ECOLOGICAL INFLUENCE OF THE MIDDLE-INCOME POPULATION ON ECONOMIC MOBILITY, EDUCATIONAL OUTCOMES, AND HEALTHY HABITS

by

Cody Arlie Reed

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Approved by:

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Dr. Scott Fitzgerald

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Dr. Jill Yavorsky

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Dr. Yang Cao

ABSTRACT

CODY ARLIE REED. Ecological influence of the middle-income population on economic mobility, educational outcome, and healthy habits. (Under the direction of DR. SCOTT FITZGERALD)

While researchers have identified many ecological conditions that impact life chances, there are many yet to be identified. This study identifies the size of the middle-income population as an ecological condition that is related to life outcomes. Specifically, this study explores the relationship between the size of the middle-income population and economic mobility, educational outcomes, and healthy habits. I use a social networks and social capital theoretical orientation to provide a potential explanation of the ecological influence of the middle-income population. Larger middle-income populations might increase ecological network connectivity, leading to greater ecological access to social capital that can improve life chances. Using commuting zone level data from Opportunity Insights, I find that a larger middle-income population is significantly related to higher upward mobility rates, higher test scores, and lower high school dropout rates. Robustness testing reveals a sensitive relationship between the size of the middle-income population and low-income smoking habits and low-income exercise habits. The findings suggest that the size of the middle-income population is an important ecological characteristic to consider for understanding social stratification.

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INTRODUCTION

Ecological conditions in which one lives impact social and economic life chances. Researchers have identified many of these conditions such as income inequality (Chetty, Hendren, and Katz 2016), single-parent households (Wilson 1987; Chetty et al. 2014), social cohesion (Elliott et al. 1996; Sampson, Morenoff, and Gannon-Rowley 2002), concentrated poverty (Chase-Lansdale et al. 1997; Wilson 1987), residential segregation (Chetty et al. 2014; Wilson 2011), job proximity (Jencks and Mayer 1990; Wilson 1996), and the quality of resources such as daycare centers, schools, and grocery stores (Jencks and Mayer 1990). These conditions are related to many outcomes such as lifetime earnings (Chetty et al. 2014), educational attainment (Klebanov et al. 1998; Burdick-Will et al. 2011), subjective well-being (Ludwig et al. 2012), life expectancy (Chetty, Stepner et al. 2016), and social ties (York Cornwell and Behler 2015). While social scientists have identified many structural conditions that influence social and economic outcomes, there are many yet to be explored. In this paper, I contribute to structural stratification literature by examining another ecological characteristic—the middle-income population[1] (MIP).

The ecological impact from the presence of the MIP has not been directly studied. However, Raj Chetty and Nathaniel Hendren (2016) did find a positive relationship between larger commuting zone (CZ) MIPs and upward intergenerational income

[1] There is no scholarly consensus defining the middle-income population. Various researchers define the middle-income population in relation to national definitions of poverty, income percentiles, and a number of standard deviations from the mean national income (Eisenhauer 2008, 2011; Pressman 2007; Profeta 2007). This article does not attempt to formalize a defininition of the middle-income population; however, I operationalize the middle-income population for my analysis in the "DATA AND METHODS" section of this paper.

mobility. The authors do not explain why the MIP was included in their statistical models or acknowledge the relationship between the MIP and mobility despite consistency across their models. Instead, the authors emphasize higher mobility rates for low-income families in CZs with “lower rates of residential segregation by income and race, lower levels of income inequality, better schools, lower rates of violent crime, and a larger share of two-parent households” (Chetty and Hendren 2016: 7). I explore the relationship between these neighborhood characteristics and upward mobility while emphasizing the size of the MIP. In addition to upward mobility, I show that the same neighborhood characteristics influence educational outcomes and healthy habits.

Metropolitan MIPs have been trending downward since the 1970s (Booza, Cutsinger, and Galster 2006; Cashell 2008). The declining MIP can be attributed to changing economic structures. Deindustrialization in the United States influenced an economic shift from goods-producing to service-producing industries. As fewer manufacturing jobs were available, workers with lower education entered into the service sector, where job security and economic returns are low (Bluestone and Harrison 1988). Concurrently, technology increased the demand for highly skilled, educated workers. The disparity in economic returns between low-skilled service work and high-skilled technical work produced polarization in the income distribution, where fewer individuals are earning middle-income salaries (Alichi, Kantenga, and Sole 2016). If the size of the MIP diffuses ecological social consequences, then exploring this relationship is crucial for understanding how societies become socially stratified. Additionally, this relationship would suggest creating more pathways for low-income individuals into the middle of the income distribution to promote favorable ecological social outcomes. Ideally, these pathways would protect against downward mobility as well.

Using commuting zone (CZ) level data from the Opportunity Insights project, I model the relationship between the MIP and the following outcomes: income mobility, test scores, high school dropout rates, low-income smoking rates, and low-income exercise habits. I select control variables that researchers have explored as influential ecological characteristics. For each model, I conduct robustness testing that measures the statistical significance of the MIP under different assumptions. I check robustness in this manner due to the uncertainty surrounding influential ecological characteristics; researchers guided by the same literature that I use to construct my models might specify their models differently.

The findings suggest that a larger MIP has a positive ecological influence on CZ outcomes. However, the significance of the MIP on CZ low-income healthy habits is sensitive to model specification. The mechanisms connecting the size of the MIP to ecological outcomes are unknown; however, using a social networks theoretical orientation, I theorize reasons that explain why larger MIPs increase ecological access to embedded network resources that improve social and economic outcomes.

The paper proceeds as follow: First, I review the literature that links ecological characteristics to social and economic outcomes. Then, I propose a theoretical link between social networks and the MIP. I follow with a discussion of the Opportunity Insights data used to test my hypotheses. I then discuss the statistical methods and model specification used in this study. Then, I discuss the results and robustness of each model.

Finally, I conclude with a discussion about what this study implies about the direction of research examining the structural mechanisms of social stratification.

LITERATURE REVIEW

Many scholars studying the spatial consequences of inequality trace their research tradition back to the publication of *The Truly Disadvantaged* by William Julius Wilson (1987). Wilson connected many social problems within black urban neighborhoods to structural economic changes that left many low-skilled workers with few well-paying job options, leading to high concentrations of poverty. Moreover, the Federal Housing Administration exasperated inner-city poverty through a process called "redlining," where mortgages were declined in predominately minority occupied neighborhoods (Massey 2015). Despite the Federal Housing Administration's ending of redlining in the 1960s, real estate agents continued practicing racial steering, a tradition of limiting the exposure of housing options for families of color in predominantly white neighborhoods. Redlining prevented wealthier families from moving into poor neighborhoods while racial steering prevents poor minority families from migrating to wealthier neighborhoods (Galster and Godfrey 2005). The resulting increase in concentrated poverty influences social outcomes such as teenage pregnancy, crime, and drug addiction (Wilson 1987).

Since the publication of *The Truly Disadvantaged* (1987), researchers have explored additional ecological characteristics associated with stratification such as income inequality, social cohesion, housing stability, family composition, and possession of resources. In this research tradition, scholars have developed the social isolation and social organization perspectives. These perspectives suggest that ecological social connectedness is a mechanism mediating individual life outcomes. Similarly, through a social networks theoretical orientation, I suggest that ecological social connectedness increases as the MIP increases. Thus, areas with larger MIPs promote better individual life outcomes.

Racial Segregation

Contemporary racial segregation in the United States is largely a product of political discrimination. For example, in addition to redlining mentioned above, interstate construction was strategically zoned through poor, black neighborhoods, decreasing land value and furthering isolation from wealthier neighborhoods (Nall 2015). Individuals in racially segregated neighborhoods are often exposed to fewer political resources while navigating through high levels of racial discrimination (Sharkey 2013). Residential racial segregation has been decreasing since the passage of the 1968 Fair Housing Act but has slowed since the 2008 Great Recession (Massey 2015; Lichter, Parisi, and Taquino 2012).

Black families face the highest levels of residential racial segregation (Quillian 2012). Interestingly, black income segregation is lower compared to white and Hispanic residents, meaning that black families reside in close proximity regardless of their income (Quillian 2012). In comparison, Hispanic families are more likely to reside in racially heterogenous census tracts, but, regardless of their income, they are more likely to have low-income neighbors (Quillian 2012). Areas with high levels of residential racial segregation often have high rates of unemployment, crime, and high school dropouts (Charles 2003; Cutler and Glaeser 1997). Additionally, Chetty and Hendren (2016b) found that upward income mobility decreased in counties as the Theil index of racial segregation increased. These findings suggest that areas with more racial segregation will have worse overall social and economic outcomes.

Income Segregation and Poverty

While racial segregation has been decreasing in the United States, income segregation has been increasing, creating areas with concentrations of high poverty and high affluence (Reardon and Bischoff 2011). Between 1990 and 2010, income segregation in the 100 largest metropolitan areas increased only among families with children (Owens 2016). Therefore, children were disproportionally exposed to many of the social problems associated with high neighborhood poverty such as low quality schools, low neighborhood trust, fewer daycare centers, and high incarceration rates (Jencks and Mayer 1990; Elliot et al. 1996; Brooks-Gunn and Duncan 1997; Wadtke et al. 2011). Multiple studies have found that average neighborhood socioeconomic composition is associated with reading attainment, where the higher socioeconomic neighborhoods have higher levels of reading achievement (Chase-Lansdale and Gordon 1996; Chase-Lansdale et al. 1997). Klebanov et al. (1998) found that neighborhood poverty and intelligence scores of one-year old infants were not strongly associated for pre-term, low-birthweight children. However, the children started to show differentiation on intelligence scores by the age of two, where children living in high poverty areas scored lower than those not exposed to poverty. The association between neighborhood poverty and intelligence scores were stronger yet at the age of three. These results suggest that local socioeconomic composition is important for early childhood development.

In the mid-1990s, the U.S. Department of Housing and Urban Development implemented the Moving to Opportunity social experiment, where a subset of families living in low-income housing projects were randomly selected for subsidized housing vouchers for moving to higher-income neighborhoods (Ludwig et al. 2012). This opportunity allowed scholars to compare families who moved into low-poverty neighborhoods to a control group who stayed in high-poverty neighborhoods. While adults who moved into low-poverty neighborhoods reported better subjective well-being, they did not improve their income or employment participation when compared to the control group (Katz, Kling, and Liebman 2001). However, children who moved to low-poverty neighborhoods were more likely to attend college and have higher adult incomes (Chetty, Hendren, and Katz 2016). The children who moved to low-poverty neighborhoods were much less likely to become single parents (Chetty, Hendren, and Katz 2016). Before the Moving to Opportunity experiment, scholars did not have data to test whether the temporal exposure to spatial environments had an accumulative affect throughout childhood. Chetty, Hendren, and Katz (2016) were able to test this hypothesis, finding diminishing returns on children's benefits of moving to a low-poverty neighborhood as their age increased. In sum, the younger the children were when they moved to a low-poverty neighborhood, the better their economic outcomes are.

Income Inequality and Social Cohesion

While researchers have thoroughly documented increasing income inequality since the 1980s (see Piketty and Saez 2003), less is known about the social consequences of such inequality (Neckerman and Torche 2007). At the state-level, income inequality measured with a Gini coefficient is associated with a host of unequal outcomes such as mental illness, incarceration, teenage births, obesity, and poor test scores (Pickett and Wilkinson 2015; Wilkinson and Pickett 2009). At the neighborhood level, income inequality is related to levels of trust, civic involvement, and crime (Sampson 2013;

Sampson, Raudenbush, and Earls 1997; Uslaner and Brown 2005). Scholars often use neighborhood crime rates as an operationalization of social cohesion (Wodtke et al. 2011). While using state-level data, Kawachi, Kennedy, and Wilkinson (1997) found that social cohesion and income inequality are significant predictors of homicides and robberies. In fact, they found income inequality as a better predictor of crime than state poverty rates. The authors suggest that crime is one of the mechanisms linking income inequality and all-cause mortality rates.

Violent crime is particularly detrimental to the cognitive and emotional development of young children due to high levels of chronic stress that may influence test score, high school completion, and college attendance (Burdick-Will 2016; Harding 2009; Leventhal and Brooks-Gunn 2000; Massey 2004). Chronic prenatal maternal stress increases the risk of a low birth weight (Torche 2011). Low birth weight impacts educational attainment and labor market participation later in life (Currie and Hyson 1999). Moreover, chronic stress is related to many health outcomes such as coronary artery disease, diabetes, Alzheimer's, obesity, and immune function (Juster, McEwen, and Lupien 2010; Pradhan et al. 2001; Yudkin et al. 2000). Additionally, where there are higher crime rates there are higher incarceration rates. Previously incarcerated individuals are more likely to struggle financially, furthering income inequality (Western 2002; Western and Muller 2013). These studies suggest income inequality and violent crime rates has a negative influence on ecological social and economic outcomes.

Housing

Local housing costs moderate the amount of disposable income a family has for improving life outcomes. Moreover, high housing costs increase the risk of eviction.

Desmond and Kimbro (2015) found that recently evicted mothers were more likely to report depressive symptoms. Additionally, mothers were more likely to report poor health for themselves and their children. Mothers reported depressive symptoms two years after being evicted. Eviction is common in urban, black neighborhoods, and women are evicted significantly more than men (Desmond 2012). Desmond (2012) relates high rates of evicted women to the rates of incarcerated men, even suggesting that they might have similar social consequences of reproducing inequality. These results suggest that the ecological availability of affordable housing impacts aggregate social and economic outcomes for low-income individuals.

Single-Parent Families

Larger ecological shares of single-parent households is associated with higher neighborhood crime, lower high school graduation rates, and lower college attendance rates (Leventhal and Brooks-Gunn 2000; Wilson 1987). While the share of single-parent households limit upward income mobility, studies claiming causal neighborhood effects suggests that the “fraction of single mothers is simply an aggregation of a household-level demographic characteristic” and that most of the effect is explained by selection of single-parent families moving to worse areas or married families moving to better areas (Chetty et al. 2014; Chetty and Hendren 2016: 35). However, the spatial proportion of single-parent households still does have a detrimental effect on income mobility (Chetty and Hendren 2016). Wilson (1987) suggests that single-parent households are an indication of neighborhood disorder reflecting economic instability and criminal activity that make it unlikely for men to provide a steady income. Other scholars suggest that more single-parent households decreases educational outcomes from less parental supervision and fewer role models (Leventhal and Brooks-Gunn 2000).

Distribution of Resources

Local political institutions that provide resources, such as quality schools and public transportation, may influence job availability, economic mobility, and college attendance (Chetty and Hendren 2016; Jencks and Mayer 1990a, 1990b; Wilson 1987). Using US population data, low-income individuals tend to live the longest in highly educated cities with high levels of government expenditures (Chetty, Stepner et al. 2016). Areas with greater levels of government expenditures might have more support for low-income individuals such as housing vouchers or broad Medicaid access that influence ecological outcomes.

Since the 1980s, a disproportionate share of income has gone to the top one percent in the income distribution, contributing greatly to income inequality in the United States (Alvaredo et al. 2013; Atkinson, Piketty, and Saez 2011; Piketty and Saez 2003). The overall increase of income in the top one percent skews the income distribution, leaving a smaller share of income growth for the other 99 percent. As economic capital[2] increases for those in the top one percent, they are more able to convert their economic capital to social capital, a form of capital that includes resources embedded in social networks[3] (Bourdieu 1986; Lin 1999). Moreover, elites[4] often occupy closed social networks, preventing the diffusion of cultural capital useful for accumulating economic capital to those throughout the income distribution (Bourdieu 1986; DiMaggio and Garip

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[2] Economic capital includes all incomes and accumulated wealth.
[3] I define social networks as any social relationship between two or more actors.
[4] I use Khan's (2012: 362) definition of elites as those "occupying a position that provides them with access and control or as possessing resources that advantage them."

2012; Khan 2012). Therefore, high spatial concentrations of elites may be areas where there are fewer resources for non-elites; in other words, they are likely areas with a high degree of opportunity hoarding (Tilly 2003).

Conclusion

Scholarly attempts to identify ecological mediators of inequality led to developing the social isolation and social organization perspectives. The social isolation perspective argues that areas with high concentrations of poverty become socially distanced from economically and racially heterogenous areas (Wilson 1987; Wodtke et al. 2011). Greater social distance results in fewer informal social connections that are important for accumulating beneficial knowledge useful for upward mobility (Jencks and Mayer 1990a). Informal connections are especially important for the most disadvantaged populations, as they provide labor market information such as job openings and organizational reputation (Lin 1999; Granovetter 1977). Lacking informal connections may lead to fewer role models for discouraging deviant behavior and promoting educational success for children and adolescents (Wilson 1987, 2011). Socially isolated areas are prone to developing cultures that are detrimental for upward mobility (Massey and Denton 1993). For example, Elijah Anderson (2000: 143) found that isolated urban neighborhoods promote a “street culture” that encourages short-term investments intended to increase status among peers, placing little importance on long-term consequences such as having unprotected sex. The social isolation perspective suggests that greater levels of ecological segregation and poverty have a negative influence on social and economic outcomes.

The social organization perspective emphasizes the social consequences of crime as a product of ecological social cohesion and collective efficacy (Sampson 2013; Wodtke et al. 2011). For example, Sampson, Raudenbush, and Earls (1997) constructed a variable for collective efficacy from the Project on Human Development in Chicago Neighborhoods, finding it highly predictive of neighborhood crime rates. Their variable was created from questions pertaining to informal social control such as whether neighbors could be counted on to intervene if they spotted children skipping school. Additionally, their variable included measures of social cohesion from surveying whether people in the neighborhood could be trusted (1997: 919-920). Essentially, the social organization perspective suggests that higher social cohesion and lower crime improves ecological social and economic outcomes. Additionally, because income inequality is positively associated with violent crime (see Kawachi, Kennedy, and Wilkinson 1997), the social organization perspective suggests that lower levels of income inequality is related to better ecological social and economic outcomes.

Both the social isolation and social organization perspectives identify a lack of ecological social connections as a negative influence on life outcomes. In the next section, I argue that the size of the MIP indicates the social connectedness within an ecological social unit[5]. If a larger MIP is related to greater ecological social connectedness, then a larger MIP provides greater access to resources embedded in social networks that can improve life outcomes.

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[5] An ecological social unit is an abstract unit of analysis denoting geographical areas where social interactions tend to converge. They can be thought of as the geographical hubs of social interaction. For my statistical analysis, I operationalize ecological social units as commuting zones.

THEORETICAL ORIENTATION

In this section, I present a theoretical link between the MIP and ecological outcomes with a social networks orientation. First, I introduce the concepts of social networks and social capital[6]. Then I discuss the connection between the MIP and social networks. Finally, I summarize the implications and follow it with hypotheses that I test in this paper.

Social Networks and Embedded Resources

Social capital is an abstract resource that can create advantages for groups or individuals (Burt 2000). Thus, ecological social units with high levels of social capital can provide affiliated individuals advantages that improve life outcomes. However, ecological social capital does not benefit those without access. Pierre Bourdieu (1986) viewed social capital as a resource one accumulates through social networks, whether it be in the present or future. This view suggests that more network connections throughout the ecological social unit increases social capital accumulation for affiliated individuals. Similarly, Robert Putnam (1993: 167) suggests that social capital "refers to features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated actions." Emphasis is placed on social organization as a collective—the better connected a society is, and the greater the trust, the more efficient it is at acting collectively. Simplifying the above definitions, I conceptualize social capital as any embedded resource accessible through social networks. These resources

[6] Throughout this study I use the terms "social capital" and "embedded resources" interchangeably.

include informal connections emphasized in the social isolation perspective and collective efficacy emphasized in the social organization perspective.

Individuals form social network connections through contact with other individuals, often through those they work with, go to school with, or live near. Connection strength increases with exposure, reciprocity, mutual emotion, and homophily[7] (DiMaggio and Garip 2012; Granovetter 1973). Increasing the strength of connections, the number of connections, and the accumulation of resources between those connections increases social capital access. Highly connected groups form network clusters. Connections between clusters are important for transferring beneficial information such as adopting practices that increase job promotion rates (Burt 2004). Therefore, individuals can maximize their access to social capital by having an abundance of strong connections with individuals possessing large quantities of resources while having connections to multiple clusters. Applying these ideas broadly to ecological social units implies the importance of social networks for providing diffuse access to social capital.

Applying Networks to Ecological Social Units

In this study, I make a key assumption in that the MIP increases the network connectedness throughout the ecological social unit. I make this claim conditional on the ecological visibility of the MIP. Individuals in the MIP are likely to converge where low-income and high-income individuals also occupy. As a simplification of this point, I will use schools as an illustration. Schools are often segregated by income (Owens, Reardon,

[7] Homophily is where contact between similar individuals is more likely than contact between dissimilar individuals (McPherson 2001). For example, individuals tend to associate with those similar in race, religion, gender, education, and normative behavior (Kalmijn 1998; Louch 2000; Smith-Lovin and McPherson 1993; Marsden 1987).

and Jencks 2016). Highly segregated low-income schools will likely have some middle-income students, and likely no high-income students. Schools comprised of mostly middle-income children will likely have both low and high-income students. Finally, high-income schools will likely have middle-income students, and few or no low-income students. In all three schools, the middle-income students are noticeably present to different degrees. I generalize this idea broadly throughout the ecological social unit.

Under the condition that individuals in the MIP are highly visible throughout the income distribution, I expect the MIP to provide more social connections throughout the ecological social unit. Applying the theoretical logic of social networks and embedded resources, it then follows that the accumulation of ecological connections translates into greater access to embedded resources. Moreover, the visibility of the MIP influences more connections between clusters within the ecological social unit. Connections between clusters provide access to additional resources; concurrently, those connections drive the diffusion of information and behaviors. If access to embedded resources influence individual outcomes, then the number of ecological connections will influence social stratification throughout the ecological social unit. Therefore, the MIP influences outcomes throughout the ecological social unit.

Summary and Hypotheses

Social networks provide individuals with access to social capital that can be used to improve life outcomes such as occupational status, social mobility, and overall well-being. If there is greater network connectivity throughout an ecological social unit, then there will be a more accessible resources for all individuals within the ecological social unit. Individuals in the MIP are highly visible throughout the ecological social unit. As exposure between individuals promotes social connections, then it follows that the MIP influences the overall connectivity throughout the ecological social unit. Therefore, the larger the MIP, the more connected the ecological social unit will be, leading to better outcomes within the ecological social unit.

There are many reasons why neighborhoods, metropolitan areas, counties, and commuting zones have different social characteristics. Accessing embedded resources through social networks provides a partial explanation for these differences. Under the assumption that the MIP increases the network connectedness throughout the ecological social unit, I will test the three following hypotheses at the commuting zone level:

H_1: The size of the middle-income population is positively associated with economic mobility

H_2: The size of the middle-income population is positively associated with educational outcomes

H_3: The size of the middle-income population is positively associated with beneficial health behaviors

DATA AND METHODS

The Opportunity Insights data are publicly available online[8]. The sample was constructed using 1996-2012 federal income tax records. Individual incomes include labor income, capital income, unemployment insurance, social security income, and disability benefits (Chetty et al. 2014). The sample includes United States citizens born between 1980 and 1991. Data are organized by commuting zones (CZs). CZs are aggregates of counties around metropolitan areas that span the entire United States. On average, CZs include four counties. There are 741 CZs covering the entire United States. Each CZ averages around 380,000 people. Information on the size of the MIP is not included in CZs with a population under 10,000 people, leaving 709 CZs for the analysis. Table 1 provides descriptive statistics of the MIP and control variables used in all six models.

The Opportunity Insights data include variables from other datasets that I include such as the Global Report Card, the National Center for Education Statistics, the Behavioral Risk Factor Surveillance System, the 2010 Census, Religion Data Archives, and the Uniform Crime Report.

Dependent Variables

This study models two measures of upward economic mobility. The first measure is the same that Chetty et al. (2014) used to model upward intergenerational income mobility. This measure includes the CZ proportion of individuals occupying the top income quintile (80th percentile or higher) and have parents in the bottom income quintile

[8] The Opportunity Insights data are publicly available online (https://opportunityinsights.org).

(20th percentile or lower). The second measure is operationalized as the CZ proportion of individuals occupying the top two income quintiles (60th percentile or higher) and have parents in the bottom income quintile (20th percentile or lower).

I use income-adjusted test scores and income-adjusted dropout rates for separate models estimating educational outcomes. Test scores include grades 3-8 mean English and math scores. Dropout rates include high school dropout rates from 593 commuting zones. Both variables were regressed on mean family income to compute income-adjusted residuals.

Opportunity Insights provides data from the Behavioral Risk Factor Surveillance System I use to model the CZ proportion of smokers and the CZ proportion of individuals who report exercising in that past month. The variables are provided by income quartiles. I model behaviors of those in the bottom income quartile and refer to this population as low-income. If the MIP increases social connections throughout the CZ then I expect the low-income population to have more social connections. If social connections promote adoption of beneficial behaviors then I expect the MIP to have a negative relationship with smoking, and a positive relationship with exercising for low-income individuals.

Middle-Income Population

For this analysis, the primary independent variable is operationalized as the proportion of CZ households that are between the 25th and 75th percentiles of the national household income distribution. Chetty et al. (2014) operationalized the same variable as the “middle class” in their analysis, finding a positive relationship with income mobility.

Control Variables

I carefully select control variables available in alignment with the ecological stratification literature. Racial segregation was measured using a Theil index from the 2000 United States Census (Chetty et al. 2014). Income segregation was measured using a two-group Theil index, also from the 2000 Census. Using income tax data, income inequality was measured by the Gini coefficient. The Gini coefficient compares the observed income distribution to a perfectly equal income distribution. Additionally, I control for CZ poverty rates and job density. Job density is the number of CZ jobs per square mile.

Opportunity Insights provides a social capital index created by Rupasingha and Goetz (2008). This index attempts to measure local norms through presidential election turnout and census response rates. Additionally, the index attempts to capture social networks through social associations such as public golf courses, sports clubs, and political organizations. I also control for the CZ fraction of religious individuals and CZ violent crime rates. Religious information is the proportion of individual who self-report as religious. Violent crime rate was constructed by dividing the CZ population by the number of arrests for violent crimes. I control for housing costs with variables labeled "Location Affordability for very Low Income Families" and "Location Affordability for Median Income Families." The dataset provides the proportion of single-parent households in 2010.

To control for the distribution of resources, I include a variable denoting the CZ government spending per capital. Additionally, I include the proportion of households in the top one percent of the income distribution as a proxy for opportunity hoarding. The models include demographic indicators such as the 2010 CZ proportion of non-white households and the 2010 CZ proportion of individuals holding a Bachelor's degree or higher. Finally, I control for the CZ median household income.

Table 1. Descriptive Statistics

	N	Mean	Median	St. Dev.
Middle-Income Population	709	0.550	0.552	0.079
Income Inequality	741	0.406	0.400	0.081
Proportion of Single-Parents	741	0.315	0.311	0.068
Income Segregation	741	0.040	0.031	0.032
Racial Segregation	741	0.130	0.107	0.100
Social Capital	722	0.172	0.064	1.295
Proportion Religious	741	0.546	0.525	0.167
Violent Crime	714	0.002	0.001	0.001
Median Income Housing Affordability	741	57.620	57.270	5.850
Low Income Housing Affordability	741	132.870	129.690	13.800
Proportion in Top One Percent	709	0.109	0.101	0.051
Government Expenditure	739	2,308.880	2,112.100	1,026.890
Proportion Non-White	741	0.242	0.181	0.196
Median Income	741	48,998.270	47,914.890	10,921.540
Job Density	741	50.280	16.846	133.556
Poverty	741	0.160	0.151	0.053
Proportion Bachelors or Greater	741	0.205	0.189	0.070

Methods

I run six models to test the hypotheses. I conduct robustness testing[9] on each model by measuring the rate of statistical significance of the MIP under every combination of control variable. There are two models testing the first hypothesis (H_1) of economic mobility, two models testing the second hypothesis (H_2) of educational outcome, and two models testing the third hypothesis (H_3) of beneficial behaviors. Consistent with how other researchers have analyzed these data (see Chetty et al. 2014), this study will use ordinary least squares (OLS) linear regression. I use standardized beta coefficients (β_n) to measure how many standard deviations the dependent variable (Y) changes when the

[9] See Young and Holsteen (2017) for more information on the robustness method used in this study.

independent variable (X_n) increases by one standard deviation with the following equation:

$$Y = \beta_1 X_1 + \beta_n X_n + \varepsilon$$

RESULTS

This section reviews the results and robustness of the six models used to test the hypotheses. The significance of the MIP does not change after adjusting standard errors for heteroskedasticity. A correlation matrix of the MIP and control variables is provided in the Appendix. The social capital index is highly correlated with the MIP with a Pearson correlation of 0.69. The high correlation is expected given the assumption that the MIP increases the network connectedness throughout the commuting zone. The significance of the MIP does not change when the social capital index is excluded in each model. Moreover, the MIP and the Gini index have a Pearson correlation of -0.73. Excluding the Gini index does not change the significance of the MIP throughout models.

Economic Mobility

I test the first hypothesis (H_1) which states that the size of the MIP is positively associated with upward economic mobility. As shown in Table 2, the MIP has a highly significant (p-value <0.001) positive relationship with both measures of upward economic mobility. With other variables held constant, a one standard deviation increase in the CZ proportion of middle-income households increases the CZ proportion of individuals in the top 40^{th} percent of the income distribution that have low-income parents by around 0.32 standard deviations. In other words, a 0.08 proportion point increase in the CZ proportion of the MIP increased economic mobility by nearly 0.03 proportion points. These results are consistent with other studies using these data (Chetty et al. 2014).

Table 2. OLS Regressions Estimating Economic Mobility

	Mobility Top 20%	Mobility Top 40%
Middle-Income Population	0.252***	0.315***
	(0.054)	(0.048)
Income Inequality	0.147*	0.067
	(0.064)	(0.056)
Proportion of Single-Parents	-0.279***	-0.361***
	(0.034)	(0.030)
Segregation		
Income	-0.322***	-0.214***
	(0.042)	(0.037)
Racial	-0.134***	-0.191***
	(0.027)	(0.024)
Social Cohesion		
Social Capital	0.107**	0.119***
	(0.039)	(0.034)
Religious	0.111***	0.118***
	(0.029)	(0.026)
Violent Crime Rate	-0.001	-0.029
	(0.037)	(0.033)
Housing		
Median Income Housing Affordability	0.109	0.115*
	(0.062)	(0.055)
Low-Income Housing Affordability	-0.303***	-0.192***
	(0.049)	(0.044)
Resources		
Proportion in 1%	-0.120***	-0.067
	(0.043)	(0.038)
Government Expenditure	0.111***	0.117***
	(0.029)	(0.027)
Proportion Non-White	0.144**	0.209***
	(0.044)	(0.039)
Median Income	0.846***	0.544***
	(0.071)	(0.063)
Job Density	-0.008	0.006
	(0.026)	(0.023)
Poverty Rate	0.198***	0.112*
	(0.053)	(0.047)
Proportion with Bachelors or Greater	-0.058	-0.028
	(0.039)	(0.034)
N	666	666

Note: *p < .05; **p < .01; ***p < .001 (two-tailed tests).

Table 3. Model Robustness of the MIP Effect on Economic Mobility Top 20 Percent

Variable of Interest	MIP		
Outcome Variable	Economic Mobility	N	666
Possible Control Terms	16	Mean R-squared	0.54
Number of Models	131,072	Multicollinearity	0.86
Model Robustness Statistics		Significance Testing	
Mean Estimate	0.171	Sign Stability	99%
Sampling SE	0.034	Significance Rate	90%
Modeling SE	0.080	Positive	99%
Total SE	0.087	Positive and Significant	90%
Robustness Ratio	1.969	Negative	1%
		Negative and Significant	0%

Note: 65,536 models estimated OLS default standard errors and 65,536 models estimated heteroskedastic-robust standard errors.

Table 4. Model Robustness of the MIP Effect on Economic Mobility Top 40 Percent

Variable of Interest	MIP		
Outcome Variable	Economic Mobility	N	666
Possible Control Terms	16	Mean R-squared	0.64
Number of Models	131,072	Multicollinearity	0.86
Model Robustness Statistics		Significance Testing	
Mean Estimate	0.387	Sign Stability	100%
Sampling SE	0.055	Significance Rate	98%
Modeling SE	0.140	Positive	100%
Total SE	0.149	Positive and Significant	98%
Robustness Ratio	2.589	Negative	0%
		Negative and Significant	0%

Note: 65,536 models estimated OLS default standard errors and 65,536 models estimated heteroskedastic-robust standard errors.

Table 3 shows the results from testing the robustness of economic mobility into the top 20 percent of the income distributions. After running every possible combination of control variables, a total of 131,072 models, the relationship between the MIP and upward economic mobility remained positive in 99% of the models. Moreover, the MIP was significant 90% of the time. The robustness ratio of 1.969 is just the recommended 2.0 threshold (Young and Holsteen 2017). Table 4 shows a more robust relationship between the size of the MIP and economic mobility into the top 40 percent of the income distribution. The MIP had a positive relationship in 100 percent of the models with a significance of 98 percent and a robustness ratio of 2.589.

The OLS regression results show a significant relationship between the MIP and upward economic mobility that is consistent across studies. Additionally, I show that the relationship is robust across 90 percent of all possible model specifications for upward economic mobility into the top 20 percent of the income distribution, and 98 percent for mobility into the top 40 percent. Therefore, the results support the first hypothesis (H_1); a larger MIP is associated with higher rates of economic mobility.

Educational Outcomes

Next I test the second hypothesis (H_2) which states that the size of the MIP is positively associated with educational outcomes. Table 5 shows the results of the two educational models. The MIP is significantly associated with test scores (p-value <0.001) and dropout rates (p-value <0.05). A one standard deviation increase in the size of the MIP increases income-adjusted test scores by around 0.22 standard deviations, holding all else constant. Consistent with the neighborhood literature on education, violent crime rates a strong negative association with test scores. Additionally, the proportion of households in the top one per cent of the income distribution has a strong negative association. Holding all other variables constant, a one standard deviation increase in the MIP decreases income-adjusted dropout rates by around 0.22 standard deviation. Larger proportions of single-parent households and households in the bottom income quartile is associated with higher income-adjusted dropout rates.

Table 5. OLS Regressions Estimating Income Adjusted Test Scores and Dropout Rates

	Test Scores	Dropout Rate
Middle-Income Population	0.217***	-0.216*
	(0.063)	(0.088)
Income Inequality	0.204**	0.093
	(0.075)	(0.101)
Proportion of Single-Parents	-0.120**	0.213***
	(0.040)	(0.051)
Segregation		
Income	-0.041	0.000
	(0.049)	(0.068)
Racial	-0.113***	0.055
	(0.032)	(0.041)
Social Cohesion		
Social Capital	0.125**	-0.053
	(0.045)	(0.058)
Religious	0.108**	-0.074
	(0.034)	(0.044)
Violent Crime Rate	-0.211***	0.163**
	(0.044)	(0.061)
Housing		
Median Income Housing Affordability	-0.078	-0.362***
	(0.073)	(0.094)
Low-Income Housing Affordability	-0.024	0.109
	(0.058)	(0.079)
Resources		
Proportion in 1%	-0.272***	0.046
	(0.050)	(0.078)
Government Expenditure	-0.064	0.043
	(0.035)	(0.045)
Proportion Non-White	-0.179***	-0.227***
	(0.052)	(0.065)
Median Income	-0.138	-0.045
	(0.084)	(0.106)
Job Density	0.110***	-0.029
	(0.031)	(0.038)
Poverty Rate	-0.156*	0.327***
	(0.062)	(0.085)
Proportion with Bachelors or Greater	0.136**	-0.117
	(0.045)	(0.063)
N	665	553

Note: *p < .05; **p < .01; ***p < .001 (two-tailed tests).

Table 6. Model Robustness of the MIP Effect on Test Scores

Variable of Interest	MIP		
Outcome Variable	Test Scores	N	665
Possible Control Terms	16	Mean R-squared	0.53
Number of Models	131,072	Multicollinearity	0.86
Model Robustness Statistics		Significance Testing	
Mean Estimate	31.323	Sign Stability	100%
Sampling SE	6.466	Significance Rate	95%
Modeling SE	11.850	Positive	100%
Total SE	13.499	Positive and Significant	95%
Robustness Ratio	2.320	Negative	0%
		Negative and Significant	0%

Note: 65,536 models estimated OLS default standard errors and 65,536 models estimated heteroskedastic-robust standard errors.

Table 7. Model Robustness of the MIP Effect on Dropout Rates

Variable of Interest	MIP		
Outcome Variable	Dropout Rates	N	553
Possible Control Terms	16	Mean R-squared	0.34
Number of Models	131,072	Multicollinearity	0.88
Model Robustness Statistics		Significance Testing	
Mean Estimate	-0.069	Sign Stability	100%
Sampling SE	0.021	Significance Rate	81%
Modeling SE	0.026	Positive	0%
Total SE	0.033	Positive and Significant	0%
Robustness Ratio	-2.093	Negative	100%
		Negative and Significant	81%

Note: 65,536 models estimated OLS default standard errors and 65,536 models estimated heteroskedastic-robust standard errors.

Robustness testing was conducted on each model. As seen in Table 6, the relationship between the MIP and income-adjusted test scores is positive in 100% of the models. The relationship is significant in 95% of the models. The relationship between the MIP and test scores has a 2.32 robustness ratio. Table 7 tests the robustness between the MIP and income-adjusted dropout rates under two standard error calculations, each calculation having 65,536 models for a total of 131,072 models. The relationship between the size of the MIP and dropout rates is negative, meaning a larger MIP decreases dropout rates, in 100% of the models. The relationship is significant in 81% of the models. This relationship is robust with an absolute robustness ratio of 2.09.

The OLS regression results show a significant relationship between the MIP and educational outcomes. The relationship remains robust for both test scores and dropout rates after testing all possible model specifications. Therefore, the results support the second hypothesis (H_2); a larger MIP is associated with better CZ educational outcomes.

Healthy Habits

Finally, I test the third hypothesis (H_3) which states that the size of the MIP is positively associated with beneficial health behaviors. Table 8 shows the OLS regression results for the two health behaviors: CZ monthly exercise and smoking rates. In both models, the MIP is significantly associated with the CZ proportion of individuals that exercise (p-value <0.001), and the proportion that smoke (p-value <0.001). A one standard deviation increase in the MIP increases the CZ proportion of individuals in the bottom income quartile who exercise by 0.31 standard deviations, holding all other variables constant. In other words, a 0.08 point increase in the CZ proportion of the MIP increases the portion of low-income individuals that exercise nearly 0.03 points. Holding all other variables constant, a one standard deviation increase in the CZ MIP decreases the proportion of low-income smokers by around 0.34 standard deviations, or over 0.02 points.

Table 9 tests the robustness of the relationship between the MIP and the CZ proportion of low-income individuals that exercise. The relationship is positive in 97% of the models, and it is significant in 70% of the models. The relationship does not reach the robustness ratio threshold of 2.0, indicating sensitivity to model specification.

Table 8. OLS Regressions Estimating Smoking and Exercise Habits

	Exercise	Smoking
Middle-Income Population	0.311***	-0.344***
	(0.084)	(0.096)
Income Inequality	-0.217*	-0.213
	(0.097)	(0.111)
Proportion of Single-Parents	-0.136**	0.179**
	(0.052)	(0.059)
Segregation		
Income	-0.134*	0.016
	(0.062)	(0.070)
Racial	0.0146	0.102*
	(0.040)	(0.046)
Social Cohesion		
Social Capital	0.143*	-0.266***
	(0.058)	(0.067)
Religious	-0.227***	-0.098
	(0.045)	(0.051)
Violent Crime Rate	0.044	-0.093
	(0.056)	(0.063)
Housing		
Median Income Housing Affordability	0.033 (0.097)	-0.432*** (0.111)
Low-Income Housing Affordability	0.195** (0.073)	-0.202* (0.083)
Resources		
Proportion in 1%	0.056	0.068
	(0.064)	(0.073)
Government Expenditure	0.079	-0.121*
	(0.044)	(0.051)
Proportion Non-White	0.310***	-0.699***
	(0.066)	(0.076)
Median Income	-0.160	0.039
	(0.137)	(0.123)
Job Density	-0.088**	0.043
	(0.038)	(0.044)
Poverty Rate	0.156	0.194*
	(0.080)	(0.091)
Proportion with Bachelors or Greater	0.538*** (0.057)	-0.201** (0.066)
N	620	620

Note: *p < .05; **p < .01; ***p < .001 (two-tailed tests).

Table 9. Model Robustness of the MIP Effect on Exercise

Variable of Interest	MIP		
Outcome Variable	Exercise	N	620
Possible Control Terms	16	Mean R-squared	0.29
Number of Models	131,072	Multicollinearity	0.86
Model Robustness Statistics		Significance Testing	
Mean Estimate	0.266	Sign Stability	97%
Sampling SE	0.084	Significance Rate	70%
Modeling SE	0.141	Positive	97%
Total SE	0.164	Positive and Significant	70%
Robustness Ratio	1.617	Negative	3%
		Negative and Significant	0%

Note: 65,536 models estimated OLS default standard errors and 65,536 models estimated heteroskedastic-robust standard errors.

Table 10. Model Robustness of the MIP Effect on Smoking

Variable of Interest	MIP		
Outcome Variable	Smoking	N	620
Possible Control Terms	16	Mean R-squared	0.14
Number of Models	131,072	Multicollinearity	0.86
Model Robustness Statistics		Significance Testing	
Mean Estimate	-0.085	Sign Stability	60%
Sampling SE	0.073	Significance Rate	47%
Modeling SE	0.160	Positive	40%
Total SE	0.175	Positive and Significant	5%
Robustness Ratio	-0.484	Negative	60%
		Negative and Significant	42%

Note: 65,536 models estimated OLS default standard errors and 65,536 models estimated heteroskedastic-robust standard errors.

Additionally, Table 10 tests the robustness of the relationship between the MIP and the CZ proportion of low-income smokers. Despite a strong negative relationship in the regression, the results indicate high sensitivity to model specification. The relationship is negative and statistically significant in 42% of all models. A greater MIP significantly *increases* low-income smoking rates in 5% of all models.

The OLS regression results show a significant relationship between the MIP and healthy behaviors. However, this relationship is conditional on the control variables included in each model. It is likely that researchers independently testing the same hypotheses with the same data as this study would specify their models differently. Therefore, the results do not support the third hypothesis (H_3); the relationship between the MIP and healthy behaviors is not convincing.

DISCUSSION

In this paper, I studied the relationship between the CZ proportion of middle-income households and upward intergenerational income mobility, income-adjusted test scores, income adjusted dropout rates, low-income exercise habits, and low-income smoking rates. While many researchers have connected ecological measures of inequality to unequal social and economic outcomes, they have not recognized the role of the MIP. I build on social stratification literature by revealing the ecological influence of the MIP.

Importantly, I show that the MIP is positively related to upward economic mobility. Commuting zones with larger MIPs provide individuals with low-income parents a greater chance at achieving a high income. For low-income individuals, a CZ where 56% of the households are in the middle of the income distribution had a three percentage point advantage for achieving the top 40% of the income distribution compared to a CZ where 48% of the households are in the middle of the income distribution, assuming all of the factors controlled for in my models are held constant. These results are consistent with Chetty et al. (2014) where they found a strong relationship between CZ middle-income households and upward income mobility. I conducted thorough robustness testing that highlights the ecological influence of the MIP despite different specification assumptions. These results are consistent with the first hypothesis (H_1)

I find a positive relationship between the size of the CZ MIP and income-adjusted test scores and income-adjusted dropout rates. Much of the structural literature on educational outcomes focuses on violent crime and single parents. While those dimensions were significant in the models, the MIP was similarly influential. The dependent variables are income-adjusted, and the models control for the CZ median income. Despite these controls, the ecological presence of the size of the MIP was highly influential. Moreover, the significance of the MIP was robust across 95% of the models estimating test scores, and across 81% of the models estimating dropout rates. These results are consistent with the second hypothesis (H_2).

This study does not support the third hypothesis (H_3) that the MIP will be significantly associated with healthy behaviors. The models show a significant, positive relationship between the size of the MIP and healthy habits; however, the relationship is sensitive to model specification.

Research Implications

This study leaves many questions about the ecological role of the MIP. I test hypotheses from a social networks perspective. The key theoretical assumption in this study is conditional on the visibility of the MIP to individuals throughout the ecological social unit. It is unknown what populations are physically most visible throughout an ecological social unit. An interesting study would be to explore the characteristics of highly visible individuals in ecological social units. Additionally, It is unknown to what extent social networks influence ecological social and economic outcomes. This leaves opportunities for exploring the role of social networks and social capital on multiple levels of analysis, whether it be neighborhoods, metropolitan areas, counties, or commuting zones.

There are opportunities to explore the relationship between the spatial arrangement of people and how social networks develop for examining questions such as whether in-migration disrupts or promotes ecological network connections. Connecting networks to spatial arrangement of people can lead to developing theories that can explain the consequences of segregation, relative perspectives of inequality, economic inequality, and a shrinking middle-income population. Measuring changing MIPs and changes in inequality would support a more compelling argument about the role of the middle-income population. Moreover, there are opportunities to connect the MIP to other ecological outcomes such as subjective well-being, life expectancy, and college attendance. While there is a lot of potential research to be done on the MIP, scholars must operationalize it consistently across studies.

Limitations

This study suffers from multiple limitations. First, I cannot claim a causal relationships between the size of the MIP and economic mobility, educational outcomes, and healthy habits. The social networks perspective suggests an ecological role for the MIP; however, it is unlikely that the MIP is capturing the full extent of the ecological social networks. There are likely many factors related to the size of the MIP and life outcomes. Perhaps ecological units with larger MIPs indicate ecological social units that have not experienced an exodus of middle-income jobs. This would suggest that changing economic conditions influences individual outcomes, rather than the presence of a middle-income population. Second, many variables were constructed using different data sets, and often at different times. Some measures, such as racial segregation, are based on data from 2000 while other measures, such as CZ poverty rates, are based on data from 2010. Ecological conditions change constantly. Thus, the models do not represent CZ composition as one specific time. Third, modeling economic mobility does not account for individual selection. It is possible that individuals who moved to different locations have different economic mobility rates. Finally, operationalizing the MIP differently might change the results. It is unknown if there are differences in ecological influence for those on the lower end of the MIP or the higher end of the MIP.

CONCLUSION

Scholars have long recognized that ecological conditions influence many social and economic outcomes independent of individual merit. Equally talented people can experience different life courses based on their structural influences. Exploring these ecological conditions is important for understanding the process of social stratification. This study contributes to structural social stratification literature by introducing the MIP as an important ecological characteristic related to social and economic inequality. I find that a larger CZ MIP is related to higher economic mobility. Additionally, individuals living in CZs with larger MIPs score higher on tests and are less likely to drop out of high school. This study suggests that the relative distribution of individual characteristics influence inequality. Here, I show that the relative proportion of middle-income households has a diffuse influence on the rest of the population in commuting zones.

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APPENDIX: CORRELATION MATRIX

	MIP	SPH	INCSEG	RSEG	NONWH	GINI	SCAP	MIHA	LIHA	VCRIM	GOVEX	REL	JOBDEN	1%	COL+	MEDINC	POOR
MIP	1	-0.63	-0.4	-0.3	-0.72	-0.76	0.69	-0.35	-0.1	-0.5	0.14	0.27	-0.23	-0.28	-0.03	0.17	-0.6
SPH	-0.63	1	0.16	0.3	0.57	0.44	-0.47	0.45	-0.18	0.42	-0.17	-0.27	0	0.01	-0.2	-0.4	0.61
INCSEG	-0.4	0.16	1	0.54	0.34	0.44	-0.28	-0.45	0.54	0.29	0.08	-0.25	0.5	0.34	0.6	0.55	-0.12
RSEG	-0.3	0.3	0.54	1	0.33	0.26	-0.19	-0.15	0.17	0.23	0.04	-0.06	0.36	0.11	0.17	0.19	0.09
NONWH	-0.72	0.57	0.34	0.33	1	0.51	-0.57	0.12	0.09	0.47	0.08	-0.02	0.16	0.14	-0.04	-0.06	0.5
GINI	-0.76	0.44	0.44	0.26	0.51	1	-0.57	0.19	0.16	0.44	-0.1	-0.3	0.27	0.71	0.18	-0.07	0.38
SCAP	0.69	-0.47	-0.28	-0.19	-0.57	-0.57	1	-0.34	-0.01	-0.46	0.15	0.36	-0.11	-0.12	0.2	0.23	-0.52
MIHA	-0.35	0.45	-0.45	-0.15	0.12	0.19	-0.34	1	-0.63	0.1	-0.36	-0.08	-0.29	-0.15	-0.62	-0.88	0.77
LIHA	-0.1	-0.18	0.54	0.17	0.09	0.16	-0.01	-0.63	1	0.15	0.35	-0.22	0.49	0.36	0.65	0.8	-0.52
VCRIM	-0.5	0.42	0.29	0.23	0.47	0.44	-0.46	0.1	0.15	1	0.05	-0.24	0.18	0.13	-0.01	-0.05	0.23
GOVEX	0.14	-0.17	0.08	0.04	0.08	-0.1	0.15	-0.36	0.35	0.05	1	-0.01	0.1	0.09	0.2	0.35	-0.31
REL	0.27	-0.27	-0.25	-0.06	-0.02	-0.3	0.36	-0.08	-0.22	-0.24	-0.01	1	-0.07	-0.18	-0.22	0.02	-0.14
JOBDEN	-0.23	0	0.5	0.36	0.16	0.27	-0.11	-0.29	0.49	0.18	0.1	-0.07	1	0.31	0.37	0.44	-0.16
1%	-0.28	0.01	0.34	0.11	0.14	0.71	-0.12	-0.15	0.36	0.13	0.09	-0.18	0.31	1	0.39	0.27	-0.06
COL+	-0.03	-0.2	0.6	0.17	-0.04	0.18	0.2	-0.62	0.65	-0.01	0.2	-0.22	0.37	0.39	1	0.67	-0.39
MEDINC	0.17	-0.4	0.55	0.19	-0.06	-0.07	0.23	-0.88	0.8	-0.05	0.35	0.02	0.44	0.27	0.67	1	-0.72
POOR	-0.6	0.61	-0.12	0.09	0.5	0.38	-0.52	0.77	-0.52	0.23	-0.31	-0.14	-0.16	-0.06	-0.39	-0.72	1

1 0.8 0.6 0.4 0.2 0 -0.2 -0.4 -0.6 -0.8 -1