**Final Project Report**
Group 2: Ravenswood House
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# Education and Exodus: How Enrollment and Funding Shape Displacement in East Palo Alto

## Abstract

East Palo Alto's Ravenswood City School District (RCESD) has experienced persistent enrollment declines, financial strain, and shifting demographics, shaped by both broader economic pressures and policy decisions. The Tinsley Voluntary Transfer Program, introduced to address educational disparities, has contributed to a steady outflow of students, weakening local school funding and reinforcing negative perceptions of RCESD schools. Simultaneously, rising property values and changes in housing tenure have intensified displacement risks, further accelerating enrollment loss.

Using data from the American Community Survey (ACS) and the California Department of Education (CDE) from 2018 to 2022, we examine the relationship between school enrollment, funding mechanisms, and demographic shifts. Our findings indicate that while home values have steadily increased, local school funding has not followed the same trajectory due to the constraints of the Local Control Funding Formula (LCFF). Enrollment declines, particularly following school closures and consolidations, align with shifts in housing tenure and geographic mobility patterns, reinforcing the cycle of displacement.

These results highlight the need for targeted policy responses to stabilize RCESD's financial health and student population. Potential strategies include adjusting funding allocations to account for enrollment-based disadvantages, reevaluating the structure of the Tinsley Transfer Program, and implementing housing policies that support families with school-age children. Addressing these challenges is crucial to preventing further erosion of educational and community stability in East Palo Alto.

## Background and Introduction

East Palo Alto, a city in San Mateo County, California, holds a distinct place in Bay Area history. As one of the last cities to incorporate (1983), it faced decades of underfunding, lost portions of its land to the construction of Highway 101, and grappled with high crime rates until recent years.[1]

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[1] Berumen, D. (2012). The Push and Pull Factors of Development in East Palo Alto, CA [Capstone project, University of Oregon]. Scholars' Bank. https://hdl.handle.net/1794/12044

Given the lack of resources, the quality of education in schools in East Palo Alto- especially the Ravenswood School District- was subpar compared to surrounding school districts.[2] In response to a lawsuit by parents and students concerning this issue, a settlement was reached in 1985 to introduce the '**Tinsley Volunteer Transfer Program**' wherein 135 minority students from the Ravenswood City School District would be accepted to transfer to one of the following six school districts: Las Lomitas, Menlo Park City, Palo Alto Unified, Portola Valley, San Carlos, and Woodside. [3]

While the Transfer Program was designed to desegregate schools and aimed to address racial disparities in education, it has also weakened local school funding and community cohesion in East Palo Alto.[4] This is because the Ravenswood School District has lost thousands of students and suffered school closures and mergers; state funding is often allocated based on student numbers.[5] The existence of the program may perpetuate the belief that Ravenswood schools are inferior, leading families who can afford it to move to areas with perceived better educational opportunities.[6] This may also have the additional effect of depressing local property values, further pushing existing residents out of the area and contributing to neighborhood decline.[7]

The issue of deprecating property values becomes paramount when we consider the **Local Control Funding Formula (LCFF)**; introduced in 2013-14, it replaced California's K-12 finance system to simplify school funding.[8] It consolidated multiple funding streams into uniform grade span grants for school districts and charter schools, while county offices of education (COEs) received funding for oversight and instructional programs.[9] LCFF funding comes from local property taxes and state funds through the Principal Apportionment.[10] This means that even though LCFF was enacted to prioritize funding for disadvantaged students, displacement in East Palo Alto motivated by the Tinsley Voluntary Transfer Program and declining perceptions of education quality would reinforce these factors by affecting property taxes, and thus, school funding.

We want to investigate this vicious cycle **to understand the specific mechanisms that influence displacement risk over time in East Palo Alto.**

[2] Hwang, A., & Ramrakhiani, N. (2019, October 25). The price of progress. The Campanile.
        https://thecampanile.org/30633/spotlight/the-price-of-progress/
[3] Ibid.
[4] Ibid.
[5] Ibid.
[6] Ibid.
[7] Ibid.
[8] California Department of Education. (n.d.). Local Control Funding Formula Overview. Retrieved February 20,
        2025, from https://www.cde.ca.gov/fg/aa/lc/lcffoverview.asp
[9] Ibid.
[10] Ibid.

## Data sources

To analyze drivers of displacement in East Palo Alto, we utilized data from the American Community Survey (ACS) 5-Year Estimates at the tract level and the California Department of Education. From the ACS, we selected the following variables:

- B07003_001: Geographical Mobility in the Past Year for Current Residence in the US[11]
- B11013_001: Subfamily Type by Presence of Own Children Under 18 Years[12]
- B25003_002: Tenure (Owner Occupied)[13]
- B25003_003: Tenure (Renter Occupied)[14]
- B19126_001: Median Family Income in the Past 12 Months (in 2022 Inflation-Adjusted Dollars) by Family Type by Presence of Own Children Under 18 Years[15]
- B25107_001: Median Value by Year Structure Built (i.e. Property Values)[16]

We selected census tracts that fall within the Ravenswood City Elementary School District (RCESD): 6117, 6118, 6119, 6119.1, 6119.2, 6120.1, 6120.2, 6121, 6121.1, 6121.2, and 6139. Note that in 2018, tracts 6119, 6120, and 6121 were all split into two tracts, adding the .1 and .2 to their ends. Additionally, while the aforementioned census tracts are zoned for RCESD schools and may have families with children attending, only four of these tracts actually have the schools located within them. We discovered this by manually creating a map and plotting the locations of the schools within the district tracts. We elected to look at the time period of 2018 to 2022 because prior to the academic year beginning in 2018, there were several school closures and mergers in RCESD.[17] There were also mergers (fewer) during the time period as well, discussed below.

The variable B07003_001 describes geographic mobility in the past year in the census tract. This table is useful in assessing the number of individuals who have moved in and out of the RCESD.

[11] U.S. Census Bureau. (2018-2022). Estimate, Total: Geographical Mobility in the Past Year Current Residence in the United States (Table B07003_001). Retrieved February 22, 2025, from https://data.census.gov

[12] U.S. Census Bureau. (2018-2022). Estimate, Total: Subfamily Type by Presence of Own Children Under 18 Years (Table B07003_001). Retrieved February 22, 2025, from https://data.census.gov

[13] U.S. Census Bureau. (2018-2022). Estimate, Total: Tenure (Owner Occupied) (Table B25003_002). Retrieved February 22, 2025, from https://data.census.gov

[14] U.S. Census Bureau. (2018-2022). Estimate, Total: Tenure (Renter Occupied) (Table B25003_003). Retrieved February 22, 2025, from https://data.census.gov

[15] U.S. Census Bureau. (2018-2022). Median Family Income in the Past 12 Months (in 2022 Inflation-Adjusted Dollars) by Family Type by Presence of Own Children Under 18 Years (Table B19126_001). Retrieved February 22, 2025, from https://data.census.gov13

[16] U.S. Census Bureau. (2018-2022). Median Value by Year Structure Built (Table B25107_001). Retrieved February 22, 2025, from https://data.census.gov

[17] California Department of Education. (n.d.). California School Directory. Retrieved February 22, 2025, from https://www.cde.ca.gov/SchoolDirectory/

We speculate changes could potentially be associated with changes in other variables we are analyzing, such as median household income for families with children or declining enrollment. This variable can also help us control for potential movements around the time of the COVID-19 pandemic. The variable B11013_001 is the estimate of the total number of families by the presence of their own children under 18 years old in the census tract. This variable is useful in assessing whether there are changes in the number of families with children over the period of time we are investigating. If, for instance, the number of children with families decline, we would expect a negative association with enrollment in RCESD schools. The variable B25003_002 is the estimate of the total number of owner occupied units in the census tract and B25003_003 is the estimate of the total number of renter occupied units in the census tract. Declining owner-occupied and rising renter occupied units (or a decline in both) could signify potential unaffordability or movement out of the district. The variable B19126_001 is the estimate of median family income in the past year for families with children under 18 years old. We can use this measure of median family income to assess impact on school funding and displacement. The variable B25107_001 is the median value of the home by the year the structure was built. Changes in this variable over time, when taken with income estimates and other variables, can help us assess whether there is a risk of displacement and declining enrollment.

We also utilized enrollment data from the California Department of Education (CDE). The dataset includes the academic year, county, district, school name, and enrollment type.[18] There is a row for each school grouped by academic year, ethnicity, gender, and grade level. The number we are most interested in is the enrollment total for the academic year. There are 13 schools total in the dataset: Cesar Chavez Elementary, Los Robles-Ronald McNair Academy, Brentwood Academy, KIPP Valiant Community Prep, Belle Haven Elementary, Costano Elementary, Green Oaks Academy, Willow Oaks Elementary, Ravenswood Comprehensive Middle, Ravenswood Middle, Ronald McNair Academy, Los Robles Magnet Academy, and Cesar Chavez Ravenswood Middle. Similarities between Ravenswood Middle and Ravenswood Comprehensive Middle reflect name changes during the time period in question, which we verified with the CDE's California School Directory, which lists all current and former operating schools in California.[19] Belle Haven Elementary, Costano Elementary (now Costano School of the Arts in 2025), Los Robles Ronald McNair Academy, KIPP Valiant Community Prep, and Cesar Chavez Ravenswood Middle School are the only schools currently open as of February 2025.[20] Willow Oaks merged with Belle Haven in 2020.[21] Brentwood Academy merged with

[18] California Department of Education. (n.d.). Statewide enrollment by grade, 1981–2022. *California Department of Education Data Reporting Office.* Retrieved February 20, 2025, from https://www.cde.ca.gov/ds/ad/fileshistenr8122.asp

[19] California Department of Education. (n.d.). California School Directory. Retrieved February 27, 2025, from https://www.cde.ca.gov/SchoolDirectory/

[20] Ravenswood City School District. (n.d.). Home. Retrieved February 27, 2025, from https://www.ravenswoodschools.org/

[21] Sheyner, G. (2020, January 10). Ravenswood board votes to close Willow Oaks and Brentwood elementary schools. The Almanac. https://www.almanacnews.com/news/2020/01/10/ravenswood-board-votes-to-close-willow-oaks-and-brentwood-elementary-schools/

Costano Elementary in 2020, and Cesar Chavez Elementary merged with Ravenswood Middle in 2019.[22] Green Oaks Academy merged with Cesar Chavez Ravenswood at the end of the 2017-2018 academic year.[23] Ronald McNair Academy and Los-Robles Magnet merged at the end of the 2017-2018 academic year.[24]

The financial data is also from the CDE.[25] This is district-wide data that applies to all schools in the district. This data includes six different types of funding as well as the total revenues for the academic year (all sources aggregated). The data also includes unrestricted amounts, restricted amounts, and total revenues, as well as the average dollar amount per student, and statewide averages by revenue type. We are most interested in the LCFF funding sources, and state aid/principal apportionment.

In order to conduct our mediation analysis, we merged the three separate datasets. First, we merged all of the ACS data together by year. We assigned census tracts to the schools based on their location, and merged the ACS data to the enrollment data, and finally merged it with the financial data.



Fig. 1
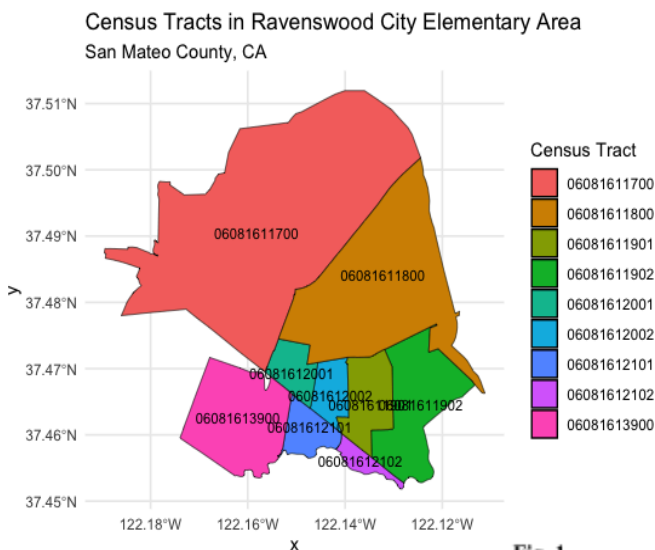
## EDA

Before conducting statistical analyses, we first explore enrollment patterns, school funding, and community demographic trends through visualizations. These exploratory data analyses provide key context for understanding the relationships between demographic shifts, housing instability, and school enrollment patterns in the Ravenswood City Elementary School District. By mapping school locations, examining enrollment trends, and analyzing financial and housing data, we can observe patterns that inform the statistical models that follow.

[22] Sheyner, G. (2020, January 10). Ravenswood board votes to close Willow Oaks and Brentwood elementary schools. The Almanac.
https://www.almanacnews.com/news/2020/01/10/ravenswood-board-votes-to-close-willow-oaks-and-brentwood-elementary-schools/
[23] California Department of Education. (n.d.). California School Directory. Retrieved February 27, 2025, from https://www.cde.ca.gov/SchoolDirectory/
[24] Ibid.
[25] Ed-Data. (n.d.). Ravenswood City Elementary. Retrieved February 20, 2025, from https://www.ed-data.org/district/San-Mateo/Ravenswood-City-Elementary

## Mapping School Locations

Figures 1 and 2 provide a spatial overview of the Ravenswood City Elementary School District (RCESD) in San Mateo County, California. Figure 1 highlights the census tracts within the district, each labeled with its GEOID. Figure 2 overlays school locations within these tracts, showing their distribution.
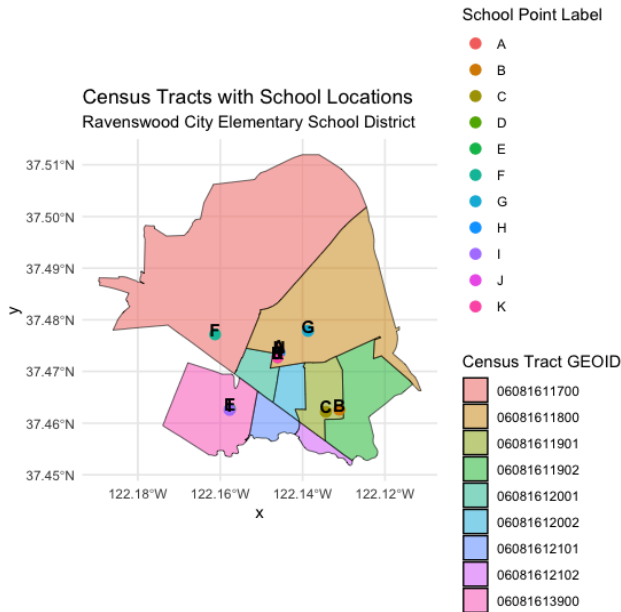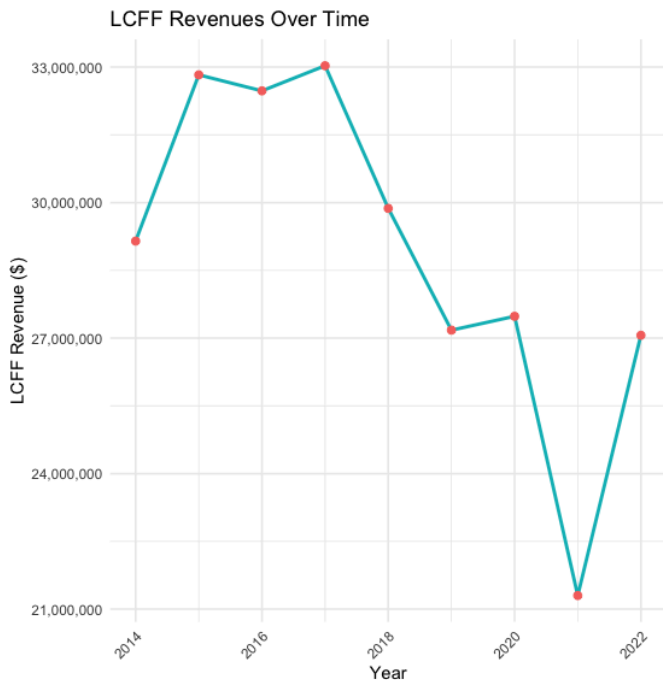
The maps reveal that most schools are concentrated in the southern and central census tracts, while the northern tracts—covering larger geographic areas with fewer schools—may represent lower-density residential zones. These areas are also where families may be more likely to participate in the Tinsley Transfer Program, opting to send their children to wealthier districts outside Ravenswood.

## LCFF Revenues Over Time

Figure 3 tracks LCFF revenues for RCESD from 2014 to 2022. The data shows a decline in LCFF revenues from 2017 to 2019, aligning with documented enrollment losses. Although there was a brief recovery in 2020, it did not offset previous funding reductions. The sharp decline in 2021, coinciding with the COVID-19 pandemic, further highlights how declining enrollment, family displacement, and community instability directly affect district finances.



Fig. 2



Fig 3.

## Enrollment Trends



Enrollment Trend in Ravenswood City Elementary

Fig. 4


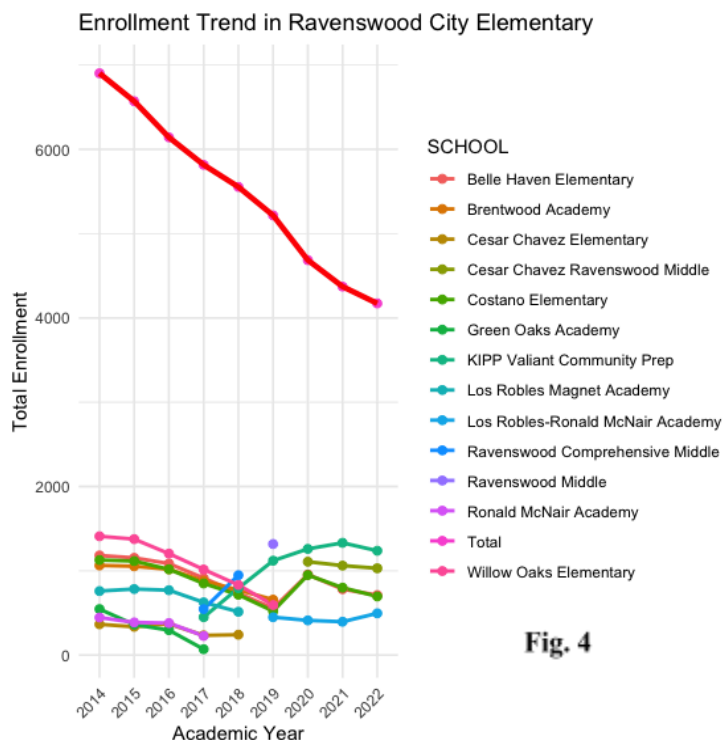
Median Family Income and Median Home Value (2018-2022)

Fig. 5

Figure 4 presents enrollment trends in RCESD from 2014 to 2022. Each colored line represents enrollment at an individual school, while the bold pink line tracks total district-wide enrollment.

Total enrollment has declined sharply, from over 6,500 students in 2014 to approximately 4,000 in 2022. Key events contributed to this trend:

● 2017–2020: Mergers of Willow Oaks Elementary, Brentwood Academy, and Cesar Chavez Elementary.
● 2019–2021: Accelerated decline, likely influenced by the COVID-19 pandemic, which exacerbated housing instability and family displacement.
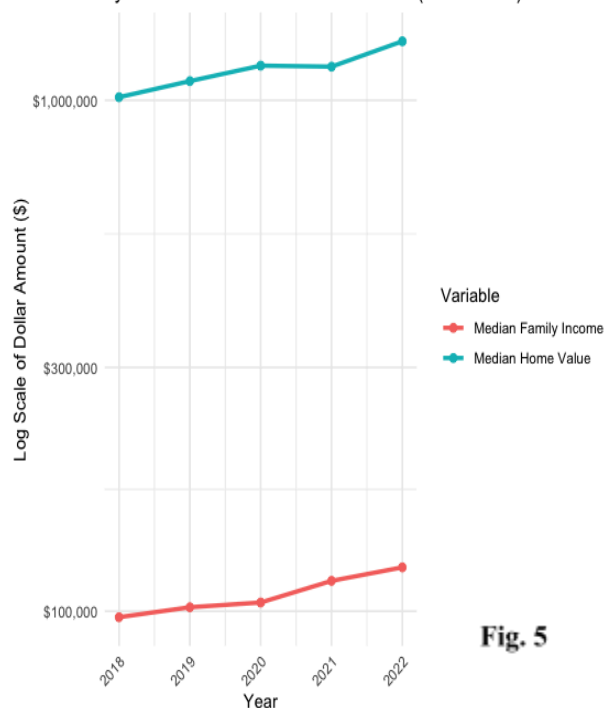
Enrollment loss is a key factor in LCFF funding, as school funding is allocated on a per-student basis. Therefore, the trends in enrollment directly shape district finances, affecting educational resources and long-term sustainability.

The line chart in Figure 5 tracks median family income and median home value in the Ravenswood City Elementary School District area from 2018 to 2022.
The data reveals a widening gap between median family income and median home value from 2018 to 2022. Although family income gradually increased during this period, the pace of growth lagged behind the rise in home values. This growing disparity highlights housing affordability as a central pressure faced by families in the district, and the widening gap is

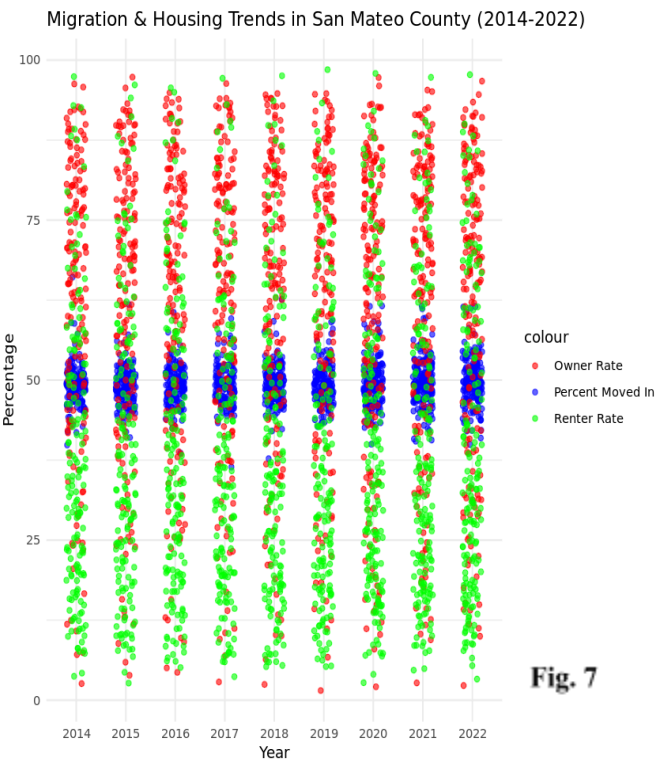likely one of the key factors contributing to the ongoing out-migration of families with school-aged children.



Fig. 7

rental prevalence.

**Migration and Housing Trends**

Figures 6 and 7 examine migration rates and housing tenure. The data shows that:

Migration rates (Figure 6) remain stable (~50%), meaning consistent population turnover. Homeownership and rental trends (Figure 6) reveal a sharp increase in owner-occupied households between 2019 and 2020, while renter-occupied households declined.Renter rates vs. migration rates (Figure 7) show a weak positive correlation, suggesting that high-rental areas experience slightly more turnover. However, migration is likely driven by multiple factors beyond just
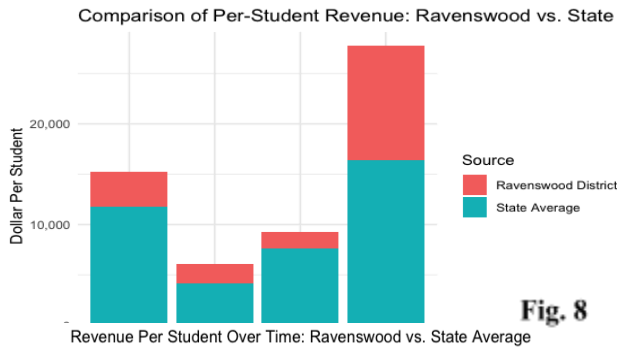


Fig. 8
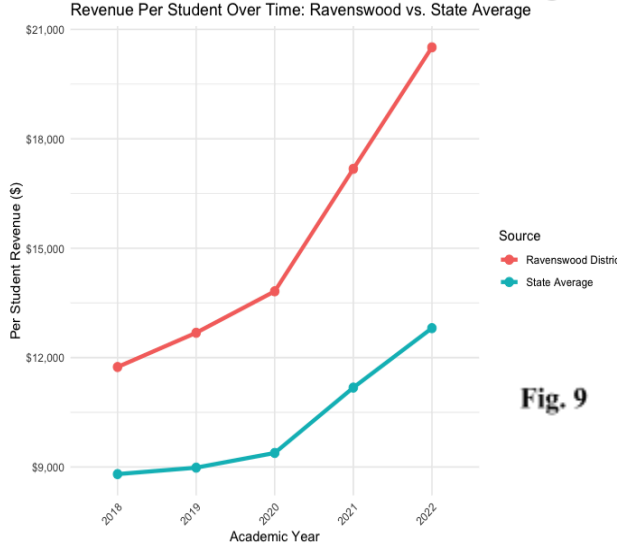


Fig. 9

Figures 8 and 9 compare per-student revenue in Ravenswood vs. the state average. Despite declining enrollment, per-student revenue in RCESD remains consistently higher than the state average due to additional state aid and supplemental funding. However:

This does not indicate financial health, as per-student revenue increases only because total enrollment declines (Figure 9).

Local property tax contributions remain lower than the state average, reflecting East Palo Alto's historically lower property values.

To better understand how housing market trends impact school enrollment, we compare East Palo Alto (which is served by Ravenswood City Elementary School District) to neighboring Palo Alto, a wealthier district with significantly different housing and economic conditions. This contrast helps contextualize how local housing pressures in East Palo Alto may be contributing to school enrollment decline.

**Housing Market Analysis: Housing Market Trends on Elementary School Enrollment in East Palo Alto and Palo Alto**

In recent years, Ravenswood schools have experienced a steady decline in enrollment, raising concerns that gentrification, rising housing costs, and displacement of lower-income families may be key contributing factors.
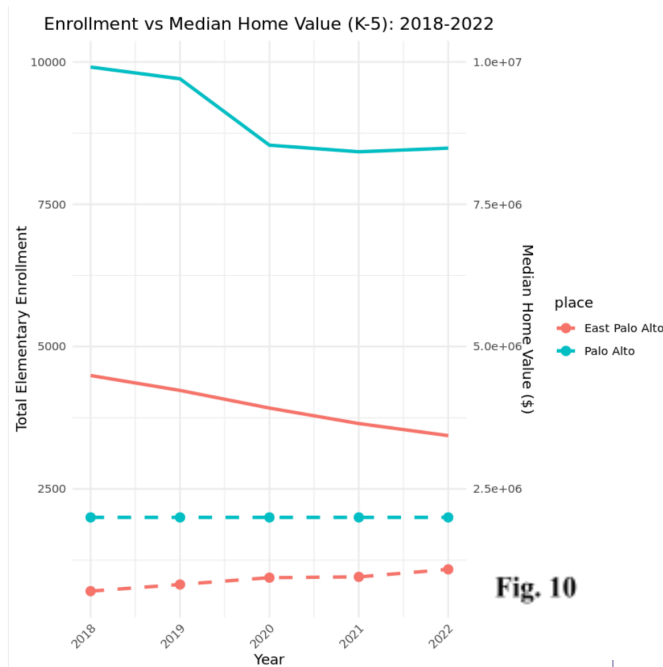


Fig. 10

The line chart above compares elementary school enrollment (solid lines) with median home values (dashed lines) in East Palo Alto and Palo Alto from 2018 to 2022.

In both cities, enrollment declined while the home value increased. The contrasting trends between the two areas suggest that Palo Alto's housing market is more stable, while East Palo Alto's rising home values could be indicative of gentrification pressures. Families who cannot afford rising rents or home prices may be leaving East Palo Alto, directly contributing to the sharper enrollment decline in that district.



Fig. 11



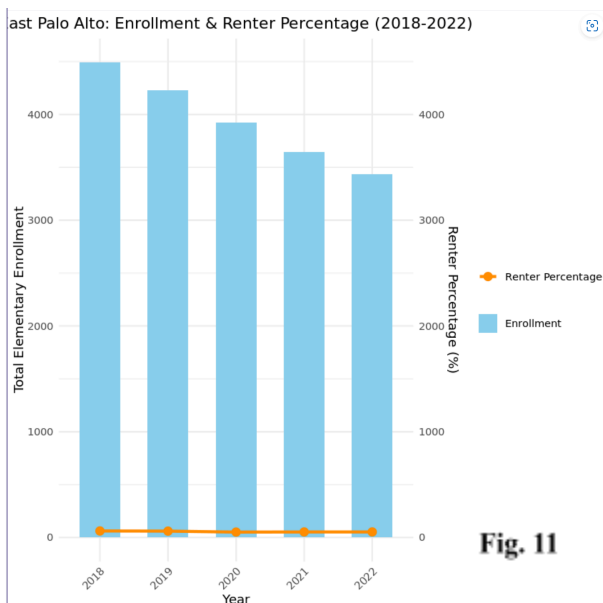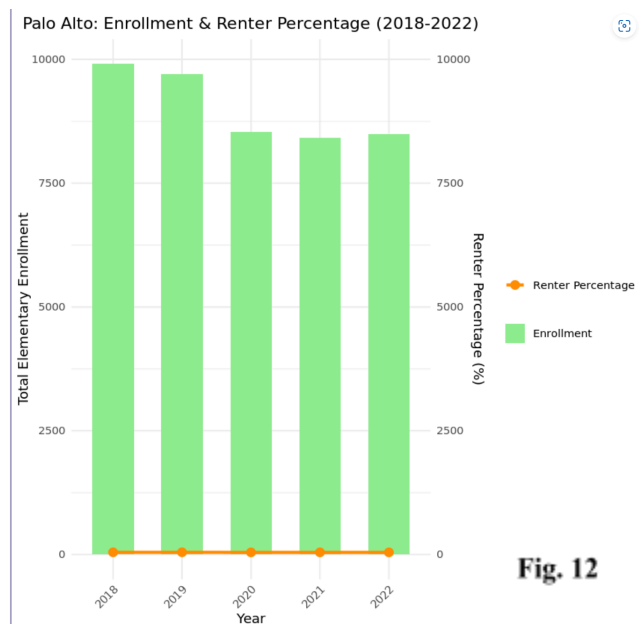Fig. 12

The two bar charts above present elementary school enrollment (bars) and renter percentage (line) in East Palo Alto and Palo Alto from 2018 to 2022.

The renter percentage (orange line) is relatively small in scale, probably due to real world data limitations. However, we still observe that East Palo Alto consistently maintains a higher renter percentage than Palo Alto.
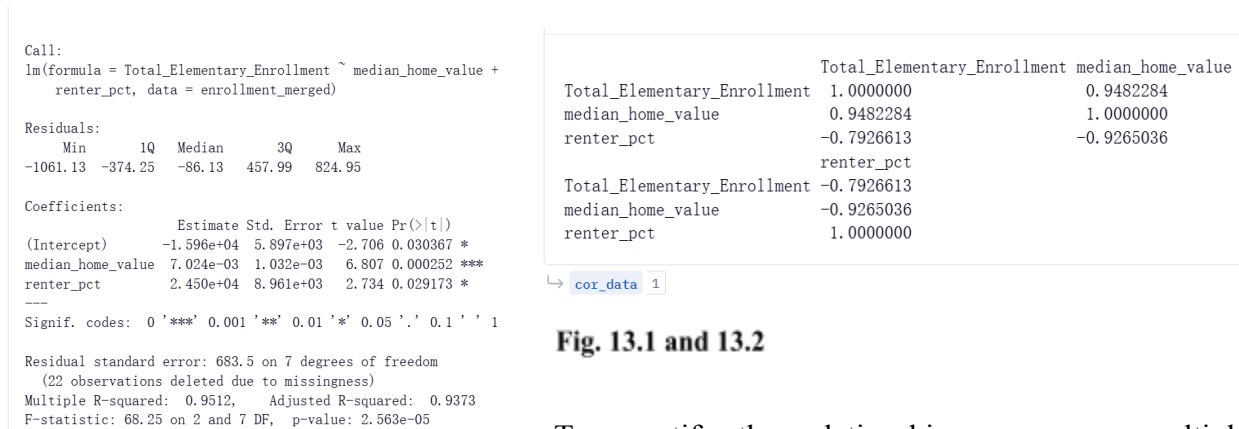
```
Call:
lm(formula = Total_Elementary_Enrollment ~ median_home_value +
    renter_pct, data = enrollment_merged)

Residuals:
    Min      1Q   Median      3Q     Max
-1061.13 -374.25   -86.13   457.99  824.95

Coefficients:
                   Estimate Std. Error t value Pr(>|t|)
(Intercept)      -1.596e+04  5.897e+03  -2.706 0.030367 *
median_home_value 7.024e-03  1.032e-03   6.807 0.000252 ***
renter_pct        2.450e+04  8.961e+03   2.734 0.029173 *
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Residual standard error: 683.5 on 7 degrees of freedom
  (22 observations deleted due to missingness)
Multiple R-squared:  0.9512,    Adjusted R-squared:  0.9373
F-statistic: 68.25 on 2 and 7 DF,  p-value: 2.563e-05
```

```
                             Total_Elementary_Enrollment median_home_value
Total_Elementary_Enrollment   1.0000000                   0.9482284
median_home_value             0.9482284                   1.0000000
renter_pct                   -0.7926613                  -0.9265036
                             renter_pct
Total_Elementary_Enrollment  -0.7926613
median_home_value            -0.9265036
renter_pct                    1.0000000
```
⤷ cor_data  1

**Fig. 13.1 and 13.2**

To quantify the relationships, we ran a multiple regression analysis. The results indicate that both variables were significant. Specifically, rising median home values were associated with changes in enrollment, while higher renter percentages also showed a notable association with enrollment patterns. The regression model achieved an R-squared value of 0.95, the model was able to explain approximately 95% of the variance in elementary school enrollment over the period.
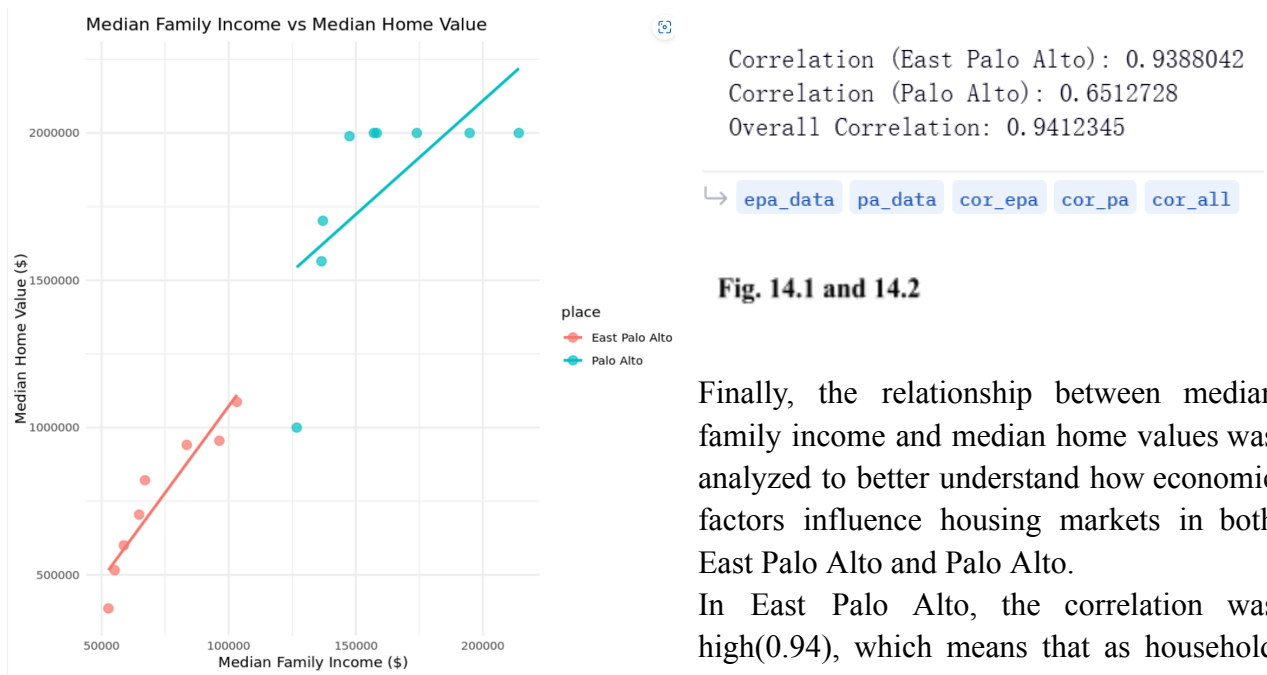


```
Correlation (East Palo Alto): 0.9388042
Correlation (Palo Alto): 0.6512728
Overall Correlation: 0.9412345
```
⤷ epa_data  pa_data  cor_epa  cor_pa  cor_all

**Fig. 14.1 and 14.2**

Finally, the relationship between median family income and median home values was analyzed to better understand how economic factors influence housing markets in both East Palo Alto and Palo Alto.

In East Palo Alto, the correlation was high(0.94), which means that as household incomes rise, home values in East Palo Alto tend to increase at a closely corresponding rate, reflecting a housing market that is highly

sensitive to changes in local income levels. The correlation in Palo Alto was relatively lower(0.65). This weaker correlation tells us that Palo Alto's housing market is relatively more stable and less directly tied to short-term income fluctuation. This stability could be attributed to a more established, high-value housing stock and a wealthier, more economically stable population, where home values are influenced more by long-term market factors rather than immediate changes in household income.

## EDA Results

These findings illustrate how housing market trends, displacement, and school enrollment are deeply intertwined. The vicious cycle of displacement begins with increasing housing costs, leading to higher mobility rates and shifts in tenure, followed by declining school enrollment, which in turn influences funding levels and perceived education quality, reinforcing further family out-migration. These insights set the stage for the statistical models that follow, helping to quantify the mechanisms driving these trends.

# Methods

## Data Processing

We collected enrollment data for the Ravenswood City Elementary School District from 2014 to 2022, merging records from multiple sources. The dataset includes enrollment figures for schools operating within the district and accounts for school closures and consolidations. To understand broader community trends, we integrated American Community Survey (ACS) estimates for geographic mobility, housing tenure, family composition, and home values at the census tract level from 2018 to 2022. Additionally, we incorporated district financial data, focusing on revenue sources such as the Local Control Funding Formula (LCFF), state aid, and local property taxes.

Data cleaning involved standardizing column formats, ensuring consistency in school names, and filtering for relevant census tracts. Financial data required conversion from text to numeric values by removing currency symbols and commas. We aggregated and summarized data where necessary to align enrollment, funding, and demographic trends across years.

## Statistical Analysis: Correlation Analysis

We start with a correlation analysis of all numeric variables to see if any of them are strongly associated. This is an important step not just to explore the data to formulate relevant hypotheses, but also to inform model selection as multivariate methods often need multicollinearity between predictors to be accounted for.

Results of the Pearson correlation matrix:

| | ACADEMIC_ YEAR | Total Enrollment | Geographic Mobility | Renter Households | Median Family Income | Families with Kids | Median Home Value | Owner Households | Total Revenue | Revenue per Student | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| ACADEMIC_ YEAR | 1 | 0.28 | -0.31 | -0.26 | 0.16 | 0.04 | 0.2 | -0.15 | -0.01 | 0.3 | **Fig. 15** |
| Total Enrollment | 0.28 | 1 | -0.01 | -0.12 | 0.43 | -0.28 | 0.41 | 0.29 | -0.01 | 0.07 | |
| Geographic Mobility | -0.31 | -0.01 | 1 | 0.92 | 0.31 | -0.12 | 0.18 | 0.81 | -0.01 | -0.09 | |
| Renter Households | -0.26 | -0.12 | 0.92 | 1 | 0.23 | -0.15 | 0.16 | 0.65 | -0.01 | -0.07 | |
| Median Family Income | 0.16 | 0.43 | 0.31 | 0.23 | 1 | -0.88 | 0.98 | 0.78 | -0.01 | 0.05 | |
| Families with Kids | 0.04 | -0.28 | -0.12 | -0.15 | -0.88 | 1 | -0.92 | -0.57 | 0 | 0.01 | |
| Median Home Value | 0.2 | 0.41 | 0.18 | 0.16 | 0.98 | -0.92 | 1 | 0.68 | 0 | 0.06 | |
| Owner Households | -0.15 | 0.29 | 0.81 | 0.65 | 0.78 | -0.57 | 0.68 | 1 | -0.01 | -0.05 | |
| Total Revenue | -0.01 | -0.01 | -0.01 | -0.01 | -0.01 | 0 | 0 | -0.01 | 1 | 0.92 | |
| Revenue per Student | 0.3 | 0.07 | -0.09 | -0.07 | 0.05 | 0.01 | 0.06 | -0.05 | 0.92 | 1 | |

Our analysis revealed key relationships between family demographics, housing, and school funding in the Ravenswood City Elementary School District. As expected, median family income and home values were highly correlated ($\rho=0.98$), indicating that wealthier families tend to reside in areas with higher property values. Conversely, areas with a higher proportion of families with children had significantly lower home values ($\rho=-0.92$), suggesting that neighborhoods with more children may be more affordable or less likely to see rapid property appreciation.

Housing stability also played a role in mobility patterns, with a strong positive correlation ($\rho=0.92$) between geographic mobility and renter households, reinforcing that areas with higher rental populations experience greater turnover. On the funding side, total revenue and per-student revenue were closely linked ($\rho=0.92$), as districts with more overall funding naturally allocate more resources per student. However, enrollment showed only a weak correlation with per-student revenue ($\rho=0.07$), indicating that fluctuations in student population had little direct impact on the amount of funding each student receives. These findings highlight the structural constraints in school funding mechanisms and suggest that broader economic and housing trends shape family demographics more than school enrollment alone.

**Nonparametric statistics:**

Since our combined dataset is summarized by year, grouped by tracts and schools, we have relatively few observations (n = 124) in our data: too few to make any assumptions about the population distribution or apply linear modeling such as regression analysis. Additionally, since the data is likely to be highly multicollinear (see correlation analysis) using multivariate analysis

also proves tricky. Thus, while panel regression (to test statistical significance of trends over time) and multiple regression (to study the mechanism and interactions of all predictors) would prove valuable, it is not feasible given the constraints with our dataset. Thus, we turn to nonparametric methods such as Analysis of Variance (ANOVA) which will help us identify any significant differences between groups using the summarized data; 'years' become 'groups' – or categories –in this analysis rather than a continuous variable.

Since we want to control for baseline differences between tracts and schools, we use the Linear Mixed-Effects Model (LMM). This is because a regular model (like linear regression or ANOVA) assumes all groups behave the same way. A Mixed-Effects Model adjusts for differences between groups, making the results more accurate when working with data that is grouped (like by location, school, or person). LMM analyzes how geographic mobility changes over academic years while accounting for variation across Census Tracts.

## Hypothesis 1: Geographic Mobility Over Time

- **Factor:** Year (2018-22)
- **Response Variable:** Geographic Mobility (Movement both into and out of the county)
- **$H_0$:** Geographic mobility does not significantly differ between the years, controlling for specific tracts.
- **$H_1$:** Geographic mobility has changed significantly over time for at least one of the years.
- **Fixed Effects:** Year (ACADEMIC_YEAR)
- **Random Effect:** Census Tract (GEOID)

The mixed-effects model results indicate that mobility varies significantly by Census Tract (GEOID variance = 6,081,230, SD = 2,466.0), meaning some areas experience much higher displacement than others. However, mobility does not change significantly year to year (Estimate = 26.46, p = 0.0796), suggesting that time alone is not a strong predictor of movement in and out of the district. Tract-level differences are more important than time trends, as the variation between Census Tracts is much larger than the within-year variation (Residual variance = 47,816, SD = 218.7).

## Hypothesis 2: Total Number of Families with Children Under 18, Over Time

- **Factor:** Year (2018-22)
- **Response Variable:** Count of Families with Kids (B11013_001_estimate)
- **$H_0$:** The number of families with kids has remained stable over time, controlling for specific tracts.
- **$H_1$:** The number of families with kids has changed significantly over time for at least one of the years.
- **Fixed Effects:** Year (ACADEMIC_YEAR)

- **Random Effect:** Census Tract (GEOID)

The mixed-effects model shows that the number of families with kids has increased significantly over time (Estimate = 8.061, p < 0.001), suggesting a consistent upward trend. Mobility patterns vary significantly by Census Tract (GEOID variance = 9,737.9, SD = 98.68), meaning some areas consistently have more families moving in and out than others. Year-to-year variation within tracts is relatively small (Residual variance = 471.9, SD = 21.72), indicating stable trends within each location. These results suggest that rather than widespread displacement, some tracts may be experiencing growth or decline in family populations over time.

## Hypothesis 3: Trends in Enrollment Over Time

- **Factor:** Academic Year
- **Response Variable:** Total Enrollment
- **H$_0$ (Null Hypothesis):** Enrollment in Ravenswood City Elementary School District has not changed significantly over time.
- **H$_1$ (Alternative Hypothesis):** Enrollment in Ravenswood City Elementary School District has significantly changed over time, for at least one of the years..
- **Fixed Effect:** Academic Year (ACADEMIC_YEAR)
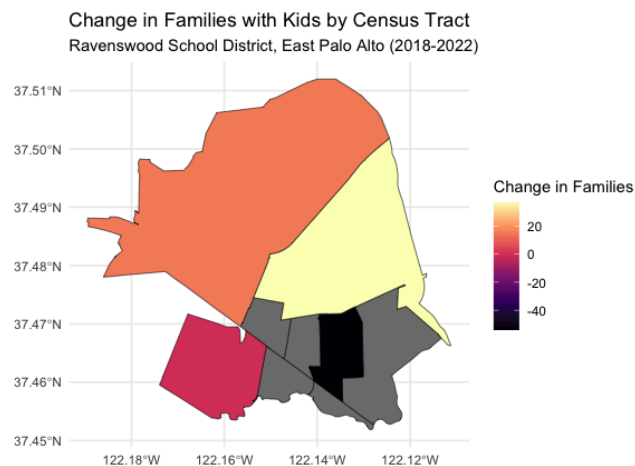- **Random Effect:** School (SCHOOL)



Fig. 16

The mixed-effects model shows that enrollment has significantly changed over time (Estimate = 35.419, p = 0.000179), indicating a consistent shift in student numbers across years. Enrollment patterns vary significantly by school (SCHOOL variance = 94,310, SD = 307.1), meaning some schools consistently have higher or lower enrollment than others. Within-school variation over time is smaller (Residual variance = 12,839, SD = 113.3), suggesting that most differences are between schools rather than within them. These results confirm that enrollment is shifting over time, but the extent of change depends on the school.

If we look at the change in enrollment for each school in RCESD we find that most schools have had a decline in enrollment from 2018 to 2022 and a couple of schools even shut down in 2018. Interestingly, the tract where Brentwood Academy was located in, prior to its merger with

Costano Elementary in 2018 (tract 06081611901) has the biggest change in the total count of families with children under 18– a decline – which we can only speculate as one of the reasons why families may have moved out of this tract/neighborhood (see Figure 16).

One exception to this overall decline in enrollment is Kipp Valiant Community Prep which has actually seen an increase in enrollment from 2018 to 2022 (see Figure 4). This school is a charter school which leads us to speculate that it may have additional resources and funding (from private investors, for example) and may be actively recruiting students. This would explain some of the intra-district mobility that we have observed through the Linear Mixed-Effects Models above!

## Hypothesis 4: Home Values Over Time

- **Factor:** Year (2018-22)
- **Response Variable:** Median Home Value (B25107_001_estimate)
- **$H_0$ (Null Hypothesis):** Median home values have not changed significantly over the years 2018–2022.
- **$H_1$ (Alternative Hypothesis):** Median home values have increased or decreased significantly over the years 2018–2022.
- **Fixed Effect:** ACADEMIC_YEAR (assessing the trend in home values over time)
- **Random Effect:** GEOID (accounting for variation in home values across census tracts)

The mixed-effects model shows that median home values have significantly increased over time (Estimate = 66,870, $p < 0.0001$), indicating a strong upward trend in home values from 2018 to 2022. The variance in home values across census tracts is substantial (GEOID variance = $2.41 \times 10^{11}$, SD = 490,638), suggesting that different areas within the district experience notably different home price trends. However, within-tract variation over time is much smaller (Residual variance = $3.24 \times 10^9$, SD = 56,889), meaning that most of the variability in home values is explained by geographic differences rather than short-term fluctuations. These results confirm that home prices have consistently risen over time, reinforcing the potential link between increasing property values and broader economic shifts in the area.

## Hypothesis 5: LCFF Funding Over Time

- **Factor:** Academic Year (ACADEMIC_YEAR)
- **Response Variable:** LCFF Revenue (clean_Revenues_Total)
- **$H_0$ (Null Hypothesis):** LCFF funding does not change significantly across academic years.
- **$H_1$ (Alternative Hypothesis):** LCFF funding has significantly changed over time.
- **Fixed Effect:** ACADEMIC_YEAR (to test the trend of LCFF funding across years).
- **Random Effect:** SCHOOL (to account for school-specific variations in LCFF funding).

The mixed-effects model indicates that LCFF funding has significantly decreased over time (Estimate = -1,241,000, p < 0.0001), suggesting a downward trend in funding allocations from 2018 to 2022. However, the model also presents a boundary (singular) fit warning, meaning that the random effect for SCHOOL has zero variance.This is because our data only has funding values for the whole district rather than by school. This could suggest that a simpler model—such as a Two-Way ANOVA—might be more appropriate in the future. Since we are more interested in seeing how Property values impact School funding (due to the LCFF policy), we move on to the next hypothesis:

**Hypothesis 6: Do Home Values Correlate with LCFF Funding?**

- **Factor:** Median Home Value
- **Response Variable:** LCFF Revenue
- **$H_0$ (Null Hypothesis):** There is no correlation between home values and LCFF funding.
- **$H_1$ (Alternative Hypothesis):** Home values are correlated with LCFF funding (either positively or negatively).
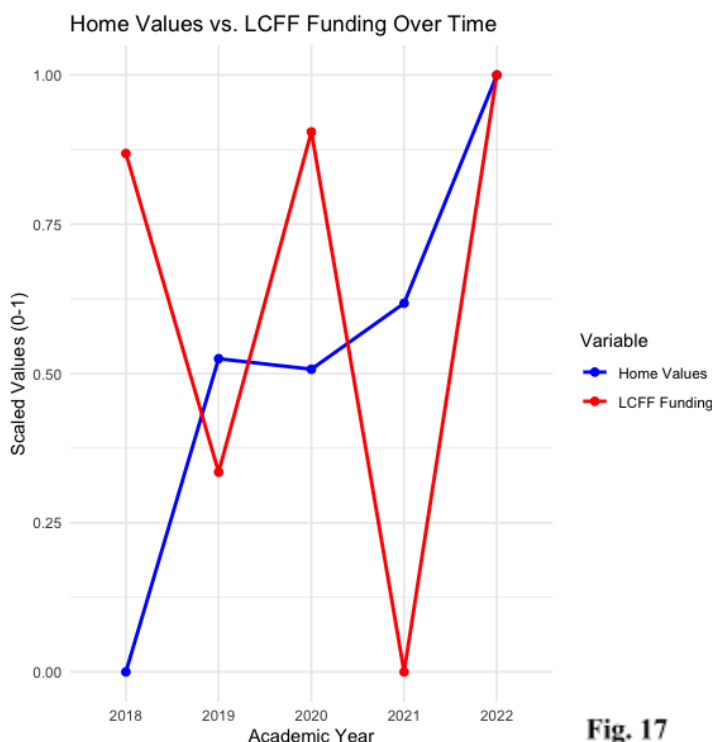


**Fig. 17**

We used Spearman's Rank Correlation (Non-parametric) since it can measure whether home values and LCFF funding move together (monotonic relationship).This is better than Pearson correlation when dealing with small sample sizes and nonlinear trends.

The Spearman's rank correlation analysis found **no significant relationship** between median home values and LCFF funding ($\rho$ = -0.010, $p$ = 0.909). The near-zero correlation coefficient suggests that **higher or lower home values do not predict LCFF revenue allocation**, and we suspect that this may be due to lagged effects i.e. increasing home values might translate to increase in LCFF funding after 1-2 years.

**Hypothesis 7: Does Enrollment Level Affect the Number of Families with Kids?**

- **Factor:** Enrollment Category (Low, Medium, High)
- **Response Variable:** Number of Families with Kids
- **Control Variable:** Census Tract (GEOID)
- **$H_0$ (Null Hypothesis):** There is no significant difference in the number of families with kids across different enrollment levels.
- **$H_1$ (Alternative Hypothesis):** The number of families with kids varies significantly based on school enrollment levels.

A two-way ANOVA was conducted to examine whether schools with different enrollment levels (low, medium, high) have significantly different numbers of families with kids while controlling for geographic differences. The results show no significant effect of enrollment category on the number of families with kids ($F(2, 117) = 0.027$, $p = 0.974$), meaning that schools with higher or lower enrollment levels do not systematically have more or fewer families with kids in their surrounding area.

However, census tract (GEOID) was highly significant ($F(4, 117) = 441.129$, $p < 0.001$), indicating that geographic differences strongly influence the number of families with kids in an area. This suggests that family distribution is more dependent on broader neighborhood factors rather than school enrollment levels.

## Overall Results:

Our statistical analyses reveal a reinforcing cycle of displacement in the Ravenswood City Elementary School District. Geographic mobility remains highly linked to rental tenure, with families in rental-dense areas experiencing frequent turnover, while home values have steadily increased over time ($p < 0.0001$). Despite this, LCFF funding has declined significantly over the years ($p < 0.0001$), indicating that rising home values do not immediately translate into increased school funding. This may contribute to a perceived decline in education quality, which—along with rising housing costs—leads to further decreases in school enrollment ($p = 0.000179$) and a decline in families with children in certain areas ($p < 0.001$). These shifts suggest a self-perpetuating cycle of displacement, where demographic changes, housing instability, and school funding mechanisms interact to gradually reshape the community.

## Future Analysis, Controls, and Policy Recommendations

Our study investigated the complex interactions between declining school enrollment, funding mechanisms, and displacement risks in East Palo Alto, with a focus on the Ravenswood City Elementary School District. The analysis suggests that there is indeed declining enrollment in RCESD, and that an increase in property values does not necessarily lead to more funding in schools. However, this could be due to lagged effects that have not become apparent due to the

narrow timeline we are looking at, especially as the makeup of owners and renters has changed over the five-year period. We also find that the interplay between median home values, migration patterns, and enrollment trends potentially impacts the total number of families living in tracts containing a school. This analysis underscores the urgent need for policy interventions to stabilize the RCESD and ensure that the district supports communities rather than accelerates the displacement of families.

**Key Findings and Implications**

*Enrollment Decline and Funding Constraints*: As enrollment in Ravenswood schools continues to shrink, LCFF allocations are impacted, leading to potential financial instability for the district, more school closures, and more school mergers. While per-school revenue remains above the state average, this can be attributed to declining enrollment rather than increased investment. School mergers and closures negatively impact community cohesion as well, since a merger with a school in a census tract outside of the census tract families are located in may influence them to move elsewhere within the district. The variation in the number of families between census tracts indicates that this movement may be associated with these mergers and closures. Further analysis may explore data that highlights the movement of families within the district to specific schools, or outside of the district to other schools via the Tinsley Voluntary Transfer Program.

*Housing Affordability and Displacement Pressures*: Our findings indicate that in 2020, owner tenure increased while renter tenure declined, suggesting a shift in housing dynamics. This could reflect displacement of lower-income renter households, potentially due to rising home values and financial instability, rather than an overall increase in housing affordability. While East Palo Alto has historically had a high proportion of renters, the shift in tenure patterns suggests that rental instability remains a key driver of displacement, even as ownership rates temporarily increased.

To prevent further school closures and create a more equitable educational and housing landscape in East Palo Alto, we propose the following policy recommendations.

**RCESD Policy Recommendations**

1. Alternative Enrollment and Retention Strategies: We propose a revision of the Tinsley Voluntary Transfer program to include reinvestment into Ravenswood schools based on the number of students who leave the district. While this is a separate part of the problem in comparison to within-district displacement, we still find that this could potentially alleviate some of the financial pressures felt by Ravenswood schools through declining enrollment, and prevent potential further school closures and mergers.

**State and Local Policy Recommendations**

1. Affordable Housing Protections: Expanded rent control measures and rental assistance programs can mitigate displacement risk among families with children under 18 years old within the Ravenswood School District if implemented at the city or state level. Additional incentivization of affordable housing development with priority allocations for families with children enrolled in the Ravenswood City Elementary School District may help keep enrollment numbers from declining and schools from closing or merging.
2. Community Development: The perception of East Palo Alto and the Ravenswood City Elementary School District as inferior to surrounding locales is further exacerbated by declining school enrollment. Investing in public infrastructure such as improved transportation, community centers, and similar can improve neighborhood stability and foster greater community cohesion.

**Additional Analyses**

For future analyses, we can consider controlling for total population within the census tracts and comparing their migration and incomes to families with children, which we looked at in this study. Since our time period also covered the COVID-19 Pandemic, it would also be prudent to enhance the analysis by controlling for the economic effects of the pandemic where possible. Some metrics to explore here could be employment rate, poverty rates, employment to population ratios, business establishments, and per capita income, and any changes associated during the period, at the tract level.

The enrollment data also included demographic statistics by grade level, focusing particularly on race and gender of students. It could be interesting to compare enrollment numbers year over year to track demographic impacts, as well as compare them with broader demographic changes at the tract level. This could highlight if there are any impacts on minority groups in East Palo Alto with respect to declining enrollment and displacement. A mediation analysis could also provide deeper insight into the relationship between displacement and enrollment, and allow us to uncover which factors may mediate the relationship between the two phenomena in East Palo Alto.

We also consider using panel regression to study lagged effects. This is useful for identifying lagged effects, where changes in independent variables like housing affordability and school funding may take time to influence dependent variables of enrollment and displacement. This method can capture longitudinal effects within specific census tracts and schools over multiple years rather than comparing different tracts in isolation. We can also control for other unobserved

differences between census tracts using this model. Additionally, school closures, gentrification pressures, and economic effects of the COVID-19 pandemic do not have immediate implications. Using a panel regression can test whether changes in renter tenure, family income, or enrollment predict future displacement trends.

Another avenue for further analysis is utilizing statistical tests, such as t-tests, to compare East Palo Alto and Palo Alto in terms of enrollment trends and school funding levels to determine whether observed differences in these dependent outcomes are statistically significant. A two-sample t-test could assess whether mean student enrollment in elementary and intermediate schools in RCESD differs significantly from that in the same types of schools in Palo Alto Unified School District. This same method can be applied to comparisons of per-student funding in both districts, to reveal disparities in LCFF allocation, which is dependent on local property taxes. This can help uncover whether systemic funding equities contribute to Ravenswood's enrollment decline, reinforcing out-migration trends.