stefancic, J. (2017). *Critical Race Theory: An Introduction* (Third edition). New York University Press.
- DeSena, J. N. (2006). "What's a Mother To Do?" Gentrification, School Selection, and the Consequences for Community Cohesion. *The American Behavioral Scientist; Thousand Oaks*, 50(2), 241–257.
- DeSena, J. N., & Ansalone, G. (2009). Gentrification, Schooling and Social Inequality. *Educational Research Quarterly*, 33(1), Article 1.
- Ding, L., Hwang, J., & Divringi, E. (2016). Gentrification and residential mobility in Philadelphia. *Regional Science and Urban Economics*, 61, 38–51.
<https://doi.org/10.1016/j.regsciurbeco.2016.09.004>

- Doucet, B. (2014). A process of change and a changing process: Introduction to the special issue on contemporary gentrification. *Tijdschrift Voor Economische En Sociale Geografie*, *105*(2), 125–139.
- Dumas, M. J. (2013). ‘Waiting for Superman’ to save black people: Racial representation and the official antiracism of neoliberal school reform. *Discourse: Studies in the Cultural Politics of Education*, *34*(4), 531–547.
- Estrada, G. (2017). What’s Good for George Sánchez Is Good for Boyle Heights: Regenerative Scholarship, Urban Racism, Gentrification, and East LA Interchange. *Kalfou; Santa Barbara*, *4*(2), 228–244.
<http://dx.doi.org.proxy.library.vanderbilt.edu/10.15367/kf.v4i2.163>
- Fishman, J. A. (1982). Sociolinguistic foundations of bilingual education. *Bilingual Review/La Revista Bilingüe*, *9*(1), 1–35.
- Flores, N., & García, O. (2017). A Critical Review of Bilingual Education in the United States: From Basements and Pride to Boutiques and Profit. *Annual Review of Applied Linguistics; Cambridge*, *37*, 14–29.
<http://dx.doi.org.proxy.library.vanderbilt.edu/10.1017/S0267190517000162>
- Freeman, L. (2005). There goes the ‘hood: Views of gentrification from the ground up. *Urban Affairs Review*, *40*(4), 463–491.
- Freire, J. A., Valdez, V. E., & Delavan, G. M. (2017). The (Dis)inclusion of Latina/o Interests from Utah’s Dual Language Education Boom. *Journal of Latinos and Education*, *16*(4), 276–289.
- Gándara, P., & Escamilla, K. (2017). *Bilingual Education in the United States* (pp. 439–452).
https://doi.org/10.1007/978-3-319-02258-1_33

- García Matthewson, T. (2016, November 8). Bilingual education can be an asset for white students but a deficit for immigrants. *PBS NewsHour*.
<https://www.pbs.org/newshour/education/massachusetts-dual-language-education-asset-white-students-deficit-immigrants>
- García, O. (2009). Emergent Bilinguals and TESOL: What's in a Name? *TESOL Quarterly*, 43(2), 322–326. JSTOR.
- García, O. (2011). *Bilingual education in the 21st century: A global perspective*. John Wiley & Sons.
- García, O. & Li Wei. (2014). *Translanguaging: Language, Bilingualism and Education*. Palgrave Pivot.
- Genesee, F. (2004). What do we know about bilingual education for majority language students? In T. K. Bhatia & W. C. Ritchie (Eds.), *Handbook of bilingualism and multiculturalism* (pp. 547–576). Blackwell.
- Genesee, F., Lindholm-Leary, K., Saunders, W., & Christian, D. (2005). English Language Learners in U.S. Schools: An Overview of Research Findings. *Journal of Education for Students Placed at Risk (JESPAR)*, 10(4), 363–385.
https://doi.org/10.1207/s15327671espr1004_2
- Gillborn, D., Warmington, P., & Demack, S. (2018). QuantCrit: Education, policy, 'Big Data' and principles for a critical race theory of statistics. *Race Ethnicity and Education*, 21(2), 158–179. <https://doi.org/10.1080/13613324.2017.1377417>
- Glass, R. L. (1964). *London: Aspects of change* (Vol. 3). MacGibbon & Kee.
- Glynn, S. (2008). Soft-selling gentrification? *Urban Research & Practice*, 1(2), 164–180.

- Goldenberg, C. (2008). Teaching English language learners: What the research does-and does not-say. *American Educator*, 33(2), 8–23.
- Goldenberg, C., & Wagner, K. (2015). Bilingual Education: Reviving an American Tradition. *American Educator*, 39(3), 28.
- Heiman, D., & Murakami, E. (2019). “It was like a magnet to bring people in”: School administrators’ responses to the gentrification of a two-way bilingual education (TWBE) program in central Texas. *Journal of School Leadership*, 29(6), 454–472.
- Heiman, D., & Yanes, M. (2018). Centering the Fourth Pillar in Times of TWBE Gentrification: “Spanish, Love, Content, Not in That Order.” *International Multilingual Research Journal*, 12(3), 173–187. <https://doi.org/10.1080/19313152.2018.1474064>
- Hélot, C., & De Mejía, A.-M. (2008). *Forging multilingual spaces: Integrated perspectives on majority and minority bilingual education*. Multilingual Matters.
- Hempel, L. M., Dowling, J. A., Boardman, J. D., & Ellison, C. G. (2013). Racial Threat and White Opposition to Bilingual Education in Texas. *Hispanic Journal of Behavioral Sciences*, 35(1), 85–102. <https://doi.org/10.1177/0739986312461626>
- Huo, X. (2020). *Higher Education Internationalization and English Language Instruction: Intersectionality of Race and Language in Canadian Universities*. Springer Nature.
- Hwang, J., & Sampson, R. J. (2014). Divergent pathways of gentrification: Racial inequality and the social order of renewal in Chicago neighborhoods. *American Sociological Review*, 79(4), 726–751.
- Jackson, J. L. (2003). *Harlemworld: Doing race and class in contemporary black America*. Univ. of Chicago Press.

- Johnson, L. A. (2017, June 28). I Am Learning Inglés: A Dual-Language Comic. *NPR*.
<https://www.npr.org/sections/ed/2017/06/28/534396017/i-am-learning-ingl-s-a-dual-language-comic>
- Joseph, M. L. (2006). *Is mixed-income development an antidote to urban poverty?*
- Kamenetz, A. (2016, November 29). 6 Potential Brain Benefits Of Bilingual Education. *NPR*.
<https://www.npr.org/sections/ed/2016/11/29/497943749/6-potential-brain-benefits-of-bilingual-education>
- Keels, M., Burdick-Will, J., & Keene, S. (2013). The effects of gentrification on neighborhood public schools. *City & Community, 12*(3), 238–259.
<http://dx.doi.org.proxy.library.vanderbilt.edu/10.1111/cico.12027>
- Kelly, L. B. (2018). Interest convergence and hegemony in dual language: Bilingual education, but for whom and why? *Language Policy; Dordrecht, 17*(1), 1–21.
<http://dx.doi.org.proxy.library.vanderbilt.edu/10.1007/s10993-016-9418-y>
- Kubota, R., Corella, M., Lim, K., & Sah, P. K. (2021). “Your English is so good”: Linguistic experiences of racialized students and instructors of a Canadian university. *Ethnicities, 14*687968211055808. <https://doi.org/10.1177/14687968211055808>
- Larson, S. (2020, August 31). “Nice White Parents,” “Fiasco,” and America’s Public-School Problem. *The New Yorker*. <https://www.newyorker.com/magazine/2020/09/07/nice-white-parents-fiasco-and-americas-public-school-problem>
- Leachman, M., Masterson, K., & Figueroa, E. (2017). A punishing decade for school funding. *Center on Budget and Policy Priorities, 29*.
- Lees, L. (2003). Super-gentrification: The Case of Brooklyn Heights, New York City. *Urban Studies, 40*(12), 2487–2509. <https://doi.org/10.1080/0042098032000136174>

- Lees, L., Slater, T., & Wyly, E. (2007). *Gentrification* (1 edition). Routledge.
- Lees, L., Slater, T., & Wyly, E. K. (Eds.). (2010). *The gentrification reader*. Routledge.
- Leong, N. (2013). Racial capitalism. *Harv. L. Rev.*, *126*, 2151.
- Lincoln, Y. S., & Guba, E. G. (1985). *Naturalistic Inquiry*. SAGE.
- Lindholm, K. J., & Aclan, Z. (1991). Bilingual Proficiency as a Bridge to Academic Achievement Results from Bilingual/Immersion Programs. *Journal of Education*, *173*(2), 99–113. <https://doi.org/10.1177/002205749117300208>
- Lindholm-Leary, K. (2012). Success And Challenges In Dual Language Education. *Theory Into Practice*, *51*(4), 256–262. <https://doi.org/10.1080/00405841.2012.726053>
- Lindholm-Leary, K., & Howard, E. R. (2008). Language development and academic achievement in two-way immersion programs. *Bilingual Education and Bilingualism*, *66*, 177.
- Maciag, M. (2015). *Gentrification in America*. Governing. <https://www.governing.com/gov-data/census/gentrification-in-cities-governing-report.html>
- Mair, V. H. (1991). What Is a Chinese ‘Dialect/Topolect’? Reflections on Some Key SinoEnglish Linguistic terms. *Sino-Platonic Papers*, *29*, 1–31.
- Marshall, S. (2009). Re-becoming ESL: Multilingual university students and a deficit identity. *Language and Education*, *24*(1), 41–56. <https://doi.org/10.1080/09500780903194044>
- Montague, N. S. (1997). Critical Components for Dual Language Programs. *Bilingual Research Journal*, *21*(4), 409–417. <https://doi.org/10.1080/15235882.1997.10162713>
- Morales, P., & Rao, A. (2015). How ideology and cultural capital shape the distribution of Illinois’ bilingual education programs. *Teachers College Record*.

- Mumm, J. (2017). The racial fix: White currency in the gentrification of black and Latino Chicago. *Focaal; Brooklyn*, 2017(79), 102–118.
<http://dx.doi.org.proxy.library.vanderbilt.edu/10.3167/fcl.2017.790109>
- Naram, K. (2017). No Place Like Home: Racial Capitalism, Gentrification, and the Identity of Chinatown. *Asian American Policy Review; Cambridge*, 27, 1–26.
- Norman, J. (2003). The Chinese dialects: Phonology. In G. Thurgood & R. J. LaPolla (Eds.), *The Sino-Tibetan Languages* (pp. 72–83). Routledge.
- Palmer, D. (2009). Middle-Class English Speakers in a Two-Way Immersion Bilingual Classroom: “Everybody Should Be Listening to Jonathan Right Now...” *TESOL Quarterly*, 43(2), 177–202.
- Papachristos, A. V., Smith, C. M., Scherer, M. L., & Fugiero, M. A. (2011). More coffee, less crime? The relationship between gentrification and neighborhood crime rates in Chicago, 1991 to 2005. *City & Community*, 10(3), 215–240.
- Paton, K. (2012). Not the only power in town? Challenging binaries and bringing the working class into gentrification research. In G. Bridge, T. Butler, & L. Lees (Eds.), *Mixed Communities: Gentrification by Stealth?* (pp. 252–272). Policy Press.
- Pattillo, M. E. (2008). *Black on the block: The politics of race and class in the city* (Nachdr.). University of Chicago Press.
- Pavlenko, A., & Blackledge, A. (2004). *Negotiation of identities in multilingual contexts* (Vol. 45). Multilingual Matters.
- Pearman, F. A., & Swain, W. A. (2017). School Choice, Gentrification, and the Variable Significance of Racial Stratification in Urban Neighborhoods. *Sociology of Education*;

- Albany*, 90(3), 213–235.
- <http://dx.doi.org.proxy.library.vanderbilt.edu/10.1177/0038040717710494>
- Redford, J. (2018). *English Language Program Participation Among Students in the Kindergarten Class of 2010-11: Spring 2011 to Spring 2012* (Statistics in Brief). National Center for Education Statistics. <https://nces.ed.gov/pubs2018/2018086.pdf>
- Rolstad, K., Mahoney, K., & Glass, G. V. (2005). The big picture: A meta-analysis of program effectiveness research on English language learners. *Educational Policy*, 19(4), 572–594.
- Schaffer, R., & Smith, N. (1986). The Gentrification of Harlem? *Annals of the Association of American Geographers*, 76(3), 347–365. <https://doi.org/10.1111/j.1467-8306.1986.tb00124.x>
- Smith, D. P., & Higley, R. (2012). Circuits of education, rural gentrification, and family migration from the global city. *Journal of Rural Studies*, 28(1), 49–55. <https://doi.org/10.1016/j.jrurstud.2011.08.001>
- Smith, N. (1996). *The New Urban Frontier: Gentrification and the Revanchist City*. Routledge.
- Strauss, A., & Corbin, J. M. (1997). *Grounded theory in practice*. Sage.
- Takaki, R. T. (1998). *Strangers from a different shore: A history of Asian Americans*. Little, Brown.
- Ter Kuile, H., Veldhuis, M., Van Veen, S. C., & Wicherts, J. M. (2011). Bilingual education, metalinguistic awareness, and the understanding of an unknown language. *Bilingualism: Language and Cognition*, 14(2), 233–242.
- Thomas, W. P., & Collier, V. P. (2002). *A national study of school effectiveness for language minority students' long-term academic achievement*. Center for Research on Education, Diversity, and Education.

- Thomas, W. P., & Collier, V. P. (2012). *Dual language education for a transformed world*. Dual Language Education of New Mexico/Fuente Press.
- UCLA: Statistical Consulting Group. (n.d.). *FAQ: How do I interpret odds ratios in logistic regression?* FAQ: How Do I Interpret Odds Ratios in Logistic Regression? Retrieved February 18, 2023, from <https://stats.oarc.ucla.edu/other/mult-pkg/faq/general/faq-how-do-i-interpret-odds-ratios-in-logistic-regression/>
- Valdez, V. E., Freire, J. A., & Delavan, M. G. (2016). The Gentrification of Dual Language Education. *The Urban Review*, 48(4), 601–627.
<http://dx.doi.org.proxy.library.vanderbilt.edu/10.1007/s11256-016-0370-0>
- Valdéz, V. E., Freire, J. A., & Delavan, M. G. (2016). The Gentrification of Dual Language Education. *The Urban Review*, 48(4), Article 4.
<http://dx.doi.org.proxy.library.vanderbilt.edu/10.1007/s11256-016-0370-0>
- Valenzuela, A., & Rubio, B. (2018). Subtractive Schooling. In *The TESOL Encyclopedia of English Language Teaching* (pp. 1–7). American Cancer Society.
<https://doi.org/10.1002/9781118784235.eelt0139>
- Von Maltitz, F. W. (1975). *Living and learning in two languages: Bilingual-bicultural education in the United States*. McGraw-Hill.

Appendices

Appendix A: Connecting Theory, Hypotheses, Constructs, and Research Questions

Theory	Hypothesis	Relationship to Construct	RQ
Asymmetrical Motivations for Bilingualism	1. Gentrified neighborhoods are more likely to have DL programs because gentrifiers tend to be of the population that are more likely to be in a position of linguistic power and would gain more social capital and prestige from these programs due to elite bilingualism.	1. Whether or not a neighborhood went through gentrification 2. The existence of DL programs	1, 2
Interest in Convergence	2. While bilingual education may have been initially implemented to serve EL populations, DL programs' expansion is due to the benefits they offer to dominant populations and their shift from serving minoritized populations to catering to dominant populations.	2. The existence of DL programs 3. The student population's linguistic needs	1, 2
	3. If DL programs' expansion is driven by their benefits to dominant populations, there is likely to be a disconnect between the minoritized populations that these programs initially served and the post-gentrification iteration of these programs.	3. The student population's linguistic needs	2
Racial Capitalism	4. Gentrification and DL programs share a link because populations that gentrify tend to be of	1. Whether or not a neighborhood went through gentrification	1, 2

dominant populations that would view DL programs and bilingualism as valuable commodities, due to the power differential between whiteness and nonwhiteness.

- 2. The existence of DL programs
- 3. The student population’s linguistic needs

5. For dominant populations, the match between DL program’s LOTE of instruction and their linguistic heritage does not factor as heavily into LOTE preference as it would to minoritized populations because the motivations are more likely to be driven by a commodification of bilingualism.

- 4. The languages involved in the DL programs 2
- 5. The (mis)match between languages used in the DL programs and languages used by residents of the neighborhood

Unified Theory

6. Since research suggests that charter schools are linked with gentrification, the existence of charter schools, particularly if the charter school has a DL program, will impact the relationship between gentrification and DLE.

- 1. Whether or not a neighborhood underwent gentrification 3
- 6. The presence of charter schools within a school district’s boundaries

Appendix B: Process for Simplifying NCES School Directory (2019-20 SY Data) to Study’s Scope

1. States removed:
 - a. AMERICAN SAMOA, BUREAU OF INDIAN EDUCATION, GUAM, PUERTO RICO, and U.S. VIRGIN ISLANDS
2. Cases removed by updated status:
 - a. Closed, Future, Inactive

Crosstab for start of year status x updated status (data from after removing states listed above)

Start of year Status (description) * Updated status (description) Crosstabulation
Count

		Updated status (description)								Total
		Added	Boundary/Agency	Closed	Future	Inactive	New	Open	Reopened	
Start of year Status	Added	50	0	0	0	0	0	0	0	50
	Changed	0	134	0	0	0	0	0	0	134
	Boundary/Agency									
	Closed	0	0	1179	0	0	0	0	0	1179
	Future	0	0	0	255	0	25	0	0	280
	Inactive	0	0	0	0	458	0	0	0	458
	New	0	1	1	0	0	916	21	0	939
	Open	0	0	0	0	3	0	97328	0	97331
Reopened	0	0	0	0	0	0	0	24	24	
Total	50	135	1180	255	461	941	97349	24	100395	

3. Cases removed by K-12 boundary
 - a. If highest grade offered (GSHI) = PK, AE
 - b. Note about grade levels coded “Not Applicable” and “Ungraded”

- i. “Not Applicable” codes are disproportionately represented in Virginia schools: 78.9% of “Not Applicable” codes are for Virginia schools. (7.2% of Virginia schools are coded “Not Applicable”). A closer examination reveals that most Career/Technical schools in Virginia are coded “Not Applicable” and about half of Alternative Education schools and about a quarter of special education schools are coded thusly. Given that Virginia would be disproportionately impacted, these schools are left in.

Grades Offered - Highest * School type (description) Crosstabulation

Count

		School type (description)				Total
		Alternative School	Career and Technical School	Regular School	Special Education School	
Grades Offered - Highest	01- 1st grade students	0	0	3	0	3
	02- 2nd grade students	0	0	29	0	29
	03- 3rd grade students	0	0	13	0	13
	04- 4th grade students	0	0	36	0	36
	05- 5th grade students	0	0	870	1	871
	06- 6th grade students	0	0	158	0	158
	07- 7th grade students	0	0	43	0	43
	08- 8th grade students	0	0	338	1	339
	09- 9th grade students	0	0	1	0	1
	11- 11th grade students	0	0	1	0	1

12- 12th grade students	6	1	322	17	346
KG- Kindergarten students	0	0	3	0	3
Missing	2	1	0	0	3
N- Not applicable	64	74	1	14	153
PK- Prekindergarten students	0	0	35	0	35
UG- Students in ungraded classes	50	13	18	7	88
Total	122	89	1871	40	2122

Grades Offered - Highest * School type (description) Crosstabulation
Count

		School type (description) Career and Technical School	Total
Grades Offered - Highest	08- 8th grade students	1	1
	11- 11th grade students	7	7
	12- 12th grade students	1190	1190
	13- 13th grade students	2	2
	AE- Total adult education students	4	4
	Missing	36	36
	N- Not applicable	103	103

UG- Students in ungraded classes	147	147
Total	1490	1490

- ii. “Ungraded” schools are disproportionately represented in Kentucky schools (127/286 ungraded codes are for Kentucky schools; 8.3% of Kentucky schools have this code). This seems to be attributable to the popularity of multi-age primary schools in Kentucky.

Virginia is the worst:

Grades Offered - Highest * School type (description) Crosstabulation

Count

		School type (description)				Total
		Alternative School	Career and Technical School	Regular School	Special Education School	
Grades Offered - Highest	01- 1st grade students	0	0	3	0	3
	02- 2nd grade students	0	0	29	0	29
	03- 3rd grade students	0	0	13	0	13
	04- 4th grade students	0	0	36	0	36
	05- 5th grade students	0	0	870	1	871
	06- 6th grade students	0	0	158	0	158
	07- 7th grade students	0	0	43	0	43

08- 8th grade students	0	0	338	1	339
09- 9th grade students	0	0	1	0	1
11- 11th grade students	0	0	1	0	1
12- 12th grade students	6	1	322	17	346
KG- Kindergarten students	0	0	3	0	3
Missing	2	1	0	0	3
N- Not applicable	64	74	1	14	153
PK- Prekindergarten students	0	0	35	0	35
UG- Students in ungraded classes	50	13	18	7	88
Total	122	89	1871	40	2122

Illinois missing codes:

Grades Offered - Highest * School type (description) Crosstabulation

Count

		School type (description)			Total
		Alternative School	Regular School	Special Education School	
Grades Offered - Highest	01- 1st grade students	0	43	0	43
	02- 2nd grade students	0	111	1	112
	03- 3rd grade students	0	103	0	103

04- 4th grade students	0	204	0	204
05- 5th grade students	1	923	0	924
06- 6th grade students	0	320	2	322
07- 7th grade students	0	5	0	5
08- 8th grade students	8	1315	1	1324
09- 9th grade students	2	5	0	7
10- 10th grade students	1	0	0	1
11- 11th grade students	5	4	0	9
12- 12th grade students	121	827	17	965
KG- Kindergarten students	0	26	0	26
Missing	2	5	193	200
PK- Prekindergarten students	1	102	3	106
Total	141	3993	217	4351

Nationwide highest grades offered x non-regular schools

Grades Offered - Highest * School type (description) Crosstabulation

Count

		School type (description)			Total
		Alternative School	Career and Technical School	Special Education School	
Grades Offered - Highest	01- 1st grade students	1	0	8	9
	02- 2nd grade students	0	0	5	5
	03- 3rd grade students	1	0	0	1

04- 4th grade students	4	0	3	7
05- 5th grade students	76	0	39	115
06- 6th grade students	35	0	22	57
07- 7th grade students	4	0	6	10
08- 8th grade students	269	1	89	359
09- 9th grade students	44	0	8	52
10- 10th grade students	77	0	9	86
11- 11th grade students	135	7	11	153
12- 12th grade students	4355	1190	1123	6668
13- 13th grade students	0	2	2	4
AE- Total adult education students	21	4	9	34
KG- Kindergarten students	2	0	26	28
Missing	49	36	247	332
N- Not applicable	65	103	16	184
PK- Prekindergarten students	26	0	259	285
UG- Students in ungraded classes	70	147	42	259
Total	5234	1490	1924	8648

My current plan is to 1) exclude all cases coded missing and 2) include cases coded not applicable or ungraded.

I'd support my decision to exclude all cases with missing data codes, as that's generally common practice. However, one reservation I have about excluding cases with missing grade level codes is that 200 of those cases (39.2% of missing

cases) come from Illinois, and 193 of these cases are for special ed schools (there are a total of 217 sped schools in Illinois, so 88.9% are coded as missing grade level data).

For cases coded "not applicable" or "ungraded," I did some crosstabs between grade level and school type (regular, special ed, vocational, etc.) as well as school status (open, reopened, etc.) and there doesn't seem to be any pattern there. The only crosstab that was meaningful was between grade level and state. So my guess is that these codes probably come down to some irregularity in state reporting or how states choose to classify certain types of schools. I can't find any clear definition of what makes a school ungraded or grade levels not applicable at a school, so I can't verify this.

The "not applicable" and "ungraded" codes are disproportionately represented by Virginia (both codes) and Kentucky ("ungraded"). In Virginia (accounting for 78.9% of "not applicable" codes), most career/technical schools, half of alternative schools, and about a quarter of special ed schools are coded "not applicable." The 30.8% of "ungraded" codes accounted for by Virginia are associated with the career/technical and alternative schools that weren't coded "not applicable," plus a small number of special ed schools. In Kentucky (accounting for 44% of "ungraded" codes), pretty much all of the "ungraded" cases are primary schools that use multi-age classrooms (and apparently this is pretty popular in Kentucky).

Obviously primary schools fall in the K-12 range, so that suggests that I should keep all "ungraded" cases. I did a crosstab of career/technical-alternative-special ed and grade level, and it looks like most of these "non-regular" schools end up getting coded with a code in the PK-12 range. So I'm thinking that I should still keep the "not applicable" codes, since it just seems like it's a Virginia quirk that they're not coded with grade levels.

4. Variables removed

SCHOOL_YEAR
FIPST
ST
STATE_AGENCY_NO
UNION
ST_LEAID
ST_SCHID
SCHID
MSTREET1
MSTREET2
MSTREET3
MCITY
MSTATE
MZIP
MZIP4

LSTREET1
LSTREET2
LSTREET3
LCITY
LSTATE
LZIP
LZIP4
PHONE
WEBSITE
RECON_STATUS
OUT_OF_STATE_FLAG
CHARTAUTH1
CHARTAUTHN1
CHARTAUTH2
CHARTAUTHN2

5. Decisions regarding school type
 - a. After merging in DL variable from DL dataset, crosstab of only DL schools x school type reveals that no career/technical schools included, but some alternative and SPED schools. So, all career/technical schools excluded from directory dataset.

Appendix C: DL Directories Examined and Rationales for Rejection

There are four online directories for bilingual/dual language programs that I evaluated as potential data sources: K12 Academics' Bilingual Immersion Program Directory, Dual Language Schools.org, and the Center of Applied Linguistics' (CAL) Dual Language Program Directory, and the Mandarin Immersion Parents' Council. I also evaluated non-DOE-affiliated, state-focused bilingual education/DLE associations and directories, as well as parent advice blogs and local newspapers' online listicles of DL programs. While I did not use any of these sources as primary data for my novel dataset, opting to use school, district, and DOE websites as evidence instead, I did use these resources to supplement my search and ensure that my dataset would be as complete as possible. In some cases, these resources suggested schools that did not come up in my Google search protocol. Beyond these online resources, I also consulted with David Golann, a librarian at the Peabody Library who specializes in education research, and Frank Lester, a librarian at the Central Library who specializes in government data. Both confirmed that there is no such directory or dataset that would have met my needs. In this appendix, I discuss each of the four directories as well as the three additional genres of information sources and share my reasoning for not using them as primary data sources.

K12 Academics

K12 Academics is a national education and referral website. It contains a large number of directories, including one for bilingual immersion programs. While the scope of this directory is wider than what my research is interested in, I thought that this could be a good resource for narrowing the number of schools that I would need to search and suggesting schools that might not appear in a Google search. Unfortunately, this directory is largely crowd-sourced, so inclusion is dependent on outreach by administrators, teachers, or participants in these programs. Furthermore, the vetting process for submissions is not transparent, and it is possible to submit information for a program without creating any kind of profile or verifying your own affiliation with the program, thus raising questions of reliability. Initially, I used links from this site as a starting point for investigating schools' and districts' websites, but I often found that this directory contained out of date information that did not reflect the information on the school or district website.

Dual Language Schools.org

This site is a resource for DL programs and includes a national DL directory. Like K12 Academics' directory, this directory depends on users' submissions for data and does not indicate whether or not there is an information vetting process. Unlike K12 Academics, Dual Language Schools.org requires users to create a profile, so there is an added layer of accountability. However, I found major issues with the reliability of the data in this directory. Namely, there were a large number of entries for schools whose names did not match the postal addresses attached to the entries. Rather, the school name would reflect a school in a totally different state (which often did not even have a DL program) and while the postal address would match to a public school, those schools did not always have a DL program. Given this major reliability issue, I did not use this directory in any capacity.

CAL's Dual Language Program Directory

I had high hopes for this particular directory because of its affiliation with CAL. Like K12 Academics and Dual Language Schools.org, this directory relied on crowdsourcing information, but also supplements these data with public record information. However, after

comparing its entries for several states with my own data and DOE data for states that offered this information, I found that it was by no means a comprehensive directory.

Mandarin Immersion Parents' Council

This organization collects information on Mandarin and Cantonese immersion programs and updates their directory every year. Of all the directories I surveyed, this one was by far the most comprehensive and complete. When compared to the data I collected, there were only a handful of Mandarin or Cantonese DL programs that were not captured in this directory. However, this directory was not a perfect match for my needs. Most importantly, this directory is limited to Mandarin and Cantonese programs, so it did not capture data on programs using any other LOTE for instruction. This directory also included programs that I did not include in my own dataset, due to their being in private schools or being immersion programs that do not follow a DL model.

Non-DOE-affiliated, State-focused Bilingual Education/DLE Associations and Directories

Unfortunately, none of these state-focused resources had complete lists for their state of interest. Often, this was due to geographical constraints (e.g., the organization was focused on a particular region, rather than the entire state). This was also due to some associations offering a list of member schools and districts, while others did not (and seemed to be intended for individual practitioners, rather than institutions of learning). Other associations listed employees of the schools or districts, but not the name of the schools or districts, which resulted in an inefficient route for online investigation. Given the hit-or-miss quality of these directories, as well as the difficulties in finding these webpages since I had no starting point for coming up with a search term and tended to come across these websites by chance, whenever they showed up in my school and district Google searches.

Parent Advice Blogs

While parent blogs were often helpful as a starting point for identifying DL programs in a region or state, these blogs tended to focus on superlative programs and actively acknowledged that they were not comprehensive lists.

Online Listicles

Similar to parent advice blogs, these listicles were helpful starting points, but were rarely comprehensive. Additionally, since these listicles often stated their publication dates, I found that many were out-of-date and not updated annually.

Appendix D: Data Search Protocol and Decision Rules for Special Cases

Department of Education

Using Google:

1. [state] department of education data
Browse all links, keeping an eye out for key words: dual language, immersion, EL, bilingual
2. [state] department of education data bilingual education
3. [state] department of education data dual language

If the DOE webpage has relevant information, collect it in the spreadsheet and save the page as a pdf or screenshot. Download any relevant documents. If there are multiple webpages with information, save the one that contains the names of schools that house the DL programs. If the DOE has a list that includes more than 250 schools, consider this as the entire state's list and proceed to the next state. If DOE has under 250 schools on list, proceed to school and district search protocol to verify DOE's list. If the Google search does not return any relevant information, proceed to protocol for using the DOE website search bar.

Using the state's DOE website search bar:

1. bilingual education
2. ELL program
3. EL program
4. dual language
5. dual immersion

Follow data collection and decision rules related to moving on to school and district searches or the next state, as detailed above. If the DOE website search bar does not return anything useful, look for a school locator map and see if there are any specialized search options. If there are still no useful pages, mark in data collection spreadsheet that there is no DOE-level data and proceed to school and district data collection protocol below.

Schools and Districts (Done Simultaneously)

Using Google:

1. [state] school dual language
2. [state] school dual immersion
3. [state] school language immersion

For all Google searches, follow every link that seems promising (promising links look like they contain information on a language program that uses both English and a LOTE). If the link goes to a school's webpage, collect relevant information on the page, save the page as a pdf or screenshot, and go to the district's webpage and follow the district website search protocol below. If the Google link goes to a district's webpage, collect relevant information. If the district's list contains >20 schools, assume that the district's list is comprehensive and move on to the next district or school website from the Google search. If there are <20 schools in the list, check the schools' webpages for confirmation and also perform district website search protocol below, to verify that the information on the page is up-to-date and comprehensive. If there is any

information that suggests that the information on the district’s webpage is outdated, check each school’s website for evidence of a DL program to validate findings using the school website search protocol below. If there is any reason to suspect that the website that you’re looking at is out of date, continue to search the school and district websites to verify that the program is still in session. However, err on the side of over-including programs, rather than not including programs, in cases that are difficult to determine whether or not the program still exists.

District website search:

1. If the district has a search bar or some type of search tool, search for the following terms:
 - dual language
 - dual immersion
 - language immersion
 - bilingual
2. If there is no search bar (or the search bar returns no useful results), look for the following pages, and search for DL-related information on them:
 - World Language Department
 - EL/ELL/ESL/etc. Department
 - Special Programs
 - Curriculum
 - Academics
 - Magnet Programs
 - Charter Schools
 - Staff Directory: See if it’s possible to search all teachers in the district and try search terms of “DL,” “dual,” “biling,” and “BE”
3. If all else fails, see if the district has a school search function that offers advanced search options. It may be possible to search for specific special programs, such as DL.

School website search:

1. Search under the following pages, if they exist:
 - About the School
 - Special Programs
 - Teacher pages: See if any teachers title their page something like “Ms. X’s 3rd Grade Dual Language Class”
 - Staff Directory: See if it’s possible to use search terms. If it’s possible, search for “DL,” “dual,” “biling,” and “BE”
2. If there is a search bar, try searching for “dual language,” “dual immersion,” and “language immersion” but be aware that the search bar may actually search the entire district’s website, not just the school’s subset of pages

General Search Advice:

If file with relevant data is found, but is historic data, try replacing relevant year numbers in URL.

Ex: if located file’s URL is <https://www.isbe.net/Documents/el-program-stat-rpt14.pdf>, see if replacing “rpt14” with “rpt15” will produce a pdf for the 2014-15 school year.

Special Decision Rules and Situations:

If the district has an Office of Bilingual Education (or similar wording) but does not explicitly describe any bilingual programmatic offerings (i.e., the education is bilingual because the learners are bilingual, not because the instruction is bilingual), do not count district.

Situation: District or school site for elementary DL program mentions a “pathway” students can take through high school. This counts as DL program if middle/high school extensions of program are labeled as DL or immersion programs. Does not count if extensions are only world language type classes like “Spanish 4 AP” or “Spanish III.” If the middle/high school DL program includes a world language type class, it still counts. Seal of Biliteracy does not count. AP/IB classes do not count. If a site has a list of schools titled “Program sites” or similar, count all schools on the list, even if no detail is given on what the program looks like at each site. Does not count if program changes name to something like “spanish language and culture program” unless they explicitly say that it is a continuation of the DL/immersion program. E.g., Kyrene middle school does not count because it is comprised of Spanish courses that use an “immersion method” but are not part of an immersion program. Kyrene high school does not count because it is the seal of biliteracy

If district/school website describes a program as not DL, but an affiliate website (e.g., DL network) claims it as DL/immersion, go with what the district/school website says UNLESS there is evidence that district/school info is outdated (e.g., Horseshoe trails ES in Cave Creek Unified SD, AZ).

If a school is listed on the DOE website as having a DL program but there is no evidence of a DL program on the school’s or its district’s website, count if DOE website list can be construed as a comprehensive list. Do not count if it is a self-reported list, especially if there are multiple, extant schools/programs not listed.

Many New Jersey schools have “bilingual programs” or “bilingual magnets” that target non-native English speakers. While these programs’ descriptions sound very much like one-way dual language programs, it is just too hard to draw a line between which bilingual programs “count” as a dual language program. Therefore, programs that only describe themselves with the term “bilingual” are not included in this dataset. Programs that use “bilingual” as a descriptor are only included if they also mention dual language, like they follow a dual language program model. Similarly, bilingual teachers should only count as evidence if the district or school website makes it clear that the bilingual education courses follow a DL model. The same goes for bilingual program pages. If there is no clarification on what type of bilingual model the program follows, do not count the program.

If a district site does not explicitly name the school with a DL program, but it is the only school at that grade level, it is safe to assume that that is the school. (ex: PA southern lehigh school district says that immersion program goes from 1-12th grade and there is only one intermediate, middle, and high school. Those schools are automatically counted and district info marked Y because there is no way to mistake which school it is).

If DOE lists a school, but District/School has evidence that the school closed before the 2019-20 SY, remove from dataset.

Info at District Level Decision Rules	
Yes	No
page or link directly on the district’s website that leads to information about the DL programs available	have to use the search bar on the district website to find information and the links do not lead to a district-wide DL/ELL/foreign language type website (i.e., they lead directly to a website housed by the specific school)
link on the district’s website goes to a school site IF that is the only program in the district	application pdf linked as a district announcement but no web page information on the program
just a graphic that tells you which school websites to visit	only info is school search function with a “dual language”/”language immersion”/etc. advanced search option (because who has time to find that...it’s not easily accessible and not a common feature)
District DL program page doesn’t have schools listed in text, but does have link to registration form and school is listed on form	search bar just leads to news article about program
For Utah ONLY: if district dl program links back to DOE for list of sites, automatic yes for school, regardless of whether or not district lists sites explicitly	there is a DL page but no specific schools are listed
	the school has evidence but it is not listed on the district site
	District lists DL program in a “fast facts” list

Info at DOE Level Decision Rules	
Yes	No
if DOE just lists district as having a program, Y for all programs within district	If DOE lists specific schools/programs within a district but school in question is not included in that list
program/district is listed on DOE but link is broken/old and you can find an updated page on the district/school site	program/district is listed on DOE with broken/old link and there is no longer evidence on the district/school site
For Washington ONLY: state DOE’s most recent dataset is SY 2017-18 and disaggregates by grade level in district, not by school. So, if district is listed in DOE dataset and there is online evidence of school, DOE info is marked as Y	

Special Case: New York

New York City has hundreds of bilingual and dual language programs, which makes google searches hard. Therefore, “-nyc” is appended to the google search protocol to weed out schools in New York City.

Decision Rule: District has an Office of Bilingual Education (or similar wording) but does not explicitly describe any bilingual programmatic offerings (i.e., the education is bilingual because the learners are bilingual, not because the instruction is bilingual)

Do not count district

Special Case: State Department of Education does not explicitly list all DL programs but has district-level data on program enrollment, including DL programs

If a district is included in dataset as having DL program, it counts, regardless of enrollment number.

Special Case: Texas DOE has data on schools with bilingual programs, but not what TYPE of bilingual program. Therefore, from list of schools with students in bilingual program, do a google search

Decision Rule: District or school site for elementary DL program mentions a “pathway” students can take through high school. Counts as DL program if middle/high school extensions of program are labeled as DL or immersion programs. Does not count if extensions are only world language type classes like “Spanish 4 AP” or “Spanish III.” If the middle/high school DL program includes a world language type class, it still counts. Seal of Biliteracy does not count. AP/IB classes do not count. If a site has a list of schools titled “Program sites” or similar, count all schools on the list, even if no detail is given on what the program looks like at each site. Does not count if program changes name to something like “spanish language and culture program” UNLESS they explicitly say that it is a continuation of the DL/immersion program

E.g., Kyrene middle school does not count because it is comprised of Spanish courses that use an “immersion method” but are not part of an immersion program. Kyrene high school does not count because it is the seal of biliteracy

Decision Rule: If district/school website describes a program as not DL, but an affiliate website (e.g., DL network) claims it as DL/immersion, go with what the district/school website says UNLESS there is evidence that district/school info is outdated (e.g., Horseshoe trails ES in Cave Creek Unified SD, AZ)

Special Case: Arizona searches include more false positives than usual because google automatically includes state abbreviation. In the context of education, A-Z is often used in non-Arizona contexts to indicate comprehensiveness.

Special Case: Norcal Trade and Tech (CA) is on the CA list for 2019-20, but it actually closed in August 2019 after only being open for one year. Foothill Leadership Academy (CA) same thing: closed June 30, 2019. Global village academy, fort Collins (CO)

Decision Rule: Exclude, because we want to limit to the best of our knowledge

Special Case: Colorado search appended “-colorin” because Color in Colorado is a widely used bilingual education resource

Special Case: excluded Columbine Elementary, Boulder SD, CO because I honestly can’t tell if two way biliteracy would count as dual language, because there is a lot of grouping by L1 and only one period of intermixing <http://columbineelementary.org/about-us/our-biliteracy-program/>

Decision Rule: A school is listed on the DOE website as having a DL program but there is no evidence of a DL program on the school’s or its district’s website. Count if DOE website list can be construed as a comprehensive list. Do not count if it is a self-reported list, especially if there are multiple, extant schools/programs not listed

Special case: if a non-district/DOE/school source/directory indicates that a school has a DL program, do a thorough search of the school website—including looking at staff directory to see if anyone is listed as DL. If yes, see how updated the listing is. If it can be confirmed that the directory/associated teacher pages were updated since 2018, count the program. If webpage is pre-2018, do not count program.

Special case: Louisiana searches include a lot of false positives because the state abbreviation “LA” returns sites from Los Angeles and those that use the Spanish word “la”. Modified google search to include “-la” to remove these, but this might also exclude some Louisiana schools so performed search both ways

Special Case: Many New Jersey schools have “bilingual programs” or “bilingual magnets” that target non-native English speakers. While these programs’ descriptions sound very much like one-way dual language programs, it is just too hard to draw a line between which bilingual programs “count” as a dual language program. Therefore, programs that only describe themselves with the term “bilingual” are not included in this dataset. Programs that use “bilingual” as a descriptor are only included if they also mention dual language, like they follow a dual language program model.

Decision Rule: If a district site does not explicitly name the school with a DL program, but it is the only school at that grade level, it is safe to assume that that is the school. (ex: PA southern lehigh school district says that immersion program goes from 1-12th grade and there is only one intermediate, middle, and high school. Those schools are automatically counted and district info marked Y because there is no way to mistake which school it is)

Decision Rule: if DOE lists it, but District/School has evidence that the school closed before the 2019-20 SY, remove from dataset

Appendix E: Texas Data Verification Protocol

1. In Google: Texas [district name] dual language
 1. If relevant match, click on it (hoping for a district-level page that discusses DL programs, but often it'll be a page for bilingual/ESL instruction)
 1. Make sure it's in Texas and the right school district
 2. Verify that they're talking about dual language/dual immersion/language immersion programs
 3. Record relevant information in google doc:
<https://drive.google.com/file/d/1SmPJNYDsxFduOreFZkvy97eH3Fpdeizs/view?usp=sharing>
 1. **DL?** Mark Y if there is a DL program, N if no evidence of DL (or bilingual only)
 2. **Grade:** If you see a grade range for the DL program at a specific school, record it here. Sometimes the DL program may not include all the grades at the school, so you can't always count on the grade range of the school being the grade range of the DL program. Other times, the webpage will state the entire range of the DL program's offerings (e.g., K-12), not the school-by-school breakdown, which isn't super helpful. No big deal if this isn't readily available—just leave it blank or put in the general grade range of the school (e.g., elementary, middle school, etc.)
 3. **Language:** enter the language(s) other than English used in the DL program
 4. **Program Type:** this is the term that the school uses to categorize the program. Usually it's just "dual language" but sometimes it will be more specific, like "one-way dual language" or "two-way dual language." In some cases, different terms are used interchangeably (e.g., dual language, dual immersion, and language immersion). In this case, just pick one to put in this column and make a note of the other(s) under the notes column
 5. **Model:** If there is information on the division of languages in the classroom, record it here. Usually it's a ratio like 50-50 or 90-10. Sometimes there is a super detailed plan that's not easily summarized. In that case, just put "district-developed model" and make sure you capture it (see next step)
 6. **Info at district level:** If there is a district page devoted to DL programs (or like, ELL programs in general or world language programs in general), mark Y. Otherwise, mark N. If there is a district page that talks about the DL program in general terms but does not list the schools that have these programs, mark N. (exception: if you can click around the site and find an application form or something that lists schools, mark Y) **this can be tricky because of gray areas, so feel free to check in with me if you're unsure
 7. **Website:** copy and paste the website URL here

8. **Notes:** if the school is a charter, mark charter. Otherwise, use this column if you had to use something other than a DL website to evidence the program or if there was anything particularly difficult about finding evidence.
 9. **Don't worry about the last 3 columns**
4. Save the website/file/whatever else you're using as evidence by adding this prefix to whatever autofills into the file name: [District name] [School name if applicable]
 1. If it's a webpage, the easiest way is to select Print>Print to PDF
 2. It's important to check the preview though, because sometimes the page doesn't save properly. You might have to change the page orientation (landscape vs. portrait) or do a print screen instead
 3. If you do a print screen, paste it into whatever image program you have (I use Paint) and save it as [District name] [School name if applicable]. You might have to capture multiple images to get the full page. In this case, just add a number to the end of the file name.
 - b. If the website lists a school that isn't included in the spreadsheet, poke around and see if you can find out when the program started at the school. If the program started in the 2020-21 SY, don't count it. If you can find evidence that it did exist in the 2019-20 SY, add a row to the spreadsheet and include that school's information
 1. If you're still unsure, you can check the [NCES public school directory](#) for the school. If the school name+state doesn't return anything, try state+address. If it says something like "new school," you'll know that it didn't exist in 2019-20 and you can leave it out. If it returns a totally different school name, but in the correct district, search for that school name in the data collection spreadsheet. If the alternative name isn't there, then just skip the school.
 - c. If the website doesn't explicitly list the date associated with the information (look for year, like 2020-21 SY etc.), check spreadsheet to see if any schools were left out
 1. If a school is not listed on the district DL webpage, go directly to the school website and search for evidence of DL program
 1. Places to look: staff directory, "about the school" tab, parent resources, teacher webpages, pages that lets you search for schools by specific features, special programs
 - d. The district may only talk about bilingual programs—these don't count unless they specifically call it a one-way dual language model/one-way immersion/some iteration of this. If the district has bilingual programs but doesn't mention dual language, still go to step 2 below
If no relevant Google match, search for district web page
 1. Once on the district webpage, use embedded search bar
 1. Search for "dual language," "dual immersion," "language immersion"—hopefully this will return a hit
 1. Sometimes you'll have to skim through student handbooks and meeting minutes. I find that the search function is super helpful

a. If still no hits, try to find a staff directory (district level is much more efficient, but sometimes you have to go to individual schools. In this case, just go to the schools that are on the spreadsheet)

1. See if there is an option to search by job/job title or something like that and search for the dual language option (sometimes you can just type “dual” and it’ll return everything, but other times, it’s a drop-down menu and you have to go by grade). Just one DL teacher is enough to mark the school as Y
2. If not, search by school and use the find function to search for dual language teachers (usually either “dual” or “DL”)

If you still only find mention of a bilingual program (i.e., no mention of DL), check the Texas Education Agency’s Texas Academic Performance Report (TAPR):

<https://rptsvr1.tea.texas.gov/perfreport/tapr/2019/srch.html?srch=C>

- . Select: Campus Report
- a. Select: Campus Name (full or partial name)
- b. Copy/paste school name from spreadsheet into field, click search (or press enter)
- c. If you get multiple campuses, select the one that matches both school and district names
- d. Click view report (this will open a new window)
- e. See what kind of bilingual program the school has—usually this is on page 8 (or you can search for “dual”)
 1. If there’s a numeric value under “bilingual education-Dual Two-Way” or “bilingual education-Dual One-Way” for 2019, mark Y and make a note in the spreadsheet that you referenced TAPR
 2. If no value for 2019, but value for 2018, mark N and make a note in the spreadsheet that you referenced TAPR
 3. If no value under either column, mark N and make a note in the spreadsheet that you referenced TAPR

If absolutely no mention of DL or bilingual programs on the district or school websites, take a quick look at your “Texas [district name] dual language” search to see if there is any news article that mentions the district’s programs.

- . If there is, check the date. If it falls between June 2019-June 2020, use it as evidence of the program and mark Y. Also add to the notes column that the evidence is from a news article
- a. If there is, and the date is outside of the range above, copy the link to the website column and add a note that there was no district/school info but there is evidence that it existed at (date of publication)
- b. If no news articles, mark N and move on

Appendix F: Texas Data Cleaning Protocol and Errata

Texas Data Cleaning

1. Starting with Data Checking spreadsheet, copy data to new page and delete all schools with no DL program (coded N in DL? Column)
 - a. If any missing data, double check these schools against school/district websites and TAPR. If possible, use links from other schools in the same district
 - b. Call this sheet “Only Y” because it is only schools from data checking sheet with DL programs
2. Copy data from “Only Y” to new sheet, call it “no PK”
 - a. Sort data A-Z by DOEdata.Grades column
 - b. Delete all entries with only Early Education or PreKindergarten. Also delete entries that span the two. Keep schools if they include either (or both) of these grade levels but extend at least into kindergarten.
 - c. Check notes for prek only entries and delete those
3. Copy data to new sheet, call it “DL1”
 - a. Add in columns/variable names and rearrange extant columns to align with master dataset.

Texas Data Merge with NCES IDs

Note: this is an adaptation of the fuzzy merge protocol

1. Paste NCES data on separate sheet
 - a. Data>Get Data from Table/Range
 - b. Named this NCES Data
 - c. Close and Save as connection only
2. Repeat for DL data, last row is 1136 (first iteration)
 - a. Name this DL Data
3. Data>Get Data>Combine Queries>Merge
 - a. First set: DL Data
 - b. Second set: NCES Data
 - c. Select columns to perform join: district and agency; school and NCES school (use ctrl to select more than 1)
 - d. Join kind: left outer (explained here: <https://radacad.com/choose-the-right-merge-join-type-in-power-bi>)
 - e. Select “Use fuzzy matching to perform the merge”
4. Expand all variables in table (green columns)
5. Close and Load
6. Sort by one of the NCES variables
7. Cut all the ones that didn’t get a match, paste onto new worksheet
 - a. Insert row at top for variable names, copy and paste from some other worksheet
8. Repeat Steps 1-2, iterating on name (e.g., DL Data 2)
 - a. Before clicking “OK” set similarity threshold to .7
9. Continue with steps 3-7
10. Repeat steps 8 and 9, each time reducing similarity threshold by .1, until all items have a match OR there are fewer than 50 without a match. The multiple iterations keep the earlier iterations from accruing a ridiculous number of potential matches.

11. Paste all matches into a new excel spreadsheet
12. Paste all items without match into a separate worksheet in the new spreadsheet
 - a. It probably doesn't matter if you sort this or not, because the original DL district and school names will stay the same. But keeping it somewhat out of order will help create visual distinctions
13. For matches: rearrange so that district variables are next to each other, same for schools
14. Compare and delete bad matches #YOLO
15. For non-matches: go through and manually enter NCES IDs and names
16. Create new excel spreadsheet, paste in complete dataset from the two worksheets
17. Make sure N=1134* (final line would be 1135 due to header line) otherwise you're in trouble

Texas Errata

1. First round of data collection did not reveal a DL dataset on TX DOE website. However, there were datasets on the total number of bilingual education students at a school. So, from here, a data checking spreadsheet was created of only schools with recorded BE students (assumption: DL students would fall under BE umbrella, regardless of L1. This may not be true) n=2523.
 - a. Intent: use this BE student list to guide website data gathering. Keep schools that have online data at district/school level; remove schools with no DL evidence OR with explicit bilingual program only evidence
2. 11-5-20 visit to TX DOE website (searching for TX school IDs), came across searchable map of TX schools with advanced search option to select one-way or two-way DL programs (assumption: this map has up-to-date data, if not for 20-21 SY then for 19-20 SY. This may not be true.)
 - a. AD copied and pasted all one-way and two-way DL programs into spreadsheet (TX DL 11-4-20 DOE.xlsx) n=1709. These data included district, school, program type, school's grade range, and school ratings. The website does not say which year the school ratings are from. Could be 18-19, as that is year of most recent STAAR reports available on DOE site, but it could also be 19-20 from some internal data source.
 - b. Merged in info from these schools to BE school dataset. 1441 DOE map schools matched to BE schools, leaving 268 schools identified by DOE map as having some kind of DL program but not being recorded as having BE students in 19-20 SY.
 - c. Appended these 268 schools to Texas data collection website (n=2791)
3. Seems to be a definite disconnect between DOE and schools and districts: DOE map citing DL does not guarantee that school has program and some BE student schools not marked on DOE map actually do have DL programs.
4. Seems to be disconnect of program terminology: DOE uses "one-way dual language" to describe programs that are simply listed as "bilingual program" or "bilingual ESL" on school websites.
5. Texas offers TAPR data for their STAAR reports. These have a page where they break down STAAR performance rates by special populations, including two-way and one-way DL programs. These could be used to further corroborate program data from school and

district websites, but the most updated data is from 2018-19 SY and this wouldn't really be helpful for schools with programs that don't reach testing grades.

a. Download full dataset here:

<https://rptsvr1.tea.texas.gov/perfreport/tapr/2019/download.html>

6. Removed Humble ISD's Centennial EL because it opened August 2020, so final
7. Assigned 999 to San Antonio ISD's Collegiate High because it opened August 2018 but has no NCES ID

Appendix G: Protocol for linking school names from webpages with NCES names and IDs using a Fuzzy Merge Algorithm

Protocol: Cleaning for Fuzzy Merge

1. Perform exploratory fuzzy merge with copy of dataset (see protocol below)
2. Pull out schools that were not able to be merged and/or had incorrect merges
 - a. Identify incorrect merges through state mismatch
 - i. Create new variable, use formula: =if(A2=B2,1,0)
 - ii. Sort by new variable, low to high, and move all 0s to pull out worksheet
 - b. Check charter schools (least likely to fuzzy merge properly because doesn't have proper district name, just "charter")
 - c. While going through matches to delete bad ones, also keep an eye out for incorrect district and school matches
3. Fix schools identified as wrong state in master dataset
 - a. Walla Walla (double listed in Oregon and Washington; it only exists in Washington)
 - b. Clear Creek ISD (listed as Pennsylvania; it's actually in Texas)
 - c.
4. Recalculate n in master dataset; adjust Fuzzy Merge Protocol as necessary
5. Since <100 schools identified as bad matches or unable to match, complete these manually, using NCES school lookup: <https://nces.ed.gov/ccd/schoolsearch/index.asp>

Protocol: Fuzzy Merge to Link NCES IDs

18. Must use Excel 365 (originally was using Excel 2013)
19. Removed Alaska, Arizona, California, and New York City schools from dataset because they already had NCES names and IDs
20. Also removed individual language binary recoding variables because they're empty right now
21. Pasted NCES District and School names and IDs onto same sheet, far right
22. Highlight pasted data: need to define boundaries, last row is 99600
 - a. Data>Get Data from Table/Range
 - b. Named this NCES Data
 - c. Close and Save as connection only
23. Repeat for DL data, last row is 2207 (first iteration); 1864 (second iteration)
 - a. Name this DL Data
24. Data>Get Data>Combine Queries>Merge
 - a. First set: DL Data
 - b. Second set: NCES Data
 - c. Select columns to perform join: district and agency; school and NCES school (use ctrl to select more than 1)
 - d. Join kind: left outer (explained here: <https://radacad.com/choose-the-right-merge-join-type-in-power-bi>)
 - e. Select "Use fuzzy matching to perform the merge"
25. Expand all variables in table (green columns)
26. Close and Load

27. Sort by one of the NCES variables
28. Cut all the ones that didn't get a match, paste onto new worksheet
 - a. Insert row at top for variable names, copy and paste from some other worksheet
29. Repeat Steps 5-6, iterating on name (e.g., DL Data 2)
 - a. If you don't select a range, excel will automatically do it for you. This wasn't an option earlier because there were two datasets on one page. This probably could have been avoided by putting each one on a separate worksheet. #hindsight2020
 - b. Before clicking "OK" set similarity threshold to .7
30. Continue with steps 7-10
31. Repeat steps 11 and 12, each time reducing similarity threshold by .1, until all items have a match OR there are fewer than 50 without a match. The multiple iterations keep the earlier iterations from accruing a ridiculous number of potential matches.
32. Paste all matches into a new excel spreadsheet
33. Paste all items without match into a separate worksheet in the new spreadsheet
 - a. It probably doesn't matter if you sort this or not, because the original DL district and school names will stay the same. But keeping it somewhat out of order will help create visual distinctions
34. For matches: rearrange so that district variables are next to each other, same for schools
35. Compare and delete bad matches #YOLO
36. For non-matches: go through and manually enter NCES IDs and names
37. Create new excel spreadsheet, paste in complete dataset from the two worksheets
38. Make sure N=2207 (or 1864), otherwise you're in trouble

Because I made a bad decision and didn't include all variables in fuzzy merge subset:

1. 1-1 merge missing variables into starting point fuzzy merge sheet from original dataset
 - a. Check to make sure all rows got variables added
2. 1-1 merge completed fuzzy merge subset with updated starting point fuzzy merge set
3. Check to make sure all merges are accurate

Appendix H: Log of Dataset Updates in Data Cleaning Process

Dataset updates

Updates made to “All states DL program school level.xlsx”

Note that file title is appended with date for different versions

Date	Updates Made	Comments
10-2-20	Deleted 2 Nevada schools that actually don't exist	read the blog more carefully next time, Abby!
10-14-20	<p>Consolidated districts that inadvertently got counted as multiple</p> <ul style="list-style-type: none"> -walla walla (1 school--WRONG) -verona (1 school, one wasn't capitalized properly) -teton (2 schools, did a fill series instead of copy) -peoria (3 schools--WRONG) -detroit (1 school—detroit public schools vs detroit public school system) -charter (twin cities german immersion school marked N for district info instead of -999) -alsip (2 schools, fill series instead of copy) <p>Removed</p> <ul style="list-style-type: none"> -Dwight Bellizzi because doesn't open until 2020-21 SY -Fort Collins Global Village Academy: closed on July 1, 2019 so was not operating in 2019-20 SY 	<p>These discrepancies came to light during analyses for CEDER paper.</p> <p>CEDER paper mistakenly merged a walla walla (Oregon) school with walla walla (Washington)...OOPS</p> <p>And two Peoria schools—districts are called the same thing but are in different states</p> <p>This version used for real fuzzy merge (fuzzy merge set removes Alaska, Arizona, and California since they already had manual names and NCES IDs inserted)</p>
10-14-20	<p>Fuzzy Merge</p> <ul style="list-style-type: none"> -did 5 iterations, with last one (@.4 similarity threshold leaving 8 sad schools with no matches) <p>See Fuzzy Merge Protocol for more details</p>	<p>During fuzzy merge, changed</p> <ul style="list-style-type: none"> -Montessori Del Mundo's district from Aurora? To Charter -Jeffco County Public Schools (or Jefferson County?) to just “Jefferson County Public Schools”
10-20-20	<p>Data Cleaning from Fuzzy Merge</p> <ul style="list-style-type: none"> -Palm Bay Academy Language Immersion Element 4-5 and Palm Bay Academy Language Immersion Campus K-4 merged, because NCES lists K-5 as one campus, 6-12 as separate -remove Rigby Elementary, Jefferson county Idaho: it doesn't exist -Tom Benson elementary in Jefferson parish is given Roosevelt middle school NCES IDs because 	<p>All States DL program school level 10-20-20 edits informed by “Sad Boys” worksheet in All states DL program school level 10-14-2020 finished merge</p> <p>Of interest: in Utah, Dual Immersion Academy is cross</p>

<p>starting 2019-20 SY, Roosevelt middle school became tom benson elementary: https://www.nola.com/news/education/article_ed894a5f-7643-51bb-b39b-769674ec304f.html</p> <ul style="list-style-type: none"> -Plantation elementary in Lafayette parish renamed Corporal Michael Middlebrook Elementary -Zeeland Schools in Michigan: site says “zeeland high schools” so both are included in dataset -st. louis language immersion charter seems to have two campuses, marine and papin, but website doesn’t differentiate. Both kept. -Nob Hill ELC in NM doesn’t show up on NCES. It’s PK-K, head start and NM PK. Maybe ELC issue -EE Waddell language academy in charlotte-mecklenbug schools, NC condensed from K-5 and 6-8 into K-8, as school is listed as single K-8 institution on NCES -Eugene International High school in Eugene SD 4J is actual a program at 3 different high schools: Churchill, Sheldon, and South Campus. So, this entry is split into 3, accordingly. -Oregon (wrong) Walla Walla merged with Washington (right) Walla Walla: Edison, green park, sharpstein deleted from Oregon; remaining three (garrison, pioneer, walla walla high) changed from Oregon to washington -Clear Creek ISD changed from PA to TX, affects 5 schools: brookwood, landolt, league city, mcwhirter, and stewart. -Clear Creek ISD schools (brookwood, landolt, league city, mcwhirter, and stewart) are actually Texas, not Kansas There was also a Kansas version. This was deleted. -Renaissance Academy (charter) in Utah condensed from 1-6 and 7-8 to 1-8 as NCES lists it as single K-9 institution -Kent Valley ELC in Kent SD, WA not listed on NCES—maybe ELC issue -Washington (wrong) Mount Pleasant SD should be TX -Beloit SD, WI had district name doubled under school name. Referenced original data collection xlsx (this is the real spreadsheet 042020) and recovered 3rd school’s name (hackett) 	<p>listed as Dual Language Academy on the DOE site</p>
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	<ul style="list-style-type: none"> -Racine SD, WI had mitchell elementary and Mitchell school—they're the same -White Plains SD, NY has two middle school campuses, but NCES doesn't have an ID for the eastview campus. Listed as 999 -East Maine SD 63 was listed in Maine; it's actually in Illinois -Utah's North Davis Prep and North Davis Prep Jr. are merged into one, as NCES lists it as single institution K-9 	
10-21-20	<ul style="list-style-type: none"> -Telluride Middle/High school item split into Telluride Middle and telluride High because they're two entities in NCES -2 CT charters with blank (non-NCES) district now "Charter" -There may be a double in DC -Need to merge Barrington Station: Chinese and Spanish -Alameda Valley school, NM is in Las Cruces, not Jemez Valley 	
10-22-20	<p>Merged Sad Boys with fuzzy merge NCES Appended newly added NCES ID rows with previously-entered NCES rows N=3100</p>	Created new version of dataset with all schools, all NCES IDs
10-23-20	<p>Updated xlsx dataset to code ASL instead of sign language. Did not save new version (still 10-22-20 file). Saved in new version: Updated xlsx dataset: mountain view in newberg, or language=Spanish john f kennedy in portchester, ny language = Spanish all schools in telluride, co = 999 columbine in jefferson county, co = 999 all CA schools = -999 columbine elementary in co changed from Jeffco to School District NO. Re-3 Fort Morgan and associated NCES IDs</p>	
1-6-20	<p>Added Texas to xlsx dataset, did fuzzy merge Created SPSS file</p>	
1-7-20	<p>In SPSS file: -Updated Houston data to include grade levels and DL model -changed White E ES to Mark White ES -coded for language (created binary language variables)</p>	

1-13-20	<p>In SPSS file:</p> <ul style="list-style-type: none"> -updated to add language immersion programs found online -added Houston ISD Rucker ES; this must've been data entry error -Woodland CCSD 50: deleted elementary west—even though there is an east and west campus, they are considered one entity by NCES -Carthage IX: sixth grade center deleted because it opened for 2020-21 SY on August 20, 2020 and has no NCES ID. https://www.fourstateshomepage.com/news/carthage-putting-finishing-touches-on-6th-grade-center/ -Union COUNTY Publi schools: Shiloh Valley Primary NCES ID added, grade range changed to k-2 -Shiloh Valley Elementary grade range changed to 3rd-5th -changed 3 eugene international high School_NCES entries to the high schools that host the program and merged Sheldon high school entry with the eugene international high entry -buckner prep in cityscapes schools, tx NCESID updated (initially was repeat of east grand prep academy, which is same charter district but different school) -clear creek isd: deleted doubles of brookwood, landolt, stewart, league city, and mcwhirter; deleted bayside int because not on website and seems to be typo in copy/paste -fixed frasc elementary in Louisiana—french charter school mistakenly matched to this -fixed Rochester school district double school 22: school 12 was renamed to douglass -fixed Austin isd martin middle double: lively middle mistakenly matched -fixed el paso: double Henderson middle, double macarthur, double marguerite j lundy/lundy. Also added in Spanish codes (language and binary Spanish vars) for schools without that data since verified by district site -mount pleasant isd: deleted doubles of Annie Sims, E C Brice, Frances Corprew, and Vivian Fowler -in pharr-san juan-alamo isd, deleted murphy middle: was double of audie murphy middle 	
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	<p>-utah canyons district: updated mount Jordan middle to mt. Jordan middle and associated NCES id—mistakenly matched to Jordan high</p> <p>-utah park city district: treasure mountain middle simply does not exist: listed as one number different than treasure mountain jr high in address and phone number; middle school is supposed to have a French program but none listed at treasure mountain jr high and grade level indicated is not covered. Merged the two (so added French immersion to treasure mountain jr high) to hedge bets.</p> <p>-virginia Fairfax co: fixed bailey’s upper elem and bailey’s elem (Which had mistakenly matched with bailey’s upper elem) for nces id and school name</p> <p>-racine usd: fixed dr. jones school to match jones elem, not janes elem. Nces id and school name</p>	
1/14/21	<p>-deleted Parkview elementary double for CUSD 300</p> <p>-deleted YHALE (yi hwang academy of language excellence) in Georgia because 2020 is its inaugural year: https://wujiecn80.wixsite.com/website/post/what-s-more-about-yhale</p> <p>-merged in additional Texas cases, saved as new file N=4422</p>	
2/1/21	<p>-deleted eastview MS in white plains NY—even though there are two campuses (eastview is 6th and highlands MS is 7th-8th), NCES only has one entry. Also updated highlands grade level range.</p> <p>-recoded DistrictID variable so it is derivative of the NCES-given School ID.</p> <p>-changed variable type of DistrictID and SchoolID variables to restricted digit so there is a leading 0</p>	<p>-deleted eastview MS in alignment with previous decisions, see 1-13-20 entry.</p> <p>-changing variable type to restricted may make weird decisions for negative numbers so the -999 missing value may need to get changed to 999 later on in life.</p>
2/11/21	<p>-deleted Elm Street Elementary from Bishop Unified in CA because closed June 30, 2019 https://www.cde.ca.gov/SchoolDirectory/details?cdscode=14766876070783</p> <p>-deleted Mountain View Elementary in Azusa Unified in CA because closed June 6, 2019 https://www.cde.ca.gov/SchoolDirectory/details?cdscode=19642796011308</p>	

<p>-deleted John Gill Elementary in Redwood City Elementary in CA because Closed July 1, 2019 https://www.cde.ca.gov/SchoolDirectory/details?cdscode=41690056044523</p> <p>-deleted Adelante Spanish Immersion in Redwood City Elementary because closed June 30, 2019 https://www.cde.ca.gov/SchoolDirectory/details?cdscode=41690056114037</p> <p>-deleted Marjorie Veeh Elementary in Tustin Unified CA because closed May 30, 2019 https://www.cde.ca.gov/SchoolDirectory/details?cdscode=30736436030670</p> <p>-deleted GULFSTREAM EARLY CHILDHOOD CENTER OF EXCELLENCE in Broward FL because PK only https://nces.ed.gov/ccd/schoolsearch/school_detail.asp?Search=1&InstName=GULFSTREAM+EARLY+CHILDHOOD+CENTER+OF+EXCELLENCE&SchoolType=1&SchoolType=2&SchoolType=3&SchoolType=4&SpecificSchlTypes=all&IncGrade=-1&LoGrade=-1&HiGrade=-1&ID=120018008639</p> <p>-DELETED INDEPENDENCE PRESCHOOL in SD U-46 because PK only</p> <p>-DELETED ILLINOIS PARK ELEMEN IN KANE COUNTY IL BECAUSE PK ONLY</p> <p>-deleted GARRETT PRI in LUFKIN ISD, WATKINS EARLY CHILDHOOD CENTER in NEWPORT NEWS, BULL EARLY EDUCATION CENTER in RACINE COUNTY, and EARLY LEARNING CENTER in SHEBOYGAN COUNTY because all are PK only</p>	
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Appendix I: Protocol for Making the District Level DL Dataset and Merging with the NCES and Census Data

Making the District Level DL Dataset

Data aggregated to the district level needs to include:

- Number of schools with DL programs
 - From this, can calculate binary has/doesn't have DL as 0 or >0
 - Merge with NCES data to calculate ratio of # DL schools/# total schools
 - Merge with NCES data to calculate # DL schools/ # total students
- Individual language variables+ no info variable
 - Best to have these as sum of all district's schools, as can calculate both binary has/doesn't have and can determine which

Steps to Create District Level DL Dataset

1. Use syntax to export custom table of districtIDs and binary language variables to excel
 - a. Have to do this because custom table is TOO BIG to copy and paste
 - b. In creating this custom table, it becomes apparent that there is no DL program for Filipino or Punjabi. This is probably because the languages were copied and pasted from the California dataset, which included all bilingual programs in the state. The one school with a Punjabi program has FLEX and FLES, and the schools with Filipino (Pilipino or Tagalog) programs are 2 with FLES and 1 with native speaker programs. Therefore, these variables are dropped because they don't have any meaningful information.
2. When creating DL_schools variable, which is intended to be a count of total number of schools with a DL program in the district, the following districts are coded 999 for this variable because data collection revealed evidence that the district has a DL program, but there was no information available related to which schools house the dl program. Language variables are not adjusted, so future analyses should take into account inclusion/exclusion of cases coded 999 for DL_schools variable
 - a. Harvard CUSD 50 (1718420)
 - b. LAMAR CISD (4826580)
 - c. Lower Kuskokwim School District (0200001)
 - d. McHenry School District 15 (1725290)
 - e. RSU 35/MSAD 35 (2311310)
 - f. West Windsor-Plainsboro Regional School District (3417700)
3. Also note that **each of the following districts could potentially have one more DL program**, as the internet says that the programs and the schools existed during the 2019-20 SY and fall within the K-12 range, but the school name does not match any school listed in the NCES directory dataset for that district. It's possible that these schools are included as part of another school, despite having a separate physical location. **Language variables are also adjusted down.**
 - a. KENT SCHOOL DISTRICT (5303960, for Kent Valley Early Learning Center, Spanish)
 - b. PHARR-SAN JUAN-ALAMO ISD (4834860 for Collegiate High, Spanish)

- c. Ruidoso Municipal Schools (3502310 for Nob Hill Early Childhood Center, Spanish)
- 4. Lastly, note that these districts have a school listed as 999 that is not included in the school count so they could potentially have one or more DL programs not included in the count. Language variables are also adjusted down
 - a. UNION FREE SCHOOL DISTRICT OF THE TARRYTOWNS (3628650): district site says they offer DL for k-4, but only school with evidence of DL program is Washington, which starts at grade 3. This seems to indicate that there ought to be at least one other school to cover the k-2 range (unless they make a grade exception at Washington? This seems unlikely)
 - b. Palatine Ccsd 15 (1730420): district site says they offer one-way DL in addition to the two-way DL programs, but they don't state which schools have one-way DL.

Making the District Level NCES Dataset/Merging with District Level DL Dataset

NCES district level data needs to include:

- Percentage EL for 2018-19
- Percentage EL for 1998
- Total number students for 2019-20
- Total number of schools per district for 2019-20

Protocol for cleaning NCES Directory and Merging with DL Dataset

NCES 2019-20 dataset cases to remove before merging

Variable	Label	Entry to Remove
GSHI	Highest Grade Offered	PK
LEVEL	LEA or school level	Adult Education

NCES 2019-20 variables to remove before merging:

- SCHOOL_YEAR
- FIPST
- ST
- STATE_AGENCY_NO
- UNION
- ST_LEAID
- ST_SCHID
- SCHID
- MSTREET1
- MSTREET2
- MSTREET3
- MCITY
- MSTATE
- MZIP
- MZIP4

LSTREET1
 LSTREET2
 LSTREET3
 LCITY
 LSTATE
 LZIP
 LZIP4
 PHONE
 WEBSITE
 RECON_STATUS
 OUT_OF_STATE_FLAG
 CHARTAUTH1
 CHARTAUTHN1
 CHARTAUTH2
 CHARTAUTHN2

Variable Crosswalk: NCES 2019-20 school directory and DL dataset

NCES	DL
STATENAME	State_NCES
SCH_NAME	School_NCES
LEA_NAME	District_NCES
NCESSCH	SchoolID
LEAID	DistrictID

NCES cases to remove after merging

Variable	Label	Entry to Remove
SY_STATUS	Start of year status	2 (closed) 6 (inactive) 7 (future)
UPDATED_STATUS	Updated status	2 (closed) 6 (inactive) 7 (future)

To merge these datasets:

1. Run syntax to add leading 0 to first 9 states alphabetically for DistrictID and SchoolID
2. Run syntax to change all state, district, and school names to uppercase
3. Create new dataset that combines cases for the following variables:

State_NCES
School_NCES
District_NCES
SchoolID
DistrictID

- a. Also include all other variables from DL dataset

- b. Note that this merge seems to create a duplicate case for doubles. Reasons for duplicates listed below:
 - i. Difference in school and/or district names (e.g., Carthage sixth grade center vs. Carthage intermediate center)
 - ii. Charter schools being listed as part of a school district instead of with the charter school district (this could be remedied in the future by only using school IDs because the district is embedded in the school's ID)
 - iii. Basically all schools listed in both the DL dataset and the NCES dataset (probably something about how they don't match on ALL variables, so two cases created)

To Fix Duplicates:

1. Run Identify Duplicates analysis based on SchoolID, matches sorted by DL, descending, with first matching case as Primary

Districts with DL but no indication of which schools/how many:

1718420 x

1725290 x

2311310 x

3417700 x

4826580 x

(these needed to be hand coded at the LEA stage)

Hand code:

DL_LEA = 1

DL_count = sysmis

DL_Charter_count = sysmis

Leave DL_Charter_LEA as 0

Schools in the DL set that are deleted and reasons:

120018008639 because PK only

Appendix J: Addressing Geospatial Data Issues Related to Charter Schools and the Protocol Used to Link Charter Schools to Non-Charter District Catchment Areas

Charter schools pose a unique data and measurement issue when conceptualizing school districts as neighborhoods, as 1) charter schools often constitute their own district and 2) they often have more flexible enrollment policies than a neighborhood school. Further complicating this issue, I could not find nationwide data on charter school geographic catchment, as the NCES does not include charter schools in their EDGE surveys. To address this issue, I geolocated each charter school, using a combination of the Census Bureau's geocoder and Geocod.io to identify the census block (the smallest geographic unit for census data) in which the charter school is located. With this census block information, I used ArcGIS to overlay district catchment areas on census block boundaries. Using this geospatial visualization, I performed a spatial join between charter school census blocks and district catchment areas to identify the district(s) that contained the census tract.

In cases where more than one school district included the charter school's census block in their catchment areas, I selected the one school district to associate with the charter school based on grade level match and enrollment numbers, giving preference to the district that aligned best with the charter school's grade range and had the largest enrollment. Out of 7455 charter schools, 27 were unable to be linked to a non-charter district (0.4% of cases missing). To account for the shift of charter schools from charter districts to non-charter districts, I added the charter schools' enrollment and finance data to its non-charter district's figures.

While I recognize that this is an imperfect approximation of a charter school's geographic catchment, linking a charter school to its nearest non-charter school district was the most feasible way to consider how the existence of charter schools impacts the school district's DLE-gentrification relationship.

Protocol to Link Charter Schools/Charter School Districts with Census Tracts

Match charter school's census tract with a school district, using the NCDB:

1. In the SPSS file for NCES' school directory, modified for K-12, merge in address variable (ADDRESS) from master NCES school directory file
2. Sort by CHARTER_TEXT
3. For charter schools only (CHARTER_TEXT = YES), paste addresses, school IDs, and district IDs into an excel spreadsheet, save for future reference (Charter_IDS_addresses.csv)
4. Copy only address variable onto separate spreadsheet (save as Charter_addressesONLY.csv) and format [according to instructions here](#).
 - a. There are 7,455 charter schools in the modified school directory file, so this is under the 10,000 record limit per batch for the Census data
5. Upload Charter_addressesONLY.csv to the Census Bureau's geographies geocoding webpage, selecting the following:
 - a. Benchmark: Public_AR_Current
 - b. Vintage: Census2010_Current
 - i. Choose the 2010 Census vintage because Geolytics' NCDB norms all data to the 2010 Census, so we want to know which 2010 census tract it would be associated with

- ii. This may not end up being super important, given that aggregating the tracts up to the school district level will probably account for any kind of change in tracts the individual charter school may experience
6. In the output file, identify the Census Tract GEOID variable and merge this into the Charter_IDs_addresses.csv file, save as Charter_Tract_GeoIDs.csv
7. Merge the GEOID variable from Charter_Tract_GeoIDs.csv into whatever dataset necessary, using the SCHOOLID or DISTRICTID variables

Protocol to Link Charter Schools with School District Neighborhood to Calculate Gentrification

1. Import Charter_Tract_GeoIDs.csv into SPSS
2. Merge in STATE, SDUNI, SDELEM, and SDSEC variables from the Geolytics_Census2000 dataset
3. Concatenate State+[SDUNI/SDELEM/SDSEC] variables to create NCES DistrictIDs
 - a. Rename these variables DistrictID_charter_uni, DistrictID_charter_ele, and DistrictID_charter_sec
 - b. Save this dataset with the same name as the CSV
4. Merge 3 new concatenated variables into All DL programs 2-18-21_useTHIS SPSS file, rename as All DL programs_CharterAltSD
 - a. Copy this new file into master data folder in the DATA IN PROGRESS folder
5. Merge 3 new concatenated variables into 3-30-21 District level dataset as well, rename as All DL programs DISTRICT LEVEL CharterAltSD
 - a. Copy this new file into master data folder in the DATA IN PROGRESS folder

Appendix K: Constructs of interest, Measure Iterations, and Data Sources

Variable Construct: Gentrification

The body of gentrification literature concurs that it is incredibly difficult to create a functional measure of this phenomenon and that there is no single, agreed-upon definition. I provide a more in-depth discussion of these difficulties in Appendix L. For my gentrification variable, I used a modified version of Freeman's (2005) measure and tested three iterations. Freeman's measure has been used by many studies of gentrification, including those by Governing Magazine (Maciag, 2015), in partnership with the Philadelphia Federal Reserve Bank (Ding et al., 2016), and in peer reviewed publications (e.g., Barton, 2016; Pearman & Swain, 2017).²⁰

Freeman's (2005) Measure of Gentrification

Freeman's measure of gentrification uses a threshold method for identifying gentrification and is conducted in two parts. In the first, neighborhoods are evaluated determine if they are considered gentrifiable at the beginning of the time period in question, based on 1) being in a central city, 2) being in the lowest 40th percentile for median income for the metropolitan area, and 3) being in the lowest 40th percentile for proportion of housing built in the past 20 years for the metropolitan area. In the second part, neighborhoods that qualified as gentrifiable are evaluated, using the following criteria, to determine whether or not they gentrified at the end of the time period in question: 1) having a greater percentage increase in educational attainment compared to the median increase for the metropolitan area and 2) having an increase in real housing prices.

Major Modifications to Freeman's (2005) Measure

I modified Freeman's measures in two ways: 1) expanding the prerequisite of being in a central city to being in one of the two types of urban areas (Urbanized Areas and Urban Clusters), as defined by the US Census Bureau; 2) increasing the threshold for gentrifiable neighborhoods from being in the lowest 40th percentile for median income and proportion of housing built to being under the 50th percentile. This expansion of the measure's definition of gentrification beyond central cities is intended to better align with the evolution of gentrification literature that has grown to include locations outside of city centers (e.g., Lees et al., 2007; D. P. Smith & Higley, 2012) and connote a more general understanding of gentrification as "an upward class

²⁰ Note that some of these studies modify Freeman's measure but cite his 2005 publication as the foundation of their gentrification calculations. The modifications I make are in alignment with other researchers' modifications.

transformation and the creation of affluent space” (Doucet, 2014, p. 125). The raising of the thresholds by 10 percentiles is motivated by Pearman and Swain’s (2017) study, which uses Freeman’s measure and finds that using the 50th percentile instead of the 40th percentile leads to more robust results.

Also, as there is no dataset that categorizes census tracts as strictly urban or rural, I developed my own method of making this distinction. Often, a tract is not exclusively urban or rural, as the boundaries of urban areas do not always conform with census tract boundaries. Instead, the Census Bureau offers data on the urban population (including urbanized areas and urban clusters) and rural population.

Initially, I considered defining a tract as urban based on its population living in urban settings. However, the distribution of tracts by urban vs. rural is heavily skewed in favor of having a majority of its population in an urban setting. 86.5% of tracts had an urban population greater than 0, and 78.1% of tracts had at least half of its population in an urban setting. There did not seem to be any meaningful cutoff point based on tract population in an urban setting, as 1) it doesn’t make sense to consider a tract with a majority urban population as not urban and 2) there are fewer than 10 percentage points between the percentage of tracts with at least 50% urban population and the percentage of tracts with an urban population greater than zero. Therefore, I decided that any tract affiliated with a CBSA (based on 2010 IDs) would be considered urban.

Shifts in Defining Elements of Freeman’s (2005) Measure Due to Data

As I merged datasets and manipulated variables to create the variables used in Freeman’s measure, I realized that the Census Bureau reconceptualized their definition of urban for the 2010 Decennial Census. This created issues in putting 2000 data in conversation with 2019 data.

Core-based statistical area (CSBA) IDs changed for the 2010 census (after Freeman’s paper was published), as the definition of “urban” (including urbanized areas and urban clusters) was updated, which expanded the subsections of CBSAs to metropolitan and micropolitan statistical areas. This has caused significant issues in gathering data to calculate the CBSA variables for Freeman’s measure of gentrification: CBSA data from the 2000 Decennial Census are linked to the old CBSA IDs, and CBSA data from the 2015-19 ACS five-year estimate use

the updated CBSA IDs. There is not a simple one-to-one correlation between IDs due to the change in definition of what constitutes as urban.

Further complicating this issue, CBSA-level data for the 2000 Decennial Census appeared to have missing data: data extracts were missing key CBSAs. Out of 324 CBSAs extant in 2000, Census Bureau data extracts only offered data for 280 CBSAs. This is highly undesirable, because the gentrification measure cannot be calculated if a case's data cannot be compared to its CBSA median. Not having baselines for 44 CBSAs would limit the number of tracts I could include in the gentrification calculation.

Instead of relying on the Census Bureau's calculations for the CBSA grain size, which aggregates individual responses to the CBSA level, I used tract-level medians for the CBSA level calculation. From Freeman's paper, it is unclear which is preferable: aggregated individual responses would better capture the true median value of the variables for the CBSA, but aggregated tract-level data offers a way to compare a tract to the other tracts in the CBSA. Given that tract aggregates minimizes missing data, I decided to proceed with this method.

In calculating the CBSA medians, I coded tracts according to their updated CBSA IDs. This was necessary because my expanded definition of "urban" incorporated areas previously unassociated with a CBSA that would have missing data in calculating the change over time in education attainment element of Freeman's measure.

In summary, I applied the 2010 definition of urban as well as 2010 CBSA IDs to both 2000 Decennial Census and 2015-19 ACS data and calculated CBSA median values for household income, percent of houses built in the last 20 years, and change in educational attainment as the median of tract-level data.

Defining a Neighborhood

When measuring gentrification, it is important to be clear about how "neighborhood" is defined in my study. While the most prevalent definition in gentrification literature equates a census tract to a neighborhood, I conceptualize a school district as the neighborhood unit. Since districts are generally the institutional level at which DL programs are available (that is, most DL programs are open to all students in the district) and the level at which many policies and decisions are made, it would make sense to define a neighborhood by the same boundaries. Similarly, there is often student mobility within a district when specialized programs, such as DL ones, are

available via application or lottery system. So, if a school's neighborhood is conceptualized as the geographic area that the schools' students live within, a DL program's neighborhood would be the entire district catchment area, as all students within the district are (theoretically) eligible for the program.

However, school districts come in all shapes and sizes, which can become an issue in cases of school districts that cover larger geographic areas, as "the larger the area examined, the more likely to discover no gentrification patterns" (Chronopoulos, 2016, pp. 3–4), as population movement is more likely to be a net zero. With this in mind, I wanted to leverage three different ways of conceptualizing gentrification in terms of a school district neighborhood.

Measure Iterations

Initially, I intended to test two methods of measuring gentrification in my school district neighborhoods: 1) by using the EDGE aggregates of census data to school district boundaries and 2) by calculating gentrification for each census tract within a school district's catchment area and then determining gentrification for the neighborhood based on how many tracts gentrified. However, EDGE aggregates of census data to school district boundaries do not have historic data as far back as the beginning of my gentrification period, so I opted to use the second option in order to keep census data calculations as uniform as possible.

In order to answer RQ3, regarding the relationship between having a DL program and different levels of gentrification in the neighborhood, I iterated on thresholds of count and percentage of tracts associated with a district that would need to gentrify in order for the district's neighborhood to be considered gentrified. Since there is no precedent for calculating gentrification in this specific manner, I included iterations ranging from a low (at least one tract gentrified) to mid (25% of gentrifiable tracts gentrified) to high (at least 50% of all tracts gentrified) threshold for gentrification. Table 1 describes the measurement and rationale for each iteration.

Nevertheless, it bears noting that the relationship between tracts and school district catchment areas is not easy to parse, even with EDGE data that links school districts and tracts. Using geospatial data to create GIS overlays of census tracts and district catchment areas, I found that there was little alignment between the two. Indeed, a single census tract could be linked to as many as 32 school districts.

For example, Figure 1 is a screenshot from ArcMap, the GIS software I used. This figure shows a California census tract (colored pink) and the nine school districts that intersect the tract (outlined in teal). One district is completely contained within the tract’s boundaries but does not encompass the entirety of the tract. The other school districts contain only a small portion of the tract in question.

Calculating gentrification at the tract level and then aggregating the number of gentrified and non-gentrified tracts to the school district level is potentially problematic in cases where the school district only includes a portion of the tract. In these cases, the entire tract’s population would be included in the measure calculation, but there would be a high likelihood that only a portion of that population would be located within the school district’s catchment area.

In conversation with Emily Schondelmeyer, Chief of the EDGE Branch at the Census Bureau, and Douglas Geverdt, Study Director of EDGE at NCES, we determined that it was not feasible to use a smaller census grain size due to missingness in the estimates from small sample sizes. We also recognized that using entire tract’s data in cases where the tract is split has the potential to cause issues related to the standard error of the estimates, as we are unable to determine whether or not the distribution of the subpopulation characteristics of interest reflects the same spatial distribution as the total population. In short, there is no practical way to both exclude partial tracts and minimize catchment area loss.

Table 1

Measure Iterations for Gentrification

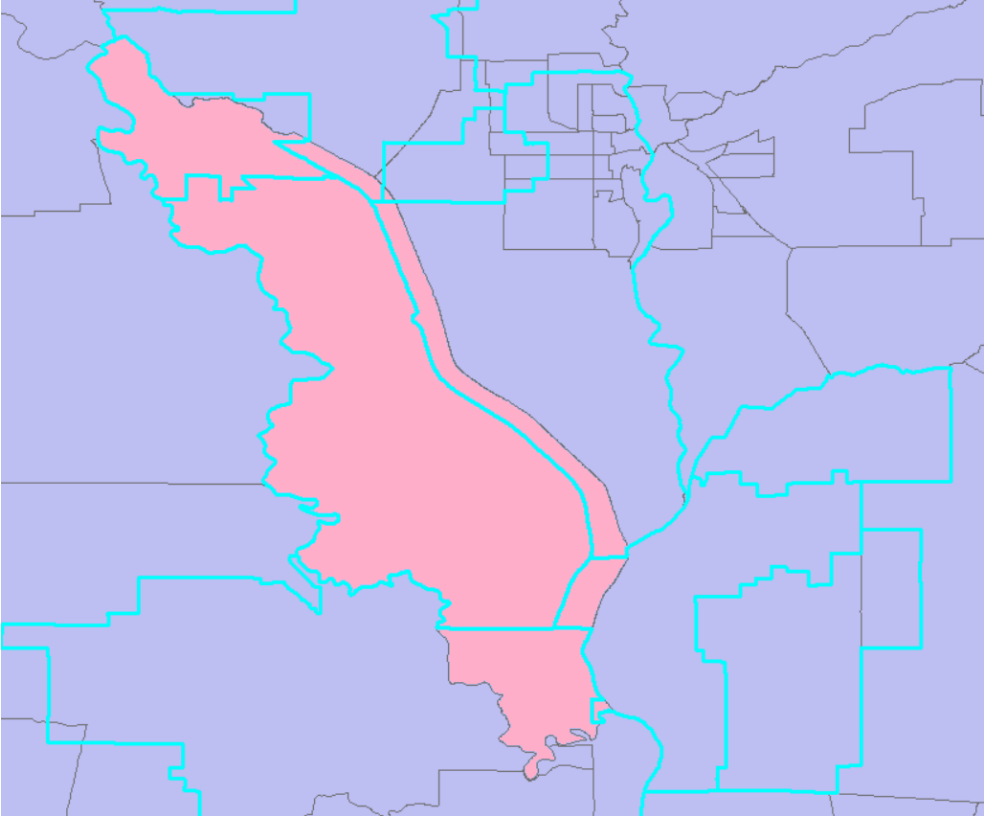
Measurement	Rationale
1. Modified Freeman (2005) for 2000-2019 (used as the foundation for items 2-4 below)	<p>A. Including Urbanized areas and Urban Clusters helps to expand gentrification beyond inner cities, as supported by evolving definitions of gentrification</p> <p>B. Raising thresholds to 50th percentile makes measurement more robust, supported by Pearman and Swain (2017)</p> <p>3. Census tracts are commonly used as the unit of analysis in gentrification literature</p>

<p>2. Modified Freeman (2005) for 2000-2019; counts as gentrification if at least 1 census tract in district gentrifies</p>	<p>A. Same rationales for modifying Freeman (see 1A and 1B)</p> <p>B. School districts are the institutional level at which DL programs are available and at which many policies and decisions are made</p> <p>C. Sometimes a small, but vocal population at a school can initiate change. So, perhaps just having one gentrifying census tract within the district is enough to create change</p>
<p>3. Modified Freeman (2005) for 2000-2019; counts as gentrification if at least 25% of gentrifiable census tracts associated with the district gentrify</p>	<p>A. Same rationales for modifying Freeman (see 1A and 1B) and defining neighborhood as district (see 2B)</p> <p>B. Perhaps more of the district’s census tracts need to gentrify in order to gain enough traction within the district to create change</p> <p>C. In my initial data exploration, approximately 30% of gentrifiable tracts gentrified</p>
<p>4. Modified Freeman (2005) for 2000-2019; counts as gentrification if at least 50% of gentrifiable census tracts associated with the district gentrify</p>	<p>A. Same rationales for modifying Freeman (see 1A and 1B) and defining neighborhood as district (see 2B)</p> <p>B. Perhaps the majority of the district’s gentrifiable census tracts needs to gentrify in order to gain enough traction within the district to create change</p>
<p>5. Modified Freeman (2005) for 2000-2019; counts as gentrification if at least 50% of census tracts in district gentrifies</p>	<p>A. Same rationales for modifying Freeman (see 1A and 1B) and defining neighborhood as district (see 2B)</p> <p>B. This is similar to 4, but with the denominator set to all the census tracts, not just the ones determined to be gentrifiable.</p>

	This sets a very high threshold for gentrification.
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Figure 1

Screenshot of a California Census Tract (Pink) Associated with Nine School Districts (Blue)



Data Sources

I calculated gentrification using data from the 2000 Decennial Census and 2015-2019 ACS five-year estimate. It is not possible to use the 2010 Decennial Census for these calculations, as the survey for this particular census was greatly abbreviated and did not include questions related to the data necessary for Freeman’s gentrification measure. In addition, I also used Geolytics’ NCDB, which is commonly used in gentrification studies to connect census tracts with school district boundaries (e.g., Pearman & Swain, 2017), and account for census tract boundary changes over time by normalizing tract-level data to 2010 so that data across the decades can be compared. Since tracts are redrawn for each decennial census, the 2015-2019 ACS data is still comparable to the 2000 Decennial Census data, as normed to 2010 by Geolytics, as the tracts in

the ACS data adhere to the 2010 boundaries. I chose to use EDGE data to associate school districts with tracts, rather than the NCDB, because EDGE's dataset had more updated information on extant school districts and was easier to merge with CCD data, as both programs are run by NCES. While my study is interested in DL programs and school districts of the 2019-20 school year, I used EDGE's 2017-18 dataset that linked districts to census tracts, as it is the most recent dataset that aligns with the 2015-19 ACS tract naming and boundaries. Twenty-four tracts associated with districts did not have 2000 Census data and consequently could not have their gentrification calculated. This impacted 28 school districts. (The number of districts impacted is not equal to the number of tracts due to the possibility of more than one district's catchment area being associated with a tract).

Variable Construct: Existence of DL Program and Access

On the surface, having a DL program is a simple concept, but there are multiple ways that this construct can be included in my model, depending on the threshold at which a DL program is considered extant and accessible. Most simply, the variable could be calculated as a binary variable that captures whether or not a district has a DL program. This assumes that the simple existence of a program is the major import. Alternatively, the variable can be expressed as the proportion of schools within the district that have a DL program. This speaks to existence in terms of accessibility of DL within the district, as perhaps it is not enough to simply *have* a DL program, but the program needs to be reachable by enough students. More schools with programs suggest more communities with access to a nearby school with DLE. One shortcoming of this measure is that it does not account for the wide range in size of schools: there could be a meaningful difference between two districts with the same number of schools and the same number of schools with a DL program, but a large difference in number of students served.

With these considerations in mind, I included three different ways of capturing the existence of DLE in a school district in my model testing: 1) as a binary of having/not having at least one school with a DL program, 2) as a ratio of schools with a DL program to the total number of schools in the district, and 3) as a student-to-program ratio. Table 2 describes the measurement and rationale for each iteration.

Table 2

Measure Iterations for Existence of DL Program

Measurement	Rationale
1. District has DL program in 2019-20 SY: 0=no school in district has a DL program 1=at least 1 school in district has DL program	A. This is the simplest way to measure the existence of a DL program: either a district has a DL program, or it does not
2. Availability of DL program in 2019-20 SY: ratio of number of schools with DL programs to total number of schools in district, z-scored	A. Research suggests that the inclusion of PSEs in DLE helps to attract more resources and support for programs. Therefore, it may be more meaningful to consider program existence in terms of availability, as gentrification may not be related to the creation of DL programs, but rather, the increase in scope and/or popularity of these programs. B. Using a ratio instead of binary yes/no measure helps to account for differences in district size, as there are potentially different implications related to access and importance given to a program for a three-school district having one school with a DL program and a 300-school district having one school with a DL program. C. The z-score transformation is necessary due to issues of scaling and centering when using a logarithmic regression.
3. Availability of DL program in 2019-20 SY: ratio of total number of students in district to number of schools with DL programs, z-scored	A. Similar rationale as 2A and 2B but considers access in terms of number of schools with programs to number of students B. While it could be argued that larger schools might have more DL classrooms, there is a) no guarantee that schools would increase their number of DL classrooms proportionately and b) not enough data to confirm or refute this assertion C. The z-score transformation is necessary due to issues of scaling and centering when using a logarithmic regression.

Data Sources

DLE, and bilingual education in general, is not regulated at a national level. There is no publicly available, nation-wide dataset on DL programs (see [Appendix E](#) for a discussion of online directories that were examined for potential use, but ultimately rejected due to incomplete and unreliable data). Therefore, I used the novel DL data discussed in Chapter 5.

In order to calculate the ratios of schools with and without DL programs, I used NCES' CCD Public Elementary/Secondary School Universe Survey Data, limiting this dataset to schools serving grades K-12 that were open for the entire 2019-20 SY. To calculate the ratio of schools with DL programs to total number of students in the district, I used NCES' CCD's Local Education Agency (School District) Universe Survey 2019-20 data.

Variable Construct: Language Match

Asymmetrical motivations for bilingualism posit that the relationship between learner and language depends on the learner's racial, ethnic, and linguistic background. The relationship of DL program languages to the student population's linguistic background can be indicative of the population to which the district is catering. Racial Capitalism suggests that for dominant populations, DL programs are desirable regardless of match between LOTE of instruction and learner's background, as their motivations are more likely to be driven by a commodification of bilingualism. Thus, it is important for my model to include a metric related to the LOTE used for instruction and how it aligns with the languages students speak outside of school settings. For example, if the majority of a district's minoritized students are Spanish speakers, but the district only offers a Mandarin-English DL program, it is clearly not adopting programming to benefit its largest minoritized population. Ideally, I would want to match the DL program's LOTE of instruction to the student population's LOTEs, but, as mentioned previously, NCES does not offer nation-wide data on students' LOTEs at a grain size that is specific enough for this type of analysis, and the Department of Education does not collect data related to DL programs' specific features, such as LOTE used for instruction.

Therefore, I operationalized two measures for this construct. For one, I calculated the measure as a binary variable, where 0 indicates that the DL program's LOTEI does not match the neighborhood's most commonly spoken LOTE, and 1 indicates that the two languages are the same. In cases where a district offered more than one LOTEI, I calculated a ratio based on the same number of most commonly spoken LOTEs (e.g., if a district offers two LOTEIs, I created a ratio based on program language match with the two most commonly spoken LOTEs in the neighborhood). For the second construct, I created a less nuanced measure of language match, where the focus was on how large the English-only population was. For this, I calculated the

percentage of tracts where the most commonly spoken language category was English only. Table 3 describes the measurement and rationale for this construct.

Table 3

Measure Iterations for Language Match

Measurement	Rationale
1. Match between DL program LOTE and most common minoritized language(s) spoken in neighborhood 0=program language does not match most common non-English language spoken at home in the neighborhood 1=language does match (in case of multiple program languages, match language in order of population ranking using same 0/1 coding, then average)	A. If DL programs are serving the minoritized populations, they should choose a LOTE of instruction that aligns with the needs of these students
2. Percent of tracts where the top language selection is English only	A. If there is a high percentage of tracts where most people speak English only, the pool of students from which the district’s DL program enrolls is more likely to be PSEs, which suggests that the program may not be geared toward PSLs

Data Sources

I used my novel DL dataset and the 2011-2015 ACS five-year estimate to determine the DL program’s LOTE of instruction and the most commonly spoken LOTE in the neighborhood, respectively.

While collecting data on schools and districts that offer DL programs, I also gathered information on the programs’ LOTEI(s). However, it is important to note that not all programs in my dataset have information on LOTE used for instruction (97.1% of districts have language information) so RQ3’s language-related analysis was performed on a subset of the data, limited to school districts with a DL program and information about the program’s LOTE(s) of instruction available online.

If a site in a district has no LOTEI information but other sites in the district offer this information and use the same LOTEI, the site without this information are assigned the same LOTEI because it is unlikely that a district would offer a different language without offering any

information. However, if there is no LOTEI information on any of the district's webpages, I did not extrapolate LOTEI data from other online information (e.g., assign Spanish as LOTEI if website offers program information in Spanish) because there is at least one instance where the website languages do not align with the instructional languages. I also performed a secondary analysis of excluded cases to ensure that there is no underlying connection between cases that did not have language data.

In order to match the programs' LOTEI to the district demographics, I used the Census Bureau's 2011-2015 ACS five-year estimate on LOTEI spoken in the neighborhood. The ACS offers language data that is broken down into 39 languages and language groups. It is also the only publicly available dataset that offers nation-wide, comprehensive data on specific languages, to my knowledge.²¹ While it would be my preference to use the most recent ACS five-year estimate data for this measure, the Census Bureau stopped reporting detailed language data in 2016, so the latest five-year estimate containing these data is used instead.

2.5.4 Control Variable: Pre-Gentrification EL-designated Population

While research suggests that DLE is beneficial for all students, regardless of race, class or linguistic background (Valdez et al., 2016), it is important to consider to whom these programs are tailored and who ends up getting access to these programs. Ideally, every student who wants to be in a DL classroom would have a seat, but financial, personnel, and other resource constraints limit the number of participants. The extant body of qualitative research on DLE posits that DL programs prioritize PSEs at the expense of ELs. Interest Convergence supports the idea that dominant populations are catered to over minoritized populations. Additionally, asymmetrical motivations for bilingualism take into account speakers' linguistic background when assigning value to speakers' bilingualism, valuing the bilingualism of dominant populations over minoritized ones. Given the assertions in bilingual education literature that PSEs may be displacing ELs from DL programs, it is important for this model to include some baseline, or control variable, for how large the district's pre-gentrification EL population was.

²¹ I considered using NCES' Education Demographics and Geographic Estimates' (EDGE) American Community Survey—Education Tabulation (ACS-ED), as it offers district-level data on students' languages spoken at home and offers data from 2005-2018. However, this survey only offers the following options for language spoken at home: English, Spanish, other Indo-European languages, Asian and Pacific Islander languages, other languages. Thus, languages other than Spanish and English do not have an exact match in this dataset. Due to this lack of precision, I decided to use the Census data, despite its limited year range.

To capture this, I used the 1999-2000 SY district-wide ratio of EL-designated students to non-designated students, where EL-designated students serve as a proxy for students who would potentially have the most to gain through access to these programs, as research suggests that bilingual education, which includes DL programs, leads to better academic outcomes for EL designated students (e.g., Genesee et al., 2005; Goldenberg, 2008).

It is worth noting that this measure is flawed. The number of EL-designated students does not include redesignated students or other bilingual students enrolled in mainstream, English-only classes, and not all students in a district apply for DL programs. Furthermore, simply being designated EL does not automatically make a student a good match for a DL program, particularly if they are not familiar with the program’s LOTE and would basically be learning two new languages at once while receiving no support for their own primary language.

Table 4

Measure for Pre-Gentrification EL Population

Measurement	Rationale
1. Ratio: number of EL-designated students to non-designated students in the year before the gentrification period (1998-99 SY)	<p>A. This captures the proportion of students who could potentially benefit from DL programs to learn English to those who are fluent in English and would be using the DL program to learn the LOTE</p> <p>B. It is important to include a baseline of this data, as it gives insight into pre-gentrification demographics</p> <p>C. School districts make programmatic decisions based on the needs of their student populations, but Interest Convergence posits that dominant populations are catered to over minoritized populations. Therefore, it is important to include some measure to capture the linguistically dominant and minoritized populations</p>

Data Source

Demographic data for EL-designated students and non-designated students is available in the NCES’ CCD Local Education Agency (School District) Universe Survey dataset. Given that my gentrification period starts in 2000, I used data from the 1998-1999 SY.

Control Variable: Pre-Gentrification District Finances

As discussed in my literature review, research on bilingual education cites a lack of resources, particularly funding, as a source of inequity for these programs (e.g., Flores & García, 2017) and that DLE's inclusion of PSEs led to more resources being allocated to these programs (Fishman, 1982). Increased funding for these programs allows for more plentiful and up-to-date classroom materials, better paid teachers, and building maintenance. Additionally, the allotment of funding is often indicative of the district's priorities. However, district funding is heavily reliant on property taxes, property taxes are tied to property value, and property value (specifically, change in property value over time) is frequently used in measures of gentrification. So, perhaps it would make sense to use district funding as an alternative measure of gentrification to Freeman's (2005), as there is a reasonably close relationship between gentrification and change in district funding. Additionally, this would reasonably fit in with other measures of gentrification that have been used in studies published in peer-reviewed paper. As noted in Appendix B, studies have used even more unorthodox methods, such as the number of coffee shops in a neighborhood (Papachristos et al., 2011) and physical changes captured by Google Street View (Hwang & Sampson, 2014).

However, some research suggests that gentrification does not necessarily lead to budgetary improvements in neighborhood schools, as gentrifying families may opt to send their children to non-neighborhood schools that are perceived as "better" (e.g., DeSena & Ansalone, 2009). Furthermore, district funding can experience change due to factors other than gentrification, such as state funding (Baker & Corcoran, 2012) and economic recessions (Baker, 2014; Leachman et al., 2017).

Weighing these concerns related to the exogeneity of this construct, I included district finances as a pre-gentrification period control variable. In order to make district funding comparable across districts, regardless of size, I propose using districts' per capita spending, rather than total annual income or spending. While the district-wide funding per student will not reveal how much money is allocated expressly for DL programs (and this sort of data is not readily available), it is still indicative of the district's ability to obtain resources and fund programs beyond what is mandatory. Table 5 describes the measurement and rationale for this construct.

Table 5

Measure for Funding

Measurement	Rationale
1. Listed dollar amount per student, transformed into a z-score	A. This would capture funding in a way that is comparable across districts, regardless of size B. The z-score transformation is necessary due to issues of scaling and centering when using a logarithmic regression.

Data Source

Districts' per capita spending data is available in the NCES' CCD's Local Education Agency (School District) Finance Survey (F-33) from the 1989-1990 SY through the 2016-17 SY. Given that my gentrification period starts in 2000, I used data from the 1998-1999 SY.

Control or Interaction Variable: Charter Status

As discussed in my literature review, charter schools are sometimes used by gentrifying families to reap the social and economic benefits of living in a gentrifying neighborhood but still keeping their children separate from the historic residents' children and maintaining access to "good" schools (e.g., Davis & Oakley, 2013; DeSena, 2006; DeSena & Ansalone, 2009). Charter schools' access mechanisms associated with charter schools mirrors DL programs' context. Both have an application process, limited seats, and may require lengthier commutes or commutes not supported by extant school bussing routes. Additionally, both are heavily reliant on parents to know that these educational opportunities exist and how best to position their children for access. Therefore, I included iterations of a charter status indicator in my model to control for charter schools' association with gentrification. I also tested an iteration of this indicator for districts with schools that were both charter and DL schools, to see if this combination yielded a stronger relationship with gentrification. In Table 6, I describe the measure iterations and provide a rationale for each.

Table 6

Measure Iterations for Existence of DL Program

Measurement	Rationale
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1. District has charter schools in 2019-20 SY: 0= district does not have any charter schools 1=district has at least 1 charter school	A. This is the simplest way to measure the existence of a charter school in a district: either a district has at least one charter school, or it does not
2. District has DL charter schools in 2019-20 SY: 0= district does not have any charter schools that offer a DL program 1=district has at least 1 charter school that offers a DL program	A. There are many similarities in the entrance mechanisms for charter schools and DL programs. Perhaps the combination of charter school and DL program augments the relationship with gentrification
3. Availability of charter schools in 2019-20 SY: ratio of number of charter schools to total number of students in district	A. Similar rationale as 1A but considers access in terms of what percentage of the schools in the district are charter schools
4. Availability of DL charter schools in 2019-20 SY: ratio of number of DL charter schools to total number of charter schools students in district	A. Similar rationale as 2A and 3A, but considers access in terms of what percentage of the charter schools are DL

Data Source

Charter status is available in NCES' CCD Public Elementary/Secondary School Universe Survey Data. I limited this dataset to schools serving grades K-12 that were open for the entire 2019-20 SY. To calculate measures of both DL and charter status, I merged the NCES data with my novel DL dataset.

Appendix L: Difficulties in Defining Gentrification

Early Definitions

One of the few consensuses in this body of literature is that the definition of gentrification is continuously expanding and evolving, due to its complex nature. Ruth Glass (1964) is credited with coining the term in *London: Aspects of Change*. In this early work that only briefly touches on gentrification, Glass defines this phenomenon as the upper and lower middle classes moving into working class neighborhoods of London, thus displacing the working-class residents and changing the “social character” of the neighborhood. At its inception, gentrification was intended as a tongue-in-cheek term for “a narrow and quixotic oddity in the housing market” (N. Smith, 1996, p. 39).

Through the last half of the 20th century, instances of gentrification arose with greater frequency, perhaps due to shifts in housing trends, or perhaps because the naming of a phenomenon makes it more visible, until it became “the leading remake of the central urban landscape” (N. Smith, 1996, p. 39). Although definitions of gentrification were written without mention of race, it was tacitly understood that this term was specifically used to describe the phenomenon of white, middle class, professional people moving into inner city neighborhoods inhabited by poor, minoritized populations, often assumed to be Black, and displacing the historic residents. For example, in Neil Smith’s (1996) foundational work in gentrification literature, *The New Urban Frontier*, he writes, “Gentrification is the process...by which poor and working-class neighborhoods in the inner city are refurbished via an influx of private capital and middle-class homebuyers and renters—neighborhoods that had previously experienced disinvestment and a middle-class exodus” (p. 32). While class is prominent in Smith’s definition, there is no mention of race or ethnicity. This is underscored in the examples he provides, of yuppies, women, and gay men as types of gentrifiers, concluding that “it is likely that the social explanation of gentrification involves some imbrication of class and gender constitution” (p. 101) but makes no mention of race, or of the intersection of race, class, gender, and sexual orientation.

Instead, N. Smith’s work, along with much of the research during the 1980s and 1990s, did not consider minoritized groups, particularly Black populations, as having the ability to be full-fledged gentrifiers. For example, in an examination of reinvestment in Harlem, Schaffer and N. Smith (1986) concluded that African Americans did not have the financial means or stability

to be gentrifiers: “the process might well begin as [B]lack gentrification, but any wholesale rehabilitation of Central Harlem properties would necessarily involve a considerable influx of middle- and upper-class whites” (p. 359). This, along with other similar studies, constructed an understanding that led to the exclusion of nonwhites from the definition of gentrifiers and resulted in an incomplete conceptualization of gentrification that always positioned whites as gentrifiers and minorities as the displaced.

Evolved Definitions

The last 50 years of gentrification research have “push[ed] the definition of the term towards a broader concept of an upward class transformation and the creation of affluent space” (Doucet, 2014, p. 125), and the last 20 to 30 years in particular have brought forth more nuanced and varied definitions. As time and research in this area progressed, the definition of gentrification has opened up in terms of the locations, race, ethnicity, and socio-economic status (SES). As Lees, Slater, and Wyly (2007) noted, “Gentrification is no longer confined to the inner city or to First World metropolises” (p. xv). The expanded definition of gentrification includes, but is not limited to non-white gentrifiers (e.g., Chronopoulos, 2016; Freeman, 2006; Jackson, 2003; Pattillo, 2008), non-middle-class gentrifiers (e.g., Butler & Lees, 2006; Lees, 2003), similar patterns of devaluation, reinvestment, and displacement that occur outside of the inner city (e.g., D. P. Smith & Higley, 2012) and critical considerations of the negative effects of gentrification for the displaced (e.g., Glynn, 2008; Paton, 2012), those who remain (Freeman, 2005), and those who are excluded from the gentrified neighborhood (e.g., Chronopoulos, 2016).

Simplified Mechanisms of Gentrification

In this growing body of literature, there is a broad tendency to follow one of two explanations of the mechanisms behind gentrification. In one, gentrification is considered as a “rational market response” (N. Smith, 1996, p. 67) to cyclical economic conditions and patterns of urban development. As N. Smith describes it, “Gentrification occurs when the [rent] gap is sufficiently wide that developers can purchase structures cheaply, can pay interest on mortgage and construction loads, and can then sell the end product for a sale price that leaves a satisfactory return to the developer” (p. 68). N. Smith concludes, “Gentrification is thereby part of the social agenda of a larger restructuring of the economy” (p. 89). Of particular note in this type of explanation is the marked lack of human actors being the ones who make gentrification

happen—rather, the gentrifiers are simply responding to the neoliberal market when it offers beneficial economic opportunities.

In the other explanation, gentrification is attributed to institutionalized racism, specifically through housing and home loan policies that discriminated against People of Color, forced them to live in undesirable neighborhoods, and ultimately devalued these areas, thus making the properties prime neighborhoods for gentrification. For example, Estrada (2017) explains the historical roots of gentrification in East Los Angeles through homeowner associations prohibiting People of Color from living in certain areas. Deed restrictions kept these minoritized populations from purchasing or living in homes in white neighborhoods (except as servants), and consequently, the neighborhoods where minoritized populations were able to find housing had lower property value and higher concentrations of non-white residents. These neighborhoods were often redlined, meaning that the homeowners loan corporation and the federal housing administration calculated that there was too much risk to lend money to these neighborhoods, thus making it harder to invest resources in rebuilding or restoring the area. In turn, this artificially inflated the value of property in white neighborhoods and deflated the value of property in minoritized neighborhoods, thereby creating the devalued neighborhoods that serve as grounds for gentrification.

Despite these expanded definitions of gentrification and varying perspectives on its underlying mechanisms, Mumm (2017) notes that “a common position in school and in the public sphere is that the term [gentrification] cannot be stably defined” (p. 104). However, the myriad of positions can be unified under the idea that gentrification is a process that “involves a locale with privileged newcomers and the displacement of marginalized residents” (p. 104-105). Of note is that while race is still often left out of definitions, it is not with the pre-2000s assumption of Black and Brown neighborhoods and white gentrifiers. Rather, the omission of race is largely due to the evolved understanding that gentrifiers are not necessarily white. Doucet (2014) supports this, explaining, “Gentrification research is a continually changing endeavor, which evolves as new spatial forms develop; but it is the process of change—class change—that has remained a constant focus” (p. 131). However, this is not to say that this expanded understanding of who can gentrify is always reflected in the research. For example, in Davis and Oakley’s (2013) study of the link between urban revitalization efforts and charter school emergence in Chicago, Philadelphia, and Atlanta, they offer a nuanced definition of gentrification, that “[g]entrifiers tend to be white and middle class, though in some instances they are minority and middle class” (p. 87) but still end up using a model centered on white gentrifiers.

Appendix M: Model Equations

Set 1: Exploratory Models

Lowest threshold of gentrification

$$G_1 = \beta_0 + \beta_1 DL_1 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_1 = \beta_0 + \beta_1 DL_1 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_1 * \beta_5 LM_1 + \beta_6 DL_1 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_1 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_1 = \beta_0 + \beta_1 DL_1 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_1 = \beta_0 + \beta_1 DL_1 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_1 * \beta_5 LM_1 + \beta_6 DL_1 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_1 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_1 = \beta_0 + \beta_1 DL_2 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_1 = \beta_0 + \beta_1 DL_2 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_2 * \beta_5 LM_1 + \beta_6 DL_2 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_2 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_1 = \beta_0 + \beta_1 DL_2 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_1 = \beta_0 + \beta_1 DL_2 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_2 * \beta_5 LM_1 + \beta_6 DL_2 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_2 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_1 = \beta_0 + \beta_1 DL_3 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_1 = \beta_0 + \beta_1 DL_3 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_3 * \beta_5 LM_1 + \beta_6 DL_3 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_3 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_1 = \beta_0 + \beta_1 DL_3 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_1 = \beta_0 + \beta_1 DL_3 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_3 * \beta_5 LM_1 + \beta_6 DL_3 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_3 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

Middle threshold of gentrification

$$G_2 = \beta_0 + \beta_1 DL_1 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_2 = \beta_0 + \beta_1 DL_1 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_1 * \beta_5 LM_1 + \beta_6 DL_1 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_1 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_2 = \beta_0 + \beta_1 DL_1 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_2 = \beta_0 + \beta_1 DL_1 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_1 * \beta_5 LM_1 + \beta_6 DL_1 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_1 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_2 = \beta_0 + \beta_1 DL_2 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_2 = \beta_0 + \beta_1 DL_2 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_2 * \beta_5 LM_1 + \beta_6 DL_2 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_2 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_2 = \beta_0 + \beta_1 DL_2 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_2 = \beta_0 + \beta_1 DL_2 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_2 * \beta_5 LM_1 + \beta_6 DL_2 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_2 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_2 = \beta_0 + \beta_1 DL_3 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_2 = \beta_0 + \beta_1 DL_3 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_3 * \beta_5 LM_1 + \beta_6 DL_3 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_3 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_2 = \beta_0 + \beta_1 DL_3 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_2 = \beta_0 + \beta_1 DL_3 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_3 * \beta_5 LM_1 + \beta_6 DL_3 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_3 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

Highest threshold of gentrification

$$G_3 = \beta_0 + \beta_1 DL_1 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_3 = \beta_0 + \beta_1 DL_1 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_1 * \beta_5 LM_1 + \beta_6 DL_1 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_1 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_3 = \beta_0 + \beta_1 DL_1 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_3 = \beta_0 + \beta_1 DL_1 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_1 * \beta_5 LM_1 + \beta_6 DL_1 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_1 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_3 = \beta_0 + \beta_1 DL_2 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_3 = \beta_0 + \beta_1 DL_2 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_2 * \beta_5 LM_1 + \beta_6 DL_2 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_2 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_3 = \beta_0 + \beta_1 DL_2 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_3 = \beta_0 + \beta_1 DL_2 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_2 * \beta_5 LM_1 + \beta_6 DL_2 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_2 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_3 = \beta_0 + \beta_1 DL_3 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_3 = \beta_0 + \beta_1 DL_3 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_3 * \beta_5 LM_1 + \beta_6 DL_3 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_3 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

$$G_3 = \beta_0 + \beta_1 DL_3 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF + \beta_6 EL$$

$$G_3 = \beta_0 + \beta_1 DL_3 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_3 * \beta_5 LM_1 + \beta_6 DL_3 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_3 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF + \beta_{15} EL$$

Set 2: Models without EL

Models also used in the charter school subset are noted in **bold**

$$G_2 = \beta_0 + \beta_1 DL_2 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_2 * \beta_5 LM_1 + \beta_6 DL_2 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_2 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF$$

$$G_2 = \beta_0 + \beta_1 DL_3 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF$$

$$G_2 = \beta_0 + \beta_1 DL_3 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_3 * \beta_5 LM_1 + \beta_6 DL_3 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_3 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF$$

$$G_2 = \beta_0 + \beta_1 DL_3 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF$$

$$G_2 = \beta_0 + \beta_1 DL_3 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_3 * \beta_5 LM_1 + \beta_6 DL_3 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_3 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF$$

Highest threshold of gentrification

$$G_3 = \beta_0 + \beta_1 DL_1 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF$$

$$G_3 = \beta_0 + \beta_1 DL_1 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_1 * \beta_5 LM_1 + \beta_6 DL_1 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_1 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF$$

$$G_3 = \beta_0 + \beta_1 DL_1 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF$$

$$G_3 = \beta_0 + \beta_1 DL_1 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_1 * \beta_5 LM_1 + \beta_6 DL_1 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_1 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF$$

$$G_3 = \beta_0 + \beta_1 DL_2 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF$$

$$G_3 = \beta_0 + \beta_1 DL_2 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_2 * \beta_5 LM_1 + \beta_6 DL_2 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_2 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF$$

$$G_3 = \beta_0 + \beta_1 DL_2 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF$$

$$G_3 = \beta_0 + \beta_1 DL_2 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_2 * \beta_5 LM_1 + \beta_6 DL_2 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_2 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF$$

$$G_3 = \beta_0 + \beta_1 DL_3 * \beta_2 LM_1 + \beta_3 C_1 + \beta_4 LM_2 + \beta_5 ZF$$

$$G_3 = \beta_0 + \beta_1 DL_3 + \beta_2 LM_1 + \beta_3 C_2 + \beta_4 DL_3 * \beta_5 LM_1 + \beta_6 DL_3 * \beta_7 C_2 + \beta_8 LM_1 * \beta_9 C_2 \\ + \beta_{10} DL_3 * \beta_{11} LM_1 * \beta_{12} C_2 + \beta_{13} LM_2 + \beta_{14} ZF$$

$$G_3 = \beta_0 + \beta_1 DL_3 * \beta_2 LM_1 + \beta_3 C_3 + \beta_4 LM_2 + \beta_5 ZF$$

$$G_3 = \beta_0 + \beta_1 DL_3 + \beta_2 LM_1 + \beta_3 C_4 + \beta_4 DL_3 * \beta_5 LM_1 + \beta_6 DL_3 * \beta_7 C_4 + \beta_8 LM_1 * \beta_9 C_4 \\ + \beta_{10} DL_3 * \beta_{11} LM_1 * \beta_{12} C_4 + \beta_{13} LM_2 + \beta_{14} ZF$$