Center for Promise

AMERICA'S PROMISE ALLIANCE®

Who's Minding the Neighborhood?

The Role of Adult Capacity in Keeping Young People on a Path to Graduation

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As of 2014, 4% of all 16-to-19 year-olds in the United States had left high school without graduating for a total of 690,000 youth.[1]. Leaving school places a burden on individual youth and on the broader society. Youth who have left school have a higher likelihood of being unemployed in adulthood, living below the poverty line, being incarcerated, and having poor health outcomes (Rouse, 2007; Sum, Khatiwada, McLaughlin & Palma, 2009). The combined social and fiscal cost has been estimated to be nearly $260,000 per youth over their lifetime (Rouse, 2005), equal to $180 billion for this cohort of youth. Yet, the current rate of youth leaving schools represents a decline from a high of approximately 14% 40 years ago.[2] The possible reasons for improvement include improved academic measurement and accountability systems, persistent action within states and districts, and the use of evidence-based strategies for putting and keeping young people on a positive academic trajectory or reconnecting them to that trajectory if they have fallen off (Civic Enterprises & Everyone Graduates Center, 2016).

In this paper, we focus on a different perspective for why the rate of youth leaving high school has improved: people. That is, we hypothesize that more adults in a community – adults who nurture, socialize, teach, and are role models for youth – will result in more young people on a positive pathway to adult success. Using Decennial Census data from 1970-2010, we examine whether the adult capacity in a community can be implicated in the reduction in the rate of youth who leave school within neighborhoods in metropolitan areas throughout the United States. We focus on metropolitan areas, because urban school districts have historically had the lowest graduation rates, with suburbs and rural districts having the highest rates (Swanson, 2009). We base our analyses on research and theory suggesting that community capacity is associated with the developmental outcomes of that community's youth (Leventhal, Dupere & Brooks-Gunn, 2009). Youth-focused neighborhood assets are substantive predictors of youth's educational success, and these assets are predicated on the adults within them (Zaff & Smerdon,

[1] From the Kids Count Data Center http://datacenter.kidscount.org/data/tables/73-teens-ages-16-to-19-not-in-school-and-not-high-school-graduates?loc=1&loct=2#detailed/1/any/false/869,36,868,867,133/any/380,381

[2] Analysis of 2010 Decennial Census data by author.

2009; Zaff, 2011). We use a community's adult-to-youth ratio as a proxy for a community's adult capacity. Our results find strong evidence that increasing these ratios would result in a substantive improvement in rates of young people leaving school in metropolitan areas in the U.S.. Our most conservative estimate finds that 1 percent increase in the ratio is associated with an average decrease in rate of youth leaving school of 1 percent. This effect is larger in communities with higher shares of African-American residents and higher shares of male residents. In addition, we find the effect is larger in higher income communities, so increases in adult capacity alone may not be sufficient, and will be most effective when accompanied with increases in a community's endowment of resources.

As a foundation for this study, we also examined the trends in rates of youth who leave high school and then assessed whether these trends varied by region, state, city, and zip codes within cities. If variation exists, we could then move forward in analyzing *why* this variation exists; that is, for example, why there are differences by zip codes within cities. We show that:

1. There has been a steady improvement in the rate of youth leaving school in the United States since 1970,
2. Although there have been improvements in the average rate, there is substantial between-state, within-state, and within-city variation in the neighborhood-level change rate.[3]

Community and Adult Capacity

Supports go beyond the walls of discrete programs and schools. Instead, each youth is embedded within a complex, multi-layered ecology that comprises family, school, and all aspects of a community; what we call a *youth system* (Zaff et al., 2016). A *supportive youth system* results when assets in a community are aligned with the needs and strengths of each youth.

[3] For complete results of these analyses, see the Appendix.

Indeed, interventions for youth who leave school that tend to work share in common a comprehensive approach that attends to the multiple psychological, physical, social, and economic needs of each young person; young people who often have experienced numerous adversities throughout their lives (Bloom, 2011; Center for Promise, 2014). Prevention efforts, as well, have focused on providing young people an array of supports across contexts (from family, within schools, and throughout their communities; Zaff et al., 2016).

To ensure that young people experience a *supportive youth system*, communities need to have sufficient capacity to deliver the supports across these contexts. We use Leventhal and Brooks-Gunn's (2000, 2003) community capacity model as our guide. Their model builds off of and/or is consistent with other community capacity models that share in common ideas about the quality and quantity of the built environment to provide services and supports for residents, the variety of social supports and networks that are available to residents, and a community's norms, values, and attitudes that guide the behaviors of residents (e.g., Connell & Gambone, 2002; Eccles & Gootman, 2002; Harding, 2010; Mancini, Bowen & Martin, 2005; Sampson & Laub, 1990; Sampson, Morenoff & Earls, 1999; Wilson, 1996). Leventhal and Brooks-Gunn's (2003) model includes:

(i) Institutional resources: The variety of organizations in a community that provide supports and services for the residents in those communities, including their presence, resources within, and accessibility.

(ii) Relationships: Neighborhood effects mediated by parent-child relationships, with a focus on the impacts that a community might have on a parent and the other people in the community who could support a parent. In addition, we include in our model how relationships outside of the family are implicated in a young person's academic outcomes.

(iii) Norms/Collective Efficacy: The values, beliefs, and expectations shared across a community, as well as the capacity of a community to supervise and monitor the activities of its youth.

There is an extensive literature on the role that relationships play for young people in mediating the causal link between community capacity and youth outcomes. Adults collectively and individually nurture, teach, socialize, provide supports to, and broker social capital for youth (Jones & Deutsch, 2011; Scales, Benson & Roehlkepartain, 2011; Ungar, 2013). Supportive relationships are often found among non-parent adults throughout a given community, and adults who are based in institutions (e.g., community-based organizations and schools). With a relative dearth of strong supports and role models in a community, young people will be without sufficient guidance and wisdom to encourage them on a productive developmental path. They will be influenced more by their peers (Harding, 2009); a dynamic that results in higher likelihood of risk-taking and engagement in problem behaviors (Mounts, 2002). We have also found in previous research that adult supports come from multiple adults (and peers) in a young person's life; what we have called a web of supports (Center for Promise, 2015). However, except for research on community-level social norms encouraged by adults in a community (e.g., Leech, 2016; Sampson, Morenoff & Earls, 1999), there is little quantitative evidence that community-level adult capacity has an effect on the educational attainment of youth.

The adult-to-youth ratio is used to measure the capacity for adults to provide supports to youth in a community. Since the adults in a community help to create the contours of the norms and values for a community, the adult-to-youth ratio, especially when interacted with other factors such as educational attainment, can also act as a good proxy for the norms and values of a community. We would therefore expect large adult-to-youth ratio communities with high rates of educational attainment to have particularly large effects. In addition, adults need resources with which to provide supports to youth. Thus, we would expect the adult-to-youth ratio to have larger effects on the rate of youth leaving school in higher income communities.

A ratio overly biased toward youth, what has been called a *youth bulge,* has been theorized and empirically examined as a predictor of increased levels of political and community violence in the international development literature (Urdal, 2006). Within youth bulge contexts, according to both opportunity and motive-oriented theories of political violence, youth perceive an economic and social benefit to engaging in violent actions (e.g., joining a rebel army), and/or

consider civil unrest to be a means to the end of resolving structural constraints (e.g., education and employment) (for a review, see Urdal, 2006). For instance, a high adult-to-youth ratio has predicted the recruitment of child soldiers in countries where children have lost parents to civil war or AIDS.

In the United States, there have been few studies of youth bulges, with those studies conducted mainly to understand civil unrest and community violence in low-income urban neighborhoods (e.g., Mangum & Seninger, 1978), with similar findings as have been found in the international development literature. More recently, Hart and colleagues (2004) examined whether high numbers of youth to adults could lead to higher rates of civic actions. They found that higher income communities with youth bulges were more likely to have youth who engaged in civic actions, but that in lower-income communities, youth bulges were related to significantly lower rates of civic actions.

For this paper, we extend the literature on youth bulges by examining the effect of neighborhood-level adult capacity on the changes in that neighborhood's rate of youth who leave high school without graduating. We hypothesize that an increase in the adult-to-youth ratio (i.e., an increase in the number of adults in a community in relation to the number of youth in that community) will covary with a decrease in the rate of youth leaving school.

Method

Data

We integrate three different datasets to conduct our analysis: the Geolytics Inc. Neighborhood Change Database (NCDB), The Business Master Files (BMF), and the Common Core of Data (CCD). The NCDB accounts for the potential changes in Census tract from Census to Census, providing neighborhood boundaries based on the 2010 Census. We use zip code as a proxy for neighborhood, or at least the vicinity within which a young person is most likely to interact with and be influenced by adults. Others have written persuasively against using zip codes and other institutional or researcher-imposed boundaries to define "community" or "neighborhood" since such geographies are socially constructed geographies (Burton & Jarrett,

2000). For a nation-wide project, however, using community-generated boundaries is impractical, if not impossible.

Our data in the NCDB are restricted to Core Based Statistical Areas (CBSAs) that have been defined as metropolitan according to 2010 Office of Management and Budget delineations; having a core urban area of at least 50,000. Within these areas, we use 'Zip Code Tabulation Areas' (hereafter referred to as zip codes) as they are defined in the 2000 census. Thus, our study is primarily an examination of youth living within urban and suburban settings. Around 50 percent of zip codes were excluded from our analysis, because they are in non-metropolitan areas, had zero population in years 1970, 1980, 1990, or 2000 (e.g., a zip code for a non-residential area, such as the headquarters for a larger company) or are missing values/data errors. The final dataset contains 16,269 Zip Codes.

The Business Master Files (BMF) from the National Center of Charitable Statistics is used to account for youth-oriented, community-based organizations. The BMF contains descriptive information for all active organizations that have registered for tax-exempt status with the IRS. The BMF files are compiled monthly by the NCCS and housed by the Urban Institute in Washington, DC. The raw IRS financial data that has been supplied by the NCCS is combined with location identifiers in the data. The data source can thus track the number of non-profits in the US and their financial activity. One problem with the BMF is that a non-profit located in a certain zip code may not operate only in that zip code. Likewise, the non-profit may provide direct services in other zip codes, not the one in which it is supposedly based (e.g., the city-wide headquarters for a non-profit with numerous satellite offices). Thus, although our estimates do not perfectly measure a non-profit's activity in that place, the data provide a zip code-level approximation of youth-focused non-profits and there is no data to suggest that any one zip code will be overly biased in its over or undercount of non-profits compared to other zip codes.

The Common Core of Data (CCD) from the National Center of Educational Statistics at the United States Department of Education provides the data for the student-to-teacher ratio in neighborhood schools. The CCD is a database of all public elementary and secondary schools in

the United States, with data sortable by zip code, among other geographic and administrative units. The database is constructed from five surveys, including a school-level survey that includes basic demographic information, numbers of students, and numbers of teachers. In many communities, youth attend schools outside of the bounds of their neighborhoods, but an estimated 73% of K-12 students attend neighborhood schools (U.S Department of Education, National Center for Education Statistics, 2009). Students might also attend private schools, but private schools only contain approximately 4.5 million students in elementary and secondary schools, compared to nearly 48 million students in public schools.

Measures

Rate of youth leaving high school without graduating. The NCDB provides the data for constructing the outcome for this study. The rate is defined as the number of 16-19 year-olds who are not in school and do not have a diploma or equivalency to the total number of youth within a given zip code.

Adult-to-youth ratio. We use data from the NCDB to construct the adult-to-youth ratio at the zip code level. Our examination is focused on the potential for the transmission of norms, attitudes, expectations, and behaviors from adults to children. In many urban communities, there are colleges and universities with students at those institutions counted in the Census as living in those zip codes. We account for this possibility by excluding young adults, 18-24, from our analysis. Thus, our adult-to-youth ratio is calculated as the number of adults in a given zip code, 25 and older, to the number of elementary and secondary school-aged children and youth (6-17 years old). The larger the ratio, the more adults per child/youth, and, according to our hypothesis, a higher likelihood of having positive norms, attitudes, expectations, and behaviors transmitted to the children and youth in that community.

Youth-oriented CBOs. Using the BMF, we constructed the measure for youth-oriented CBOs by counting the number of CBOs in a given zip code that contained one of the following National Taxonomy of Exempt Entities codes: arts, culture and humanities; education; health; housing/shelter; public safety; recreation, sports, leisure, athletics; youth development; human

services— multipurpose and other; community improvement, capacity building; public, society benefit—multipurpose and other; religion related, spiritual development.

Student-to-teacher ratio. Using data from the CCD, we calculate the student-to-teacher ratio for schools within a given zip code; that is, the number of students within a school compared to the number of teachers in that school. We use this measure to proxy the human capital within schools and therefore as another measure of adult capacity in a community. This is admittedly a rough estimate of within-school adult capacity since it measures the aggregate of teachers and students in a building, but does not account for variations in class sizes and the presence of other adults in the school.

Covariates. The mean family income of the zip codes, percentage of adults (25 years-old and older) with at least a college degree, racial composition, and neighborhood population were all included as covariates in the full models that are reported.

Estimation Strategy for the Adult-to-Youth Ratio Analysis

Given the improvement over time in the rate of youth who leave school and the variation in improvement at the state, city, and zip code levels, we investigate the effect of the adult-to-youth ratio within communities on the improving rates of youth who leave school over the last four decades. We estimate a theoretically predicated model that examines the relation between adult-to-youth ratios and changes in the rates of youth leaving school within neighborhoods, accounting for other community capacity, such as presence of youth-oriented CBO's and adults within schools. Our specification takes a first difference equation approach that takes the form:

$$\Delta discon_{ic,t} = \Delta X_{1ic,t}\beta_1 + \Delta X_{2ic,t}\mathrm{B}_2 + discon_{ic,t-1}\alpha_1 + \Delta discon_{ic,t-1}\alpha_2 + f_{ct} + \Delta u_{ic,t} \quad (1)$$

where $\Delta discon_{i,ct}$ is the change in the rate of youth leaving school in neighborhood i, in city c, between years' t and t-10. $\Delta X_{1i,ct}$ is a vector consisting of percentage changes in child saturation rates, amount of youth-oriented CBO's, and average student-to-teacher ratios of local schools between t and t-10. $\Delta X_{2i,ct}$ is a vector consisting of changes in sociodemographic variables that we think could be driving the changes in youth leaving school that includes zip-code-level

income, educational attainment, racial composition, and neighborhood population. $discon_{ic,t-1}$ is the rate of youth leaving school in the base-year that is intended to control for mean reversion, and $\Delta discon_{ic,t-1}$is the lag of the dependent variable included to soak up any serial correlation in the error term. f_{ct} is a city-time fixed effect that is particularly important to include since we are interested in within-city variation, and this should absorb any city-level or nationwide factors that might have impacted rates of youth leaving school in a particular decade (for instance, Hurricane Katrina or the recession in the 2000s). $\Delta u_{i,ct}$ is the change in error terms between t and t-10 (i.e., $\Delta u_{ic,t} = u_{ic,t} - u_{ic,t-10}$). When running this regression, we cluster the errors by neighborhood.. All the variables are logged, so all the variables in equation (1) represent percentage changes when multiplied by 100.

Note that we are favoring the first differenced approach over a regression of the form:

$$\Delta discon_{ic,t} = X_{1ic,t-1}\beta_1 + X_{2ic,t-1}\mathrm{B}_2 + discon_{ic,t-1}\alpha_1 + \Delta discon_{ic,t-1}\alpha_2 + f_{ct} + u_{ic,t} \quad (2)$$

This is to mitigate the potentially confounding effects of mobility. In our analysis of Census data, we see that relatively few families stay in their homes longer than ten years, so it is much more likely that the coefficients in equation (2) will be a result of the same people moving among neighborhoods than in equation (1).[4]

The effects of interest in equation (1) are contained in the coefficients in vector β_1. Since we are regressing changes on log changes, each of these can be interpreted as the average change in the rate of youth leaving school that occurs when there is a one-percent change in the variable of interest. However, in order for these to show strong evidence of a relation, we need to overcome three issues: 1. omitted variables bias, 2. two-way causality, and 3. cross-sectional dependence. These issues can be tempered, but not fully resolved, by leveraging the panel features of our data.

[4] Specifically, our data shows that the proportion of people living in the same home as they were 10 years ago in 1970, 1980, 1990, 2000, and 2010 were 0.41, 0.47, 0.51, 0.53, and 0.84, respectively.

For proper identification of the coefficients, β_1, it must be that changes in rates of youth leaving school are not correlated with changes in the error term given our set of controls (i.e., $E\left(\Delta u_{ic,t} | \Delta X_{1ic,t}, \Delta X_{2ic,t}, discon_{ic,t-1}, \Delta discon_{ic,t-1}, f_{ct}\right) = 0$). First differencing removes any time invariant omitted variables, and including a city-time fixed effect means that any between city and time variables are similarly removed. We also control for other important, observable factors that could be a problem if we were to only include the adult-to-youth ratio, CBO presence, and student-to-teacher ratios.

To further ensure identification, we follow the strategy commonly taken in dynamic panel models (Arellano & Bond, 1991; Anderson & Hsiao, 1981; Ziliak, 1997) and when estimating neighborhood effects (Case & Katz, 1991; Rosenthal, 2008); utilizing the lags of our variables of interest, $X_{1ic,t-2}, X_{1ic,t-3}$, as instruments. For robustness, we also use the fourth lag for the variables for adult-to-youth ratios, since we have that available. This strategy removes any problems of two-way causality, since our instruments are predetermined. Still, this does not rule out the possibility that past values of our community support measures may still be endogenous, due to time-varying neighborhood-level omitted variables.

Another concern for proper identification is cross-sectional dependence between units, specifically spatial dependence. That is, we are concerned that other neighborhoods $\Delta X_{1jc,t}$ may enter into neighborhood i's equation (1). Changes in the rate of youth who leave school in neighborhood i could result from changes in community supports not in neighborhood i, but instead changes in an adjacent neighborhood j. For instance, there could have been an influx of adults into the adjoining neighborhood, because of rising local demand for services. However, the estimation of this improvement in the rate of youth leaving school could attribute this to changes in their neighborhood of residence, i. If cases of spatial dependence are true then the change in error terms amongst the different neighborhoods will therefore be correlated, then our estimates will converge to a random variable (Hsiao, 2014).

To correct for the presence of cross-sectional dependence in the model, we follow the approach suggested in Pesaran (2006), and use a common correlated effects mean augmented regression (CCE). To be computed by simply adding the cross-sectional means of $\Delta discon_t$,

ΔX_{1t}, ΔX_{2t}, $discon_{ic,t-1}$, and $\Delta discon_{ic,t-1}$ to the regression fitted in equation (1), the equation becomes:

$$\Delta discon_{ic,t} = \Delta X_{1ic,t}\beta_1 + \Delta X_{2ic,t}\mathrm{B}_2 + discon_{ic,t-1}\alpha_1 + \Delta discon_{ic,t-1}\alpha_2 + \overline{\Delta discon_{c,t}}b_1 + \overline{\Delta X_{1c,t}}\mathrm{B}_3 + \overline{\Delta X_{2c,t}}B_4 + \overline{\Delta discon_{c,t-1}}\alpha_3 + \overline{discon_{c,t-1}}\alpha_4 + \Delta u_{ic,t} \quad (3)$$

By adding the means, we effectively filter out the common correlated factors, and should obtain consistent estimates of β_1. The coefficients, b_1, B_3 , B_3, α_3, and α_4 do not have any meaningful interpretation, and are placed in the regression solely for this purpose. In this specification, we continue to instrument $\Delta X_{1ic,t}$ with $X_{1ic,t-2}$ and $X_{1ic,t-3}$, since the CCE estimator will not solve our aforementioned endogeneity concerns.

Before moving on to the results, we wish to emphasize that our estimation strategy is designed to recover reduced form estimates. It eliminates a wide range of potential confounding factors, but our strategy is still vulnerable to time-varying, within-city omitted variables. To fully resolve this issue would require some source of exogenous variation (a so-called 'natural experiment') that shifts the adult-to-youth ratio without also shifting any omitted variables that are not correlated with youth who leave school. However, finding a source of variation that is not restricted to only a small number of neighborhoods in a small number of time periods seems highly unlikely. So, we sacrifice certainty of causality for greater breadth in our results. Future research that focuses on smaller samples, but that can eliminate within omitted variables, would be a strong complement to this study.

Results

Table 1 provides the summary statistics for all zip codes in our analysis. There is notably substantial variation in the measures. Our baseline results to estimate the effect of adult-to-youth ratios on rates of youth leaving school are shown in Table 2, which presents six different versions of the regressions shown in Equations 1 and 3. Column (1) shows a simple linear regression without controls or fixed effects. This produces our expected results; increases in

student-to-teacher ratios, increases in the number of youth-oriented CBOs, and increases in the adult-to-youth ratio are associated with statistically significant decreases in the rate of youth leaving school. Of the three, the adult-to-youth ratio is found to have the largest effect, where a one-percent increase in the adult-to-youth ratio is related to, on average, a 4.7-percent decline in the neighborhood's rate of youth leaving school. The corresponding numbers for CBO's and schools are 0.2- and 0.8-percent, respectively.

Column (2) adds the set of controls for the neighborhood's socioeconomic composition and mean reversion detailed in the last section, and (3) adds further fixed effects to control for city-time factors that could be shifting the rate of youth leaving school. The results in column (2) are not particularly different from the results in (1) for student-to-teacher ratios, indicating that the results are not simply misinterpreted socioeconomic effects, and in particular, are not due to changes in neighborhood income. This addition of socioeconomic and mean reversion covariates substantially reduces the effects of CBOs, so the effect is no longer statistically significant. The effect of the adult-to-youth ratio is also reduced substantially, but it still remains both statistically and practically significant, indicating that a one percent increase in a neighborhood's adult-to-youth ratio leads to, on average, a 1.6 decrease in the rate of youth leaving school.

City-time fixed effects are added in column (3). These do not substantially alter the coefficients for CBOs or student-teacher ratios. Adding fixed effects also actually slightly increase the average effect of the adult-to-youth ratio to a 1.9 percent decrease. This effect remains statistically significant.

Before moving on, it may help to provide context if we evaluate the adult-to-youth ratio effect in columns (1)-(3) in terms of the real-world application. Referring to the Census data in 2010, an average of 63 out of every 1,000 youth in a zip code left school without graduating, and the average adult-to-youth ratio is approximately 3.5, or 14500/4143. So, keeping the denominator constant, a one-percent increase in the adult-to-youth ratio translates to approximately 145 adults, resulting in roughly 18 fewer youth leaving school without graduating, or one fewer youth leaving school for every seven more adults in the neighborhood.

To further ensure proper identification, we instrument using lagged values of the adult-to-youth ratio in column (4), use the CCE estimator in column (5), and use both in column (6). The CCE estimate is actually larger than the estimates in column (3), so while spillovers between neighborhoods are still possible, there does not appear to be much evidence that they are a confounding factor in our specification. The IV estimate in column (4) is reassuringly not very different from columns (2) and (3) for the adult-to-youth ratio, strongly suggesting the result is not a product of two-way causality. The effect in column (4) provides the most accurate estimate among our models, showing that a one percent increase in the adult-to-youth ratio relates to a decrease in the rate of youth leaving school by one percent.

Columns (6) and (7) provide more inflated effects. Column (6) indicates that a one-percent increase in the adult-to-youth ratio is related to, on average, a 7-percent reduction in the rate of youth leaving school. This translates into a reduction of approximately one fewer youth leaving school for every two more adults in the neighborhood. We are cautious about this estimate, since it implies that a one-percent increase in the adult-to-youth ratio would reduce youth leaving school to zero in many neighborhoods. Although this is plausible, we emphasize the more conservative results in column (4) as our preferred estimate.

Overall, the results in Table 6 indicate that there is strong evidence to support our hypothesis that increasing adult capacity is related to a reduction in the rate of youth leaving school in a neighborhood. The adult-to-youth ratio remains significant when we instrument for the measures with lags, include city and time fixed effects, account for numerous neighborhood level covariates, and account for youth-oriented CBOs and student-to-teacher ratios.

Robustness checks. For our first series of robustness checks, we rerun the analysis using alternative definitions of the adult-to-youth ratio. Specifically, instead of the neighborhood ratio of 25-65 year-olds to 6-17 year-olds, we change the numerator to all those above age 25, 25-34 year-olds, 35-44 year-olds, 45-54 year-olds, and all those above age 55). This serves two purposes. The first is to ensure that our results are not an artifact of our choice for how to calculate the ratio, which is admittedly somewhat arbitrary, without much guidance from the extant literature on youth bulges. The second is to allow us to see if there is any particular age

group of adults that is driving the effect of the ratio on youth leaving school more than other age groups.

Results for our first check are shown in Table 5. Surveying the table, there are two important things to note. First, the effects are, in terms of direction, not different from our original results. Increases in the ratio still result in an improvement in rates of youth leaving school in 33 out of 36 of the regressions performed. The second is that the magnitude of the effect is largest for people aged 55 and older, with slightly smaller effects for 45-54 year-olds and 25-34 year-olds. The effect for 35-44 year-olds is, interestingly, not significant.

Another concern with the analysis is that the improvements in the rate of youth leaving school could result from the displacement of the original youth in the neighborhood with more economically advantaged occupants or simply with more economically advantaged and more highly educated youth moving into the neighborhood. If so, neighborhoods with higher mobility rates should experience greater changes in youth leaving school than low mobility neighborhoods. To test these propositions, we 1) interact the main effect of the adult-to-youth ratio with the proportion of people in the living the neighborhood in 2010 who are in the same house in which they lived in 2000; and 2) use the log-level of disconnected youth instead of the change rate. The results for these analyses can be found in Tables 4 and 5 and use all the same specifications as in Table 2.

For #1, looking at the interaction effect, we see that they are all negative and significant. This indicates that neighborhoods where more of the occupants were living there 10 years ago actually experienced larger reduction in rates of youth leaving school in response to increases in adult-to-youth ratio than high mobility neighborhoods. This, combined with our aforementioned choice to regress changes on changes, rather than changes on levels, and that the effects hold constant changes in neighborhood income, poverty, and education, make us confident that the effects we find signal real improvements in the lives of youth leaving school, not rearrangements of people across neighborhoods.

For #2, we also rerun the analysis using the log-level of youth leaving school in the neighborhood as the dependent variable instead of the change in the rate. This is meant to check

that the results are not due to new residents who never left moving into the neighborhood, and thus increasing the denominator but not the numerator. For example, suppose a college builds new housing for students in a given neighborhood, creating an influx of college students. College students had not, by definition, not completed high school. Thus, even if none of the youth who left school who had been living in that community had reconnected and graduated, the statistical estimate would manifest as an improvement. Log-levels should account for this type of scenario since log levels do not consider the denominator in the change. The results for this robustness check are found in Table 5, and again, are not notably different than before. This check, along with our choice to regress changes on changes noted in the previous section, should alleviate concerns that our results are an artifact of mobility rather than meaningful improvements for neighborhood youth.

Interaction effects. While the results presented thus far provide strong evidence that increases in the adult-to-youth ratio covary with lower rates of youth leaving school, they are only the average effects across all neighborhoods. As such, they potentially hide many of the more nuanced aspects of the structure in neighborhoods, and hence do not completely explain what environmental factors may systematically influence the effects of adult capacity on youth leaving school. Our current specification indirectly implies these factors exist and matter for estimation. The very fact that we are reporting an *average* effect implies that the effect is the result of the interactions between the adult-to-youth ratio and baseline conditions of the neighborhood. In this subsection, we add several interactions to the model to see how the effect of community supports varies across neighborhoods.

Adding interaction effects means that our new regression takes the form:

$$\Delta discon_{ic,t} = \Delta X_{1ic,t}\beta_1 + \Delta X_{2ic,t}\mathrm{B}_2 + X_{3ic,t-10}\mathrm{B}_3 + \Delta X_{1ic,t}{}' X_{3ic,t-10}\mathrm{B}_4 + discon_{ic,t-1}\alpha_1 + \Delta discon_{ic,t-1}\alpha_2 + f_{ct} + \Delta u_{ic,t} \quad (4)$$

Where $X_{3,t-10}$ is a vector consisting of the following variables in the base year: rate of youth leaving school, proportion of the neighborhood that is Black, proportion of the neighborhood that is White, proportion of the neighborhood that is Hispanic, proportion of the neighborhood that is male, the proportion of adults who are college educated, and neighborhood-

level income. The vector of coefficients, B_4, can be interpreted as the difference in the effect between a neighborhood where none of the people meet that criteria and a neighborhood where everyone does. For example, the coefficient on the proportion of males tells us the difference in the effect between a neighborhood whose children were entirely male and one where they were entirely female. Results for this regression using the same six specifications as in Table 2 are found in Table 6. All six estimators tell a similar story in terms of the magnitude and direction of effects,

The first row of Table 6 presents the adult-to-youth ratio coefficient. These carry little meaning by themselves and should instead only be evaluated in conjunction with the interaction effects. Rows 2 shows the interaction effects with the baseline rate of youth leaving school. Across all specifications, we see the effect in places that started with worse rates of youth leaving are either positive or insignificant. A priori, this is not what we would expect, since places that start with high rates have more room for large improvements. Instead, it may indicate that dropouts are self-perpetuating. This is a feasible that there is precedent for in the literature (Sampson, et al, 2008) that should be explored in future research. However, since it is insignificant in our preferred specification (column 4) we choose not explore it further in this study.

Next, we evaluate the neighborhoods where a larger number of occupants are Black or African American, Hispanic, or White. Looking at row 3, we see that increases in the adult-to-youth ratio have more pronounced effects in neighborhoods where a higher share of residents is Black or African American. Looking at column 4, we see that a one-percent increase in the adult-to-youth ratio would result, on average, in a decrease in the rate of youth leaving school that is 30-percent greater in an all-Black or African-American neighborhood than an entirely White neighborhood. That means that for every 5.4 more adults living in a neighborhood, there is one fewer young person who leaves school. We do not find a significant effect for all-Hispanic neighborhoods.

Similarly, when we look at row 6, we see that effects are also larger in neighborhoods where more young people are male. The results indicate that the average effect of a one-percent

increase in the adult-to-youth ratio would be as much as 70-percent greater in a neighborhood where all youth are male. We also find a significant and sizeable interaction effect for income. Since we use the log of income, we interpret the finding as meaning that doubling the average income of a community relates to an effect that is 12-percent greater than in the lower income neighborhood (the adult-to-youth ratio in a neighborhood with an average income of $100,000 having a 12-percent greater effect than in a neighborhood with an average income of $50,000). An interaction with the proportion of adults in a neighborhood with a 4-year degree or higher did not have a significant effect.

Conclusions and Implications

There are large numbers of youth in the United States who have left high school without graduating. The problem has been steadily improving over the last four decades, but there is great variation in whether those improvements are seen in all cities and neighborhoods within those cities. The result is that there are still nearly 700,000 16-19 year olds who do not have a high school diploma. We have presented evidence that a change in the adult capacity in a community is related to improvements in the rate of youth leaving school. Our most conservative estimate indicates that increasing the adult-to-youth ratio in a neighborhood by one percent results in a decrease in the rate of youth leaving school by one percent.

This finding is consistent with models of community capacity that elucidate the organizational, relational, and cultural supports that put youth on positive developmental trajectories, including educational trajectories (Leventhal & Brooks-Gunn, 2003). These facets of community capacity are predicated on the people within a community and institutions housed within that community. In addition, our findings extend the literature on youth bulges beyond community and political violence (Urdal & Hoelscher, 2005). When there are not enough adults in a community compared to the number of youth, youth will not have the norms, values, and social opportunities and constraints that they may need in order to achieve academically. Likewise, more adults in a community can help keep youth on positive educational pathways or re-engage youth if they have previously fallen off of positive pathways.

The largest effects are found for those 45 years old or older. This finding may reflect the stronger incentives that older people have to invest in creating a more productive community environment than younger people do. Consistent with social organization theories (e.g., Sampson et al., 1999), older residents are more likely to be home owners, to be connected to social organizations, and, in general, volunteer at higher rates. However, younger residents (25-to-34 year-olds) still have a significant effect on the rate of youth leaving school. We do not know why the adult-to-youth ratio with 35-to-45 year-olds in the numerator is not a significant predictor. Additional research should be conducted to see if this finding remains and, more productively, why it exists.

Two other findings are particularly worth attention. First, the effect of an adult-to-youth ratio is amplified in neighborhoods that are comprised most of African-American residents. Since the average African-American resident lives in a neighborhood that is approximately two-thirds African American in 11 of the 100 largest metropolitan areas in the country (and more than half in 24 of the 100 largest metropolitan areas[5]), the potential benefits of this amplified effect cannot be underestimated. Factors such as biases in mass incarceration and higher mortality rates work against an increase in adult residents, especially male residents, in predominantly African American communities.

Second, the adult-to-youth ratio effect is also amplified in higher income communities. As our analysis shows, doubling a neighborhood's mean income increases the effect size of the ratio by 12 percent; for example the adult-to-youth-ratio effect in a community with a mean income of $100,000 has a lower income community would be 12-percent greater than in a community with a mean income of $50,000 (meaning, for example, that 6.2 more adults in a higher income community would be associated with one fewer young person leaving school). This finding could suggest that adult capacity alone is not sufficient. Instead, if we

[5] William H. Frey, Brookings Institution and University of Michigan Social Science Data Analysis Network's analysis of 2005-9 American Community Survey and 2000 Census Decennial Census tract data.

consider neighborhood-level income to proxy the resources available in that community, we could conclude that a combination of adult capacity and the resources that those adults could use to support youth is needed to reduce the rate of youth who leave school. Social supports provided by adults (Dang & Miller, 2013; Furman & Buhrmester, 1985; Greeson & Bowen, 2008) could include emotional (the bonds between an adult and young person), instrumental (tangible supports such as money, food, shelter), informational (navigational tools), and appraisal supports (setting expectations for youth and holding the youth to those expectations). Without sufficient resources in a community, the adults in the community might not be able to provide the array of social supports that youth need (Center for Promise, 2015).

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Table 1
Summary Statistics

Statistic	N	Mean	St. Dev.	Min	Max
Rate of Youth Leaving School	24,829	0.083	0.076	0.000	0.910
Adult-to-Youth Ratio (AYR)	24,829	3.080	4.524	1.015	459.343
Class Size (STR)	24,829	16.884	3.249	0.015	46.400
# Non-Profits (CBO)	24,829	13.021	17.438	0	363
Proportion Black	24,829	0.105	0.164	0.000	1.000
Proportion White	24,829	0.790	0.222	0.002	1.000
Proportion Hispanic	24,829	0.110	0.093	0.001	0.766
Proportion in Poverty	24,829	0.236	0.148	0.000	0.937
Proportion College Grads	24,829	0.118	0.191	0.000	0.998
Proportion Male	24,829	0.513	0.023	0.214	1.000
Average Family Income	24,829	71,508.830	37,673.630	7,237.964	485,843.800

Table 2
Regressions of Changes in Rate of Youth Leaving School on Changes in Community Capacity Measures

	Dependent variable: Change in Disconnected Youth					
	OLS			*IV*	*CCE*	*CCE-IV*
	(1)	(2)	(3)	(4)	(5)	(6)
Δ STR	0.008***	0.013***	0.006**	0.004	0.006**	-0.031
	(0.003)	(0.003)	(0.003)	(0.021)	(0.003)	(0.032)
Δ CBO	-0.019***	-0.003***	-0.003***	-0.003	-0.003***	-0.003
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.004)
Δ AYR	-0.047***	-0.016***	-0.019***	-0.010***	-0.031***	-0.071***
	(0.003)	(0.0001)	(0.0001)	(0.004)	(0.0002)	(0.015)
Observations	16,269	16,269	16,269	16,269	16,269	16,269
R^2	0.055	0.392	0.425	0.479	0.446	0.440
Controls	N	Y	Y	Y	Y	Y
FE	N	N	Y	Y	N	N

Note: *p<0.1; **p<0.05; ***p<0.01

Table 3

Effect on Rate of Youth Leaving School When Using Alternative Numerators for Adult-to-Youth Ratio

Dependent variable: Change in Rate of Youth Leaving School

			OLS		*OLS*	*CCE-IV*
Age Group	(1)	(2)	(3)	(4)	(5)	(6)
55+	-0.023***	-0.008***	-0.020***	-0.025**	-0.016***	-0.008
	(0.002)	(0.002)	(0.002)	(0.012)	(0.002)	(0.017)
45-54	-0.052***	-0.019***	-0.014***	-0.018**	-0.014***	-0.023**
	(0.002)	(0.002)	(0.002)	(0.009)	(0.002)	(0.010)
35-44	-0.041***	-0.010***	-0.003	-0.007	-0.003	-0.013
	(0.002)	(0.002)	(0.002)	(0.008)	(0.002)	(0.009)
25-34	-0.024***	-0.014***	-0.001	-0.012**	-0.003*	-0.033**
	(0.001)	(0.001)	(0.002)	(0.008)	(0.001)	(0.013)
Observations	16,187	16,181	16,181	8,188	16,181	8,188
Controls	N	Y	Y	Y	Y	Y
FE	N	N	Y	Y	N	N

Notes: ***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 4
Robustness Check for Mobility on Rate of Youth Leaving School #1

	Dependent variable:Change in Disconnected Youth					
		OLS		*IV*	*CCE*	*CCE-IV*
	(1)	(2)	(3)	(4)	(5)	(6)
Δ AYR	0.118***	0.055***	0.021**	0.184***	0.031***	0.400***
	(0.012)	(0.009)	(0.009)	(0.050)	(0.009)	(0.048)
Δ AYRxPROPSTAYERS	-0.274***	-0.107***	-0.023	-0.397***	-0.040***	-0.444***
	(0.017)	(0.014)	(0.014)	(0.076)	(0.014)	(0.072)
Observations	16,722	16,722	16,722	16,722	16,691	16,722
R^2	0.033	0.096	0.188	0.161	0.182	0.141
Controls	N	Y	Y	Y	Y	Y
FE	N	N	Y	Y	N	N

Notes: ***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 5

Robustness Check for Mobility Effect on Rate of Youth Leaving School #2

	Dependent variable: Change in Disconnected Youth (Log-Level)					
		OLS		*IV*	*CCE*	*CCE-IV*
	(1)	(2)	(3)	(4)	(5)	(6)
	-0.353***	-0.276***	-0.391***	-0.004	-0.394***	-0.498**
	(0.018)	(0.015)	(0.016)	(0.115)	(0.017)	(0.202)
Observations	16,269	16,269	16,269	16,269	16,269	16,269
R^2	0.108	0.456	0.514	0.340	0.472	0.099
Controls	N	Y	Y	Y	Y	Y
FE	N	N	Y	Y	N	N

Notes: ***Significant at the 1 percent level.

**Significant at the 5 percent level.

*Significant at the 10 percent level.

Table 6
Adult-to-Youth Ratio Effect on Youth Leaving School with Interactions

	Dependent variable:Change in Disconnected Youth					
		OLS		*IV*	*CCE*	*CCE-IV*
	(1)	(2)	(3)	(4)	(5)	(6)
Δ AYR	0.485***	0.496***	0.231***	1.851***	0.221***	0.989
	(0.090)	(0.087)	(0.088)	(0.636)	(0.085)	(0.906)
Δ AYRxDISCON	0.151***	0.165***	0.206***	-0.157	0.211***	0.015
	(0.030)	(0.029)	(0.028)	(0.209)	(0.028)	(0.332)
Δ AYRxPROPBLK	-0.177***	-0.076***	-0.082***	-0.120***	-0.110***	-0.151***
	(0.026)	(0.026)	(0.026)	(0.029)	(0.025)	(0.056)
Δ AYRxPROPHSP	-0.072**	-0.062*	-0.044	0.049	-0.080**	-0.003
	(0.033)	(0.032)	(0.032)	(0.169)	(0.031)	(0.160)
Δ AYRxPROPWHT	0.082***	-0.004	0.151***	0.229*	0.067**	0.064
	(0.029)	(0.029)	(0.030)	(0.137)	(0.029)	(0.158)
Δ AYRxPROPMALE	-0.310***	-0.373***	-0.329***	-0.768***	-0.334***	-0.699**
	(0.041)	(0.040)	(0.038)	(0.180)	(0.038)	(0.272)
Δ AYRxPROPGRAD	-0.048***	-0.047***	-0.008	-0.012	-0.005	0.014
	(0.017)	(0.016)	(0.016)	(0.086)	(0.016)	(0.104)
Δ AYRxINCOME	-0.031***	-0.030***	-0.007	-0.126**	-0.007	-0.055
	(0.008)	(0.007)	(0.008)	(0.051)	(0.007)	(0.071)
Observations	16,428	16,428	16,428	8,466	16,428	8,466
R^2	0.342	0.402	0.478	0.366	0.457	0.459
Controls	N	Y	Y	Y	Y	Y
FE	N	N	Y	Y	N	N

Notes:
***Significant at the 1 percent level.
**Significant at the 5 percent level.
*Significant at the 10 percent level.

Appendix

Rates of Youth Leaving High School without Graduating in the United States from 1970-2010

In this section, we document four findings to motivate the analyses on the effects of a adult-to-youth ratios on rates of youth leaving high school without graduating:

1. there has been a steady improvement in the rate of youth leaving high school without graduating in the United States since 1970;
2. although there have been improvements in the average neighborhood rate of youth leaving school there are still many places where the situation is worsening;
3. there has been substantial within city variation in the neighborhood change rate; and

These facts are intended to provide backdrop and context for the subsequent section where we investigate the causal effect of adult-to-youth ratios on rates of youth leaving school. However, we view these facts not only being important for our analysis, but also of independent interest and a contribution in and of themselves.

1. There has been a steady, incremental improvement in the rate of youth leaving school from 1970 to 2010. Table 1 shows the summary statistics in neighborhood dropout rates for each census from 1970 to 2010. They show the mean rate has been steadily decreasing by between 1 and 3 percentage points each decade for the last 4 decades, with the largest improvement being a 3.1 percentage point improvement from 9.1 percent in the 2000 to 6 percent in 2010.

This can be seen visually in Figure 1, which shows the distribution of neighborhood rates of youth leaving school in each decade for the entire sample. An improvement in the rates would be seen in an overall shift in the mass of the distribution to the left towards zero. This is what we see in each decade, with the most substantial changes in rate having occurred in the last two decades.

A concern with this finding could be that aggregating data to the zip code level is masking a different trend in the individual data. We check this in Table 2, where we calculate the national rate by the population weighted averages. This shows the same basic picture of incremental improvements, with only slight changes in the rates. That is, the trend is not an artefact of aggregating the data to different geographic levels.

2. There is substantial variation in the changes in the rate of youth leaving school. While the first finding creates an optimistic picture of youth leaving school, a more granular look at rates of youth leaving school within neighborhoods paints a bleaker picture. Figure 3 shows us the distributions of the change in rates of youth leaving school for each 10-year bracket in the data (1970-80, 1980-90, 1990-00, 2000-10). Reflecting what we know from the first finding, the mass on the left of 0 is larger in each figure, meaning that in each decade more neighborhoods have experienced improvements in their rate of youth leaving school than not. However, looking at the right side of the zero in each panel, we also see that there are many neighborhoods that actually saw increases in their rates of youth leaving school in each decade.

This raises the question about whether the improvements in youth leaving school have been dispersed around the country, or whether these improvements are concentrated in particular areas. And, likewise, whether increases in youth leaving school are concentrated in certain geographies.

Our findings show that there has been substantial variation in the improvements in rates of youth leaving school across states. The southern states (Texas, Georgia, North Carolina, and South Carolina) appear to have had the biggest gains since 1970. The Western Sunbelt states (Arizona, Nevada, and New Mexico), on the other hand, have persistently had some of the worst rates since 1970, with the exception of California, that is gradually improving. The Northeastern states have consistently had low rates throughout the entire time period, as do states in the northern part of the Midwest (Wisconsin, North Dakota, South Dakota, Minnesota, and Iowa). The rest of the Midwest (Kansas, Missouri, Indiana, Illinois, and Michigan) appears to be steadily in the middle. Full documentation of the change rate by state can be found in figures 3-7.

Changes in the rate of youth leaving school are not necessarily linear. In many of the figures, we see that the improvements are in fits and starts (Texas), while in others the improvement is steady over time (California). To look at whether the change is linear, we take the correlations between the change rates in each 10-year bracket, shown in table 4. These correlations have a consistent dynamic; the 10-year correlations are all negative and between -.29 and -0.39, and the 20-year and greater correlations are all statistically zero. This suggests mean reversion in the rate of youth leaving school; a neighborhood will generally experience a change in their rate of youth leaving school that will persist for a relatively short duration, with the neighborhood eventually experiencing a change in the opposite direction.

3. There is substantial within city variation in change rates in the rate of youth leaving school. The aforementioned state maps and table suggest there are broad regional trends affecting the rate of youth leaving school at the state level, but if we want to focus on the neighborhood as our unit of observation there needs to be within city variation, as well. If there was not within city variation, then this would suggest that the local resources of a community or neighborhood have little power to shift a community's rate of youth leaving school; instead, any change being more a product of larger economic trends of a city or region.

We use three cities as examples to assess within city variation. Boston, MA, Los Angeles, CA, and Phoenix, AZ are three of the 25 largest cities in the country, ranking 1st, 12th, and 25th respectively, in having lower rates of youth leaving school as of 2010. First, we look at how much overlap there is in the distribution of youth leaving school in each city (e.g., Figure 8 for rates in 2010). Boston appears to perform better than the other cities in terms of its city-wide rate of youth leaving school. This can be seen by noting that the mass of Boston's distribution is left to that of Los Angles and Phoenix, which appear to be less sandwiched against zero.

Despite there being overall differences between each city's performance in terms of rates of youth leaving school, Figure 8 shows that within city variation in rates of youth leaving school appears to be greater than between city variation. There is a large amount of overlap among the cities' distributions. If you pick any point along any of the three distributions (except for the right tail of the Phoenix distribution) there is a substantial number of neighborhoods in the other

cities that have a similar level of youth leaving school. In addition, best performing zip codes have no youth leaving school, no matter the city. Similarly, in each city, the bottom neighborhoods have extremely high rates of youth leaving school (see Figures 9-11). No matter the city we examine, there is a set of neighborhoods that could be considered to be performing poorly.

Table A1

Summary Statistics for Neighborhood Rates of Youth Leaving School, 1970-2010

Year	N	Mean	St. Dev.	Min	Max
1970	9,037	0.147	0.106	0.000	1.000
1980	9,035	0.126	0.091	0.000	1.000
1990	9,034	0.105	0.080	0.000	1.000
2000	9,034	0.089	0.076	0.000	0.910
2010	9,036	0.057	0.070	0.000	1.000

Table A2

National Rate of Youth Leaving School 1970-2010

1970	1980	1990	2000	2010
0.141	0.126	0.112	0.097	0.059

Table A3

Summary Statistics for Neighborhood Change Rates of Rate of Youth Leaving School, 1970-2010

Statistic	N	Mean	St. Dev.	Min	Max
1970-1980	9,036	-0.021	0.094	-1.333	0.958
1980-1990	10,575	-0.023	0.075	-1.000	1.000
1990-2000	11,785	-0.017	0.071	-1.000	0.797
2000-2010	11,798	-0.031	0.076	-0.700	0.900
1970-2010	9,037	-0.090	0.112	-1.971	0.719

Table A4

Correlations among Neighborhood Change Rate of Rate of Youth Leaving School, 1970-2010

1970-1980	1			
1980-1990	-0.281	1		
1990-2000	0.013	-0.405	1	
2000-2010	-0.062	0.020	-0.344	1

Figure A1

Distribution of Neighborhood Rates of Youth Leaving School, 1970-2010

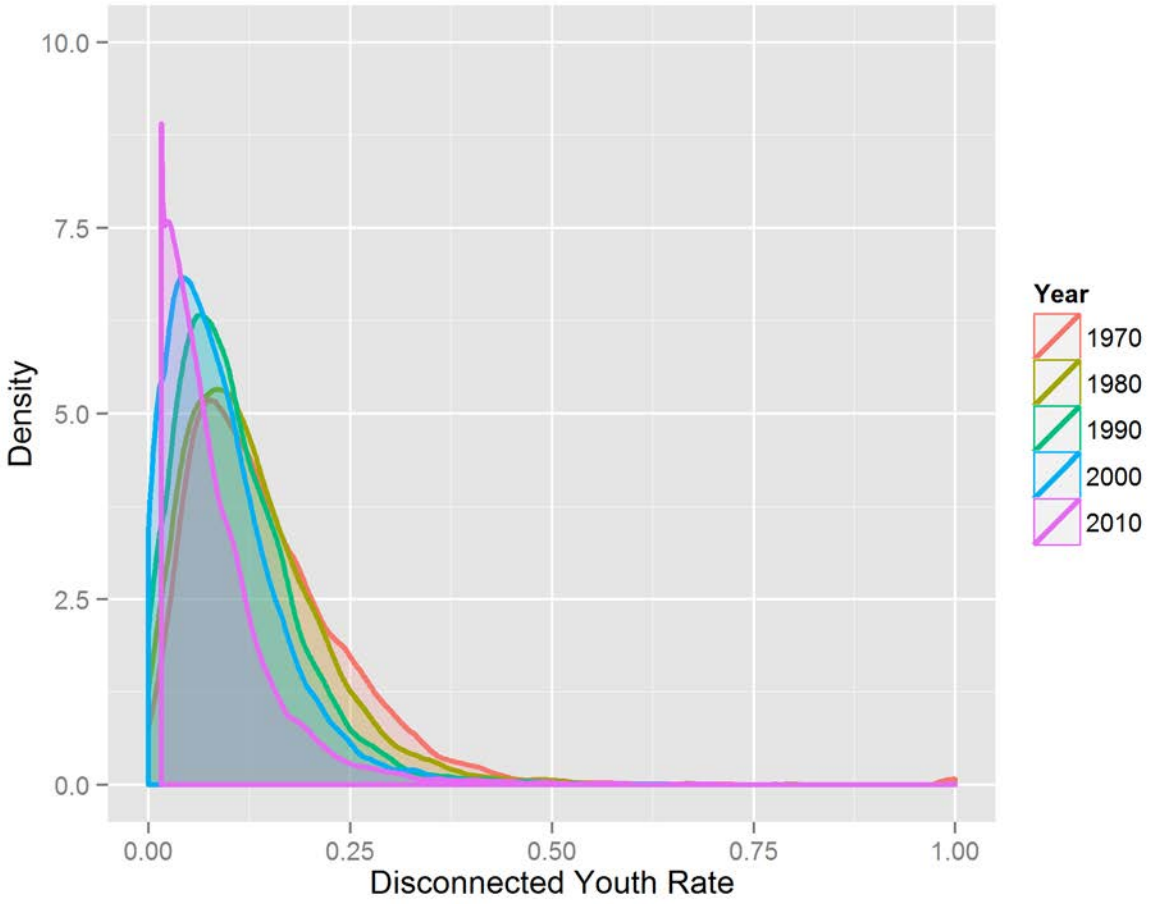

Figure A2

Distributions of Change Rates of Rate of Youth Leaving School

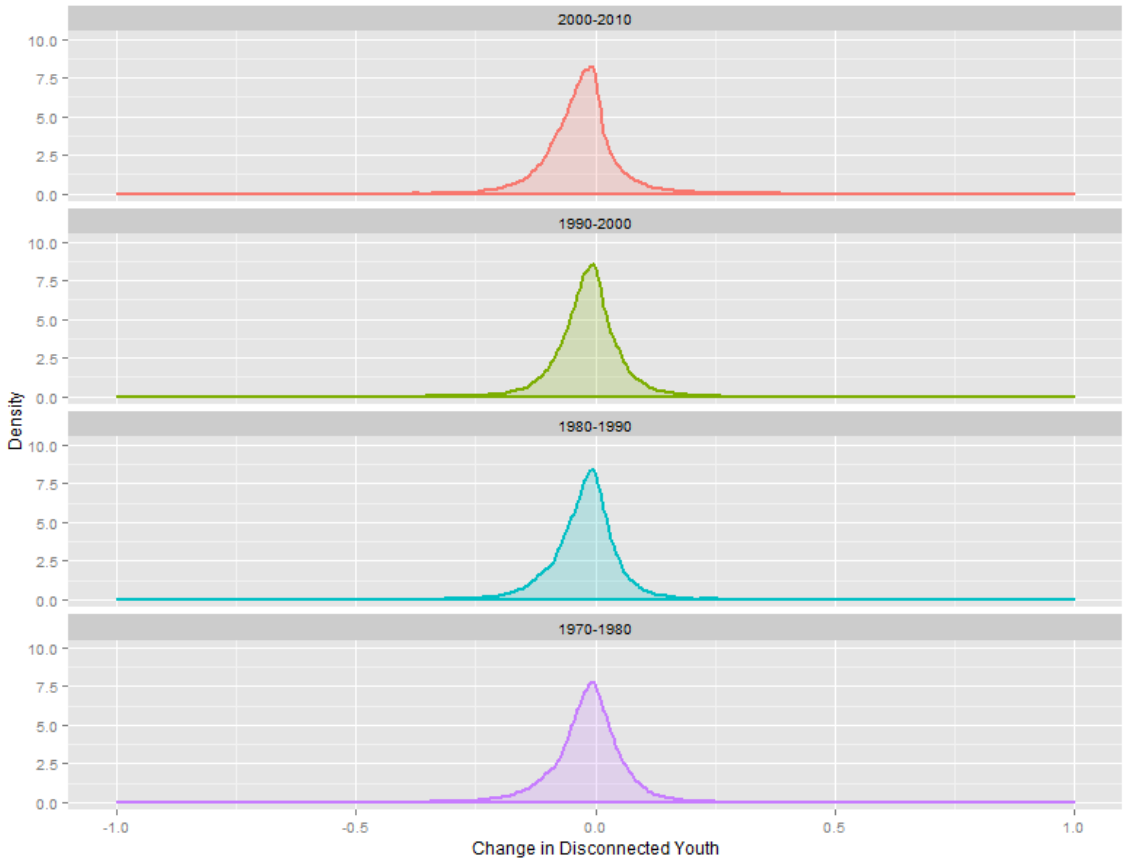

Figure A3

Rate of Youth Leaving School by State in 1970

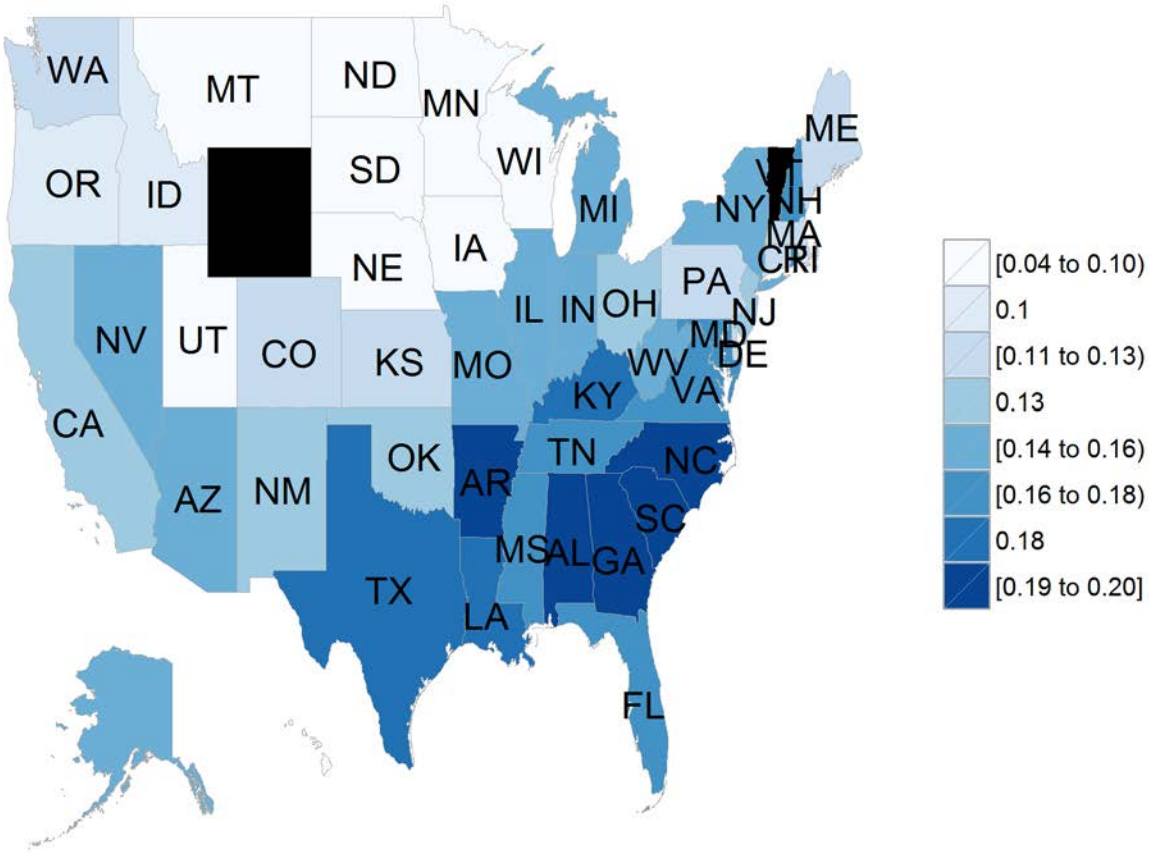

Figure A4

Rate of Youth Leaving School by State in 1980

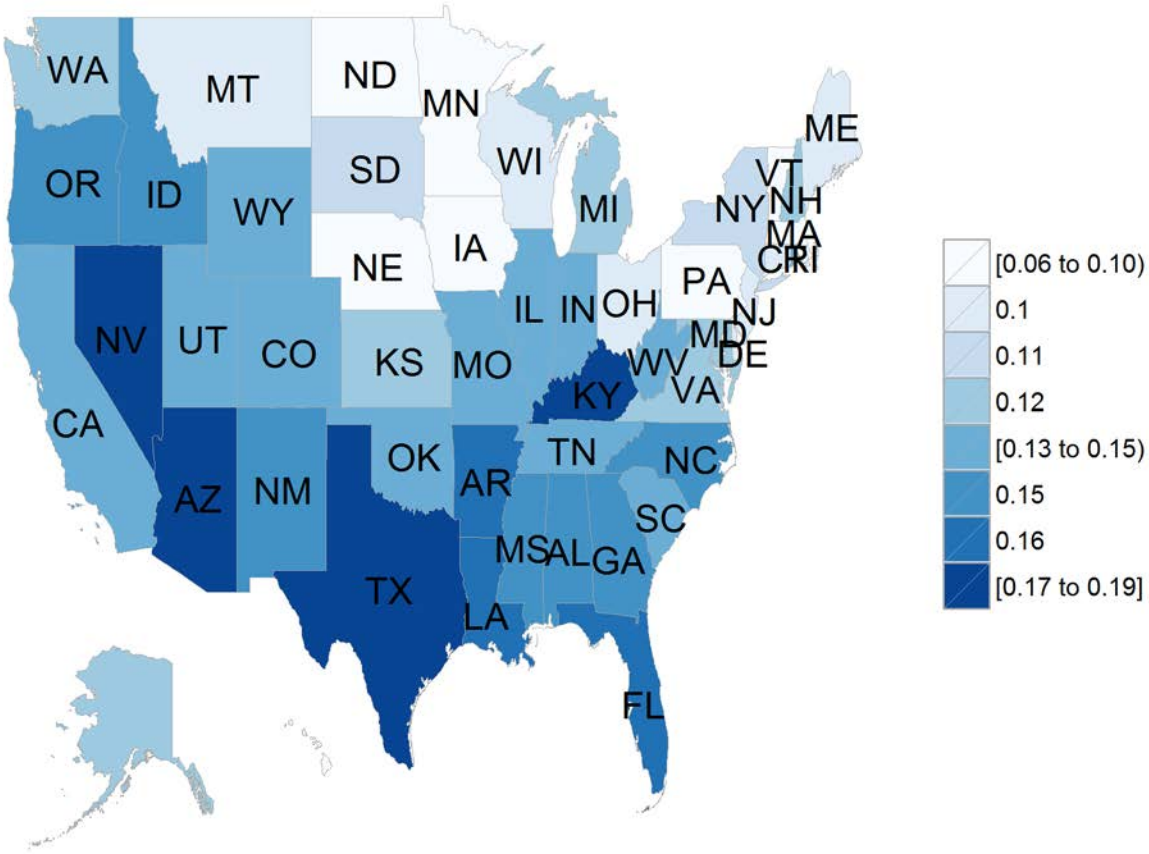

Figure A5

Rate of Youth Leaving School by State in 1990

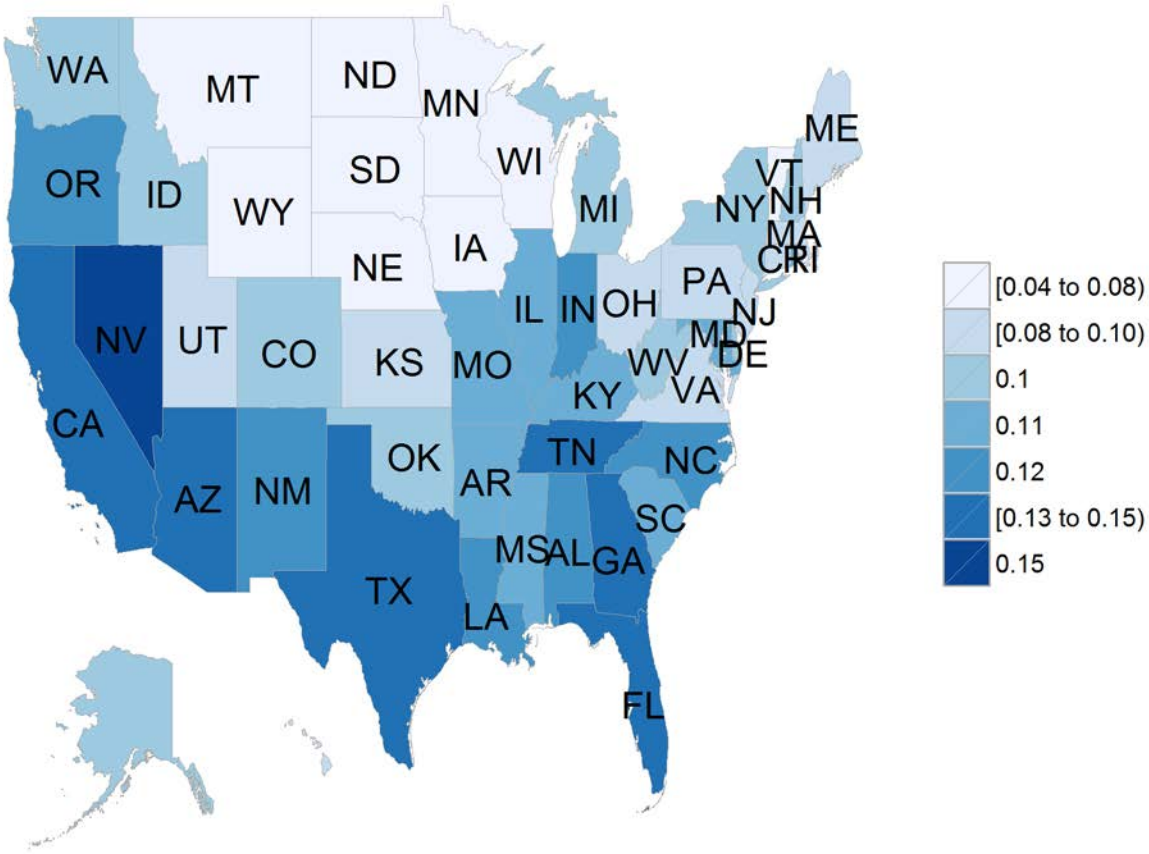

Figure A6

Rate of Youth Leaving School by State in 2000

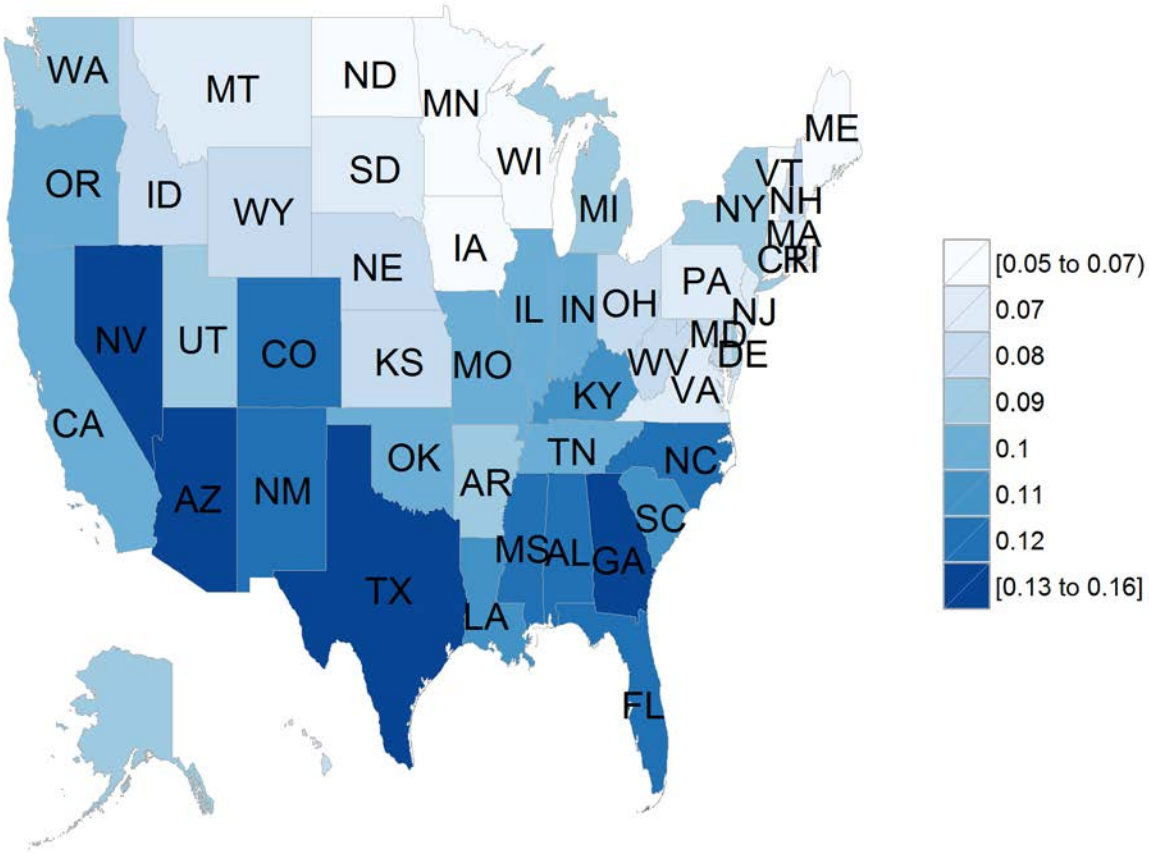

Figure A7

Rate of Youth Leaving School by State in 2010

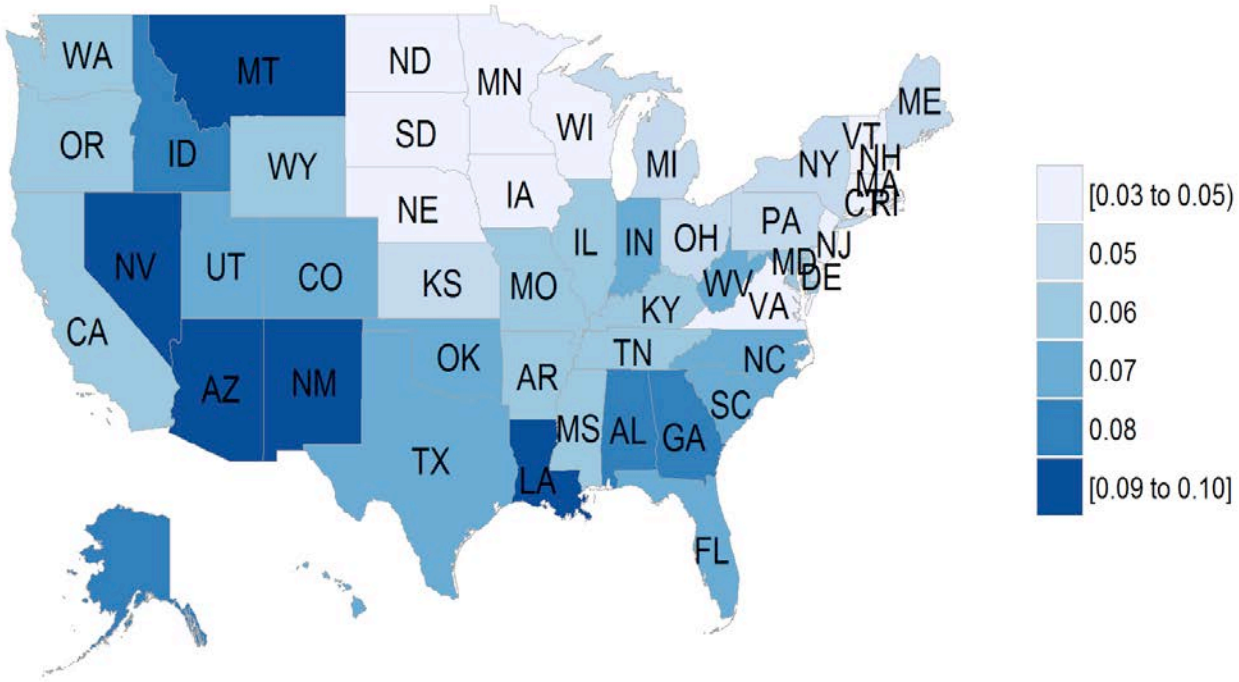

Figure A8

Distribution of Rates of Youth Leaving School in Boston, Los Angeles, and Phoenix 2010

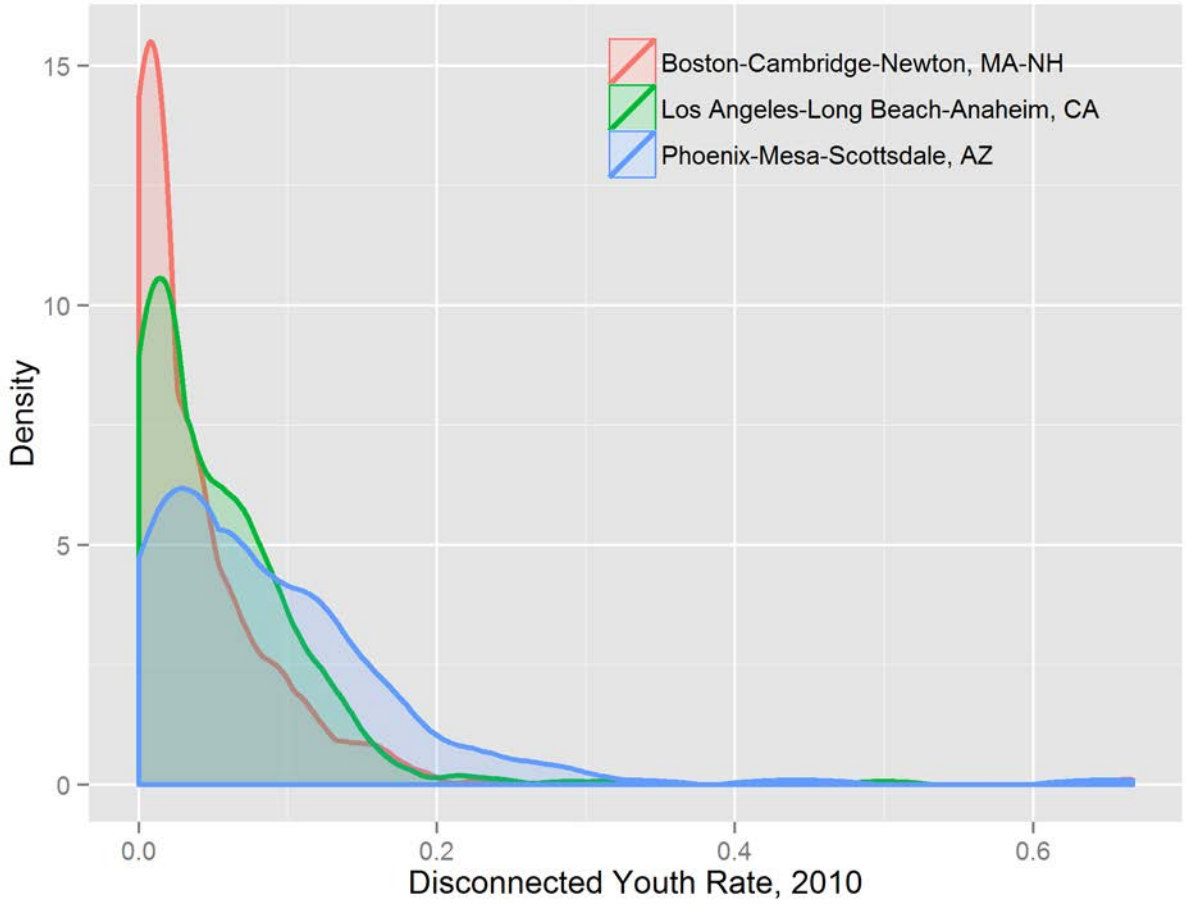

Figure A9

Distribution of Rate of Youth who Leave High School without Graduating in Boston Metro Area (2010).

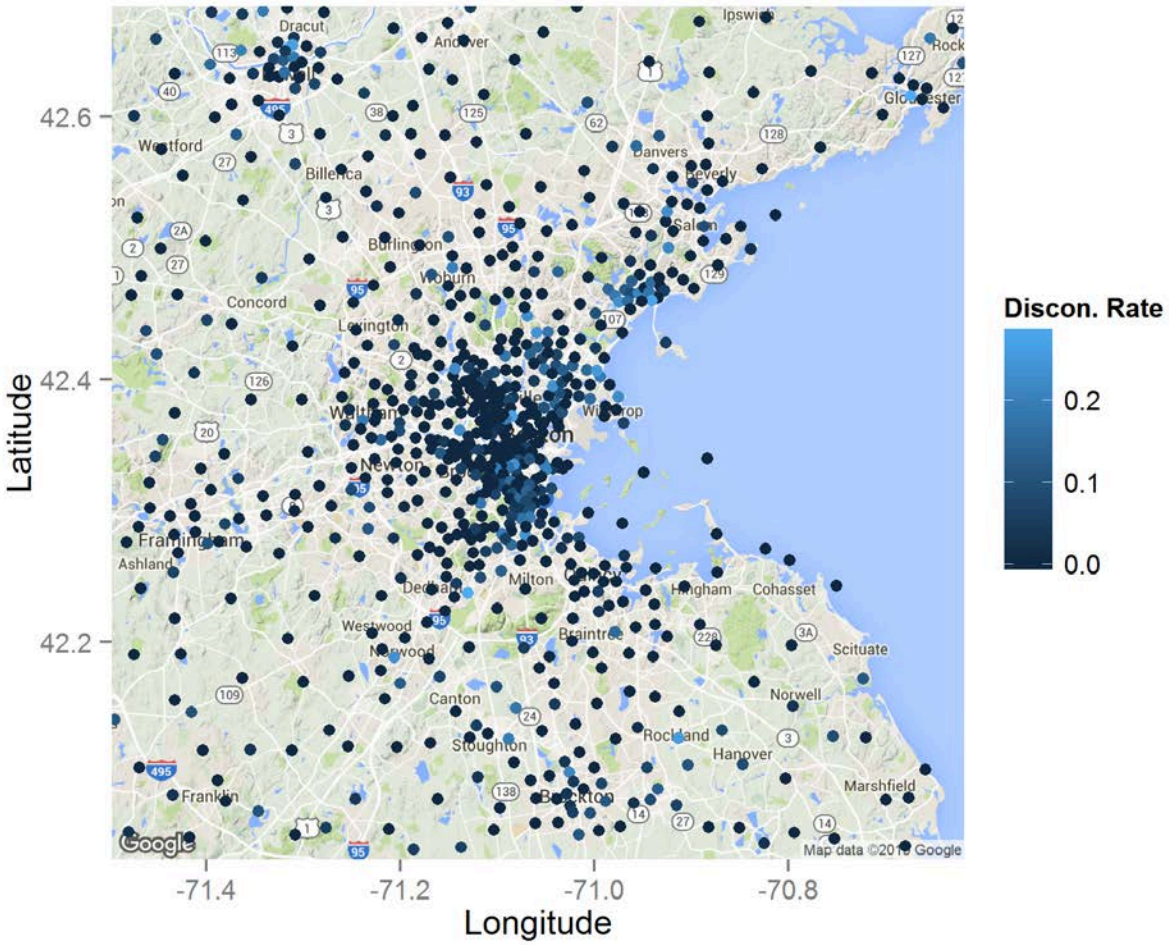

Figure A10

Distribution of Rate of Youth who Leave High School without Graduating in Los Angeles Metro Area (2010).

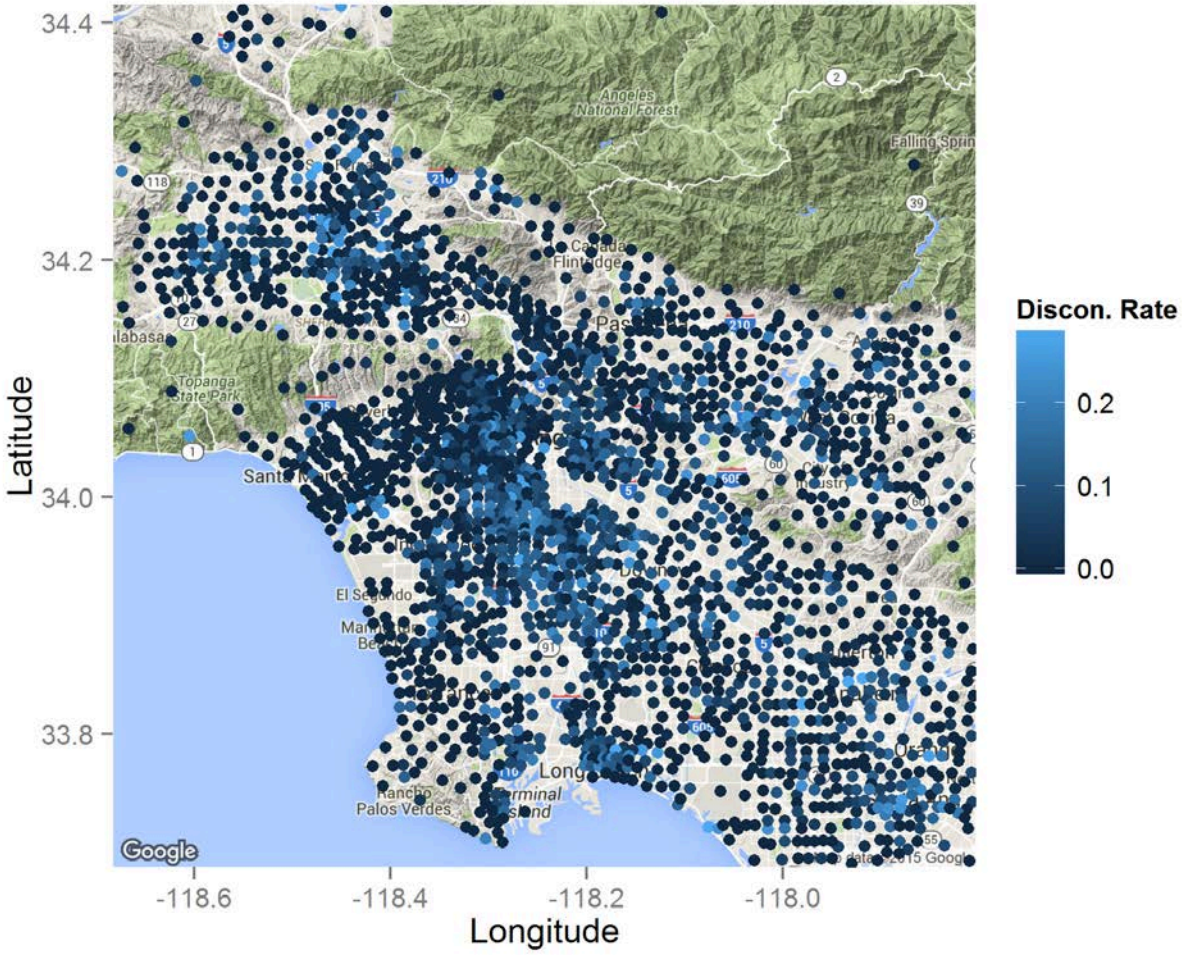

Figure A11

Distribution of Rate of Youth who Leave High School without Graduating in Phoenix Metro Area (2010).