DRAFT

Family Complexity and Intergenerational Mobility

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Abstract---The goal of the present study was to examine the relationship between family complexity and intergenerational mobility across the United States using large publicly available datasets. Four types of family complexity were extracted from the U.S. Census Bureau's 2014 Survey of Income and Program Participation and compared to state levels of intergenerational mobility derived from datasets published by Raj Chetty and his colleagues. Regression analyses revealed a significant positive relationship between state-level prevalence of simple 2-parent biological families and mobility, replicating the results of Chetty and his colleagues. The results also showed a statistically significant negative relationship between upward mobility and state-level prevalence of families with *only* parent complexity or *only* sibling complexity. Prevalence of families with *both* parent and sibling complexity showed an even stronger and significant negative relationship with mobility. The limitations of this study and implications for further research are discussed.

Keywords---intergenerational mobility, childhood exposure effect, family structure, family complexity, S.I.P.P.

I. INTRODUCTION

A. Previous Research on Intergenerational Mobility

The "American Dream" can be defined by the ideal that children are able to achieve a higher standard of living than their parents. However, absolute income mobility, or the fraction of children who earn more than their parents, has steadily declined since 1940. Roughly 90 percent of children who were born in 1940 earned more than their parents while only about 50 percent of children born in 1980 earn more than their parents. While absolute income mobility has fallen the most for the middle class, families across the entire income spectrum have experienced radical decreases in mobility. Raj Chetty and his colleagues found that most of the decline in absolute mobility has been driven by unequal distribution of economic growth. These researchers conducted various simulations involving increased GDP rates and distribution of wealth, discovering that with current GDP rates

absolute income mobility can be restored to around 80% by distributing GDP more broadly across income groups. In addition to the national income trends, some areas of the United States such as the industrial Midwest have experienced declines in absolute mobility of more than 60% during the same time period, raising questions about the geography of mobility [1].

Chetty and his colleagues described the United States as a collection of societies, some of which are "lands of opportunity" while others provide children very little opportunities to escape poverty. When dividing communities into commuting zones, or aggregations of counties, there is substantial variation in the rates of mobility among cohorts of children in these areas. For example, children from families at the 25th percentile in Seattle have outcomes comparable to children from families at the median in Atlanta, while some cities have rates of mobility comparable to countries with the highest mobility rates in the world [2]. Chetty and his fellow researchers also found that much of the spatial variation in children's outcomes emerges long before they enter the labor market, suggesting that differences in mobility are driven by factors that affect children while they are growing up. By correlating the spatial variation in mobility with observable characteristics, five major factors were identified that are strongly correlated with mobility: 1) segregation by income and race, 2) levels of income inequality, 3) school quality, 4) social capital and crime rates and 5) family structure [2]. .

Raj Chetty and others also published research that identified properties of high- vs. low-opportunity areas to obtain insights into policies that can increase economic opportunity. Following work from the study on the geography of intergenerational mobility, Chetty and his colleagues wanted to determine whether the properties of the neighborhoods themselves drove upward mobility or whether the upward mobility was due to systematic differences in the types of people living in these neighborhoods. If the former is true then changing neighborhoods would be a good way to improve economic mobility and should be something policy makers focus on. The *childhood exposure effect* describes a phenomenon where children have improved outcomes for every additional year they spend growing up in a better environment. For example, a child who moves to a better neighborhood at nine years old has substantially better outcome than a child who moves to a better neighborhood at 16 years old, while someone who moves at age 23 will have no improvement in outcome at all. The lesson learned by this analysis is that mobility should be tackled at a local level through the improvement of childhood environments [3].

B. Previous Research on Family Structure and Complexity

From their studies of geographical differences in intergenerational mobility, Chetty et al. [2,3] concluded that one of the strongest predictors of upward mobility were measures of family structure taken in the community where the child spent most of their developmental years. Children were not just positively affected by residing in a two-parent rather than a single-parent family. Chetty et al.'s [2,3] research on the childhood exposure effect demonstrated that children also had higher rates of upward mobility when they lived in a community or region that overall had fewer single-parent families.

While Chetty et al. [2,3] primarily studied the impact of family structures defined by the presence or absence of each parent, less is known about how other more complex family structures may affect intergenerational mobility at the individual child or community level. Bloome et al. [4] studied how variations in the family structure can affect the individual child's intergenerational mobility using data from the National Longitudinal Survey of Youth. Bloome et al. [4] compared individuals "who lived with both parents stably throughout childhood, 0-18 years, from those who did not." She also identified families who lived stably with one parent from 0-18 years. For those children living outside stable one- or two-parent families, Bloome et al. identified parental transitions, that is, each time a parent or stepparent entered or left the household. By identifying the number of transitions experienced by those individuals raised outside the two types of stable families, Bloome et al. [4] was able to provide evidence that it was the number of transitions regardless of family income that negatively affected the individual's upward mobility. These findings suggest the importance of studying the relationship of intergenerational mobility to more diverse childhood living arrangements.

Manning et al.[5] noted the prevalence of family arrangements beyond one-parent and two-parent families and discussed the need for capturing the presence and composition of siblings in order to better understand more complex family arrangements. They developed a measure of family complexity that merges family structure and sibling composition to delineate the differences between: (1) simple two-biological parent families; (2) families with complex sibling (half- or step-sibling) arrangements; and (3)complex-parent (stepparent, single-parent) families. Using the Survey of Income and Program Participation (S.I.P.P), they were able to obtain a sufficient sample size to evaluate changes in the distribution of these family types between 1996 and 2009. By 2009, 59.2 percent of families were categorized as simple two-parent families; 5.2 percent showed only sibling complexity; 28.5 percent of

families had only parent complexity and 7.1 percent showed both sibling and parent complexity. Twenty-one percent of children with college-educated parents were living in complex families, while approximately 50% of those children whose parents had lower levels of education were in complex families. Family (parent or sibling) complexity was also more prevalent in racial/ethnic subgroups and with the disadvantaged [5].

Brown et al. [6] noted that research on family structures has greatly increased over the last three decades with careful studies of living arrangement patterns and their impact on child well-being. These studies suggest that children residing outside of two-parent families in complex *parent* arrangements experience poorer academic, behavioral and emotional outcomes [6]. However, there are only a few studies suggesting that complex *sibling* arrangements (i.e., presence of half- or step-siblings) may also be negatively associated with academic and emotional child well-being [6]. Furthermore, the lack of research to determine the effects of sibling complexity on the individual child's *economic* well-being prompted Brown et al. [6] to utilize the 2008 S.I.P.P. data in order to explore this relationship. Their results showed that that sibling complexity (i.e., presence of half- or step-siblings) was also associated with an individual child's lower economic well-being regardless of whether the child resided in a one-parent or a two-parent biological family. Table 1 summarizes the previous research discussed above.

TABLE 1. DESCRIPTION OF PREVIOUS RESEARCH ON FAMILY COMPLEXITY TYPES

Study Name	**Dataset**	**Design**	**FamilyComplexity Types Measured**	**Other Variables Measured**
Chetty et al. 2014	Census IRS	Cross-Sectional Correlational	2-parent ***vs***. 1 parent biological family	Absolute Income Mobility
Bloome et al. 2017	National Longitudinal Study of Youth	Longitudinal Correlational	2 parent biological family for 0-18 yrs. with 0 transitions ***vs.*** 1 parent biological family for 0-18 yrs with 0 transitions ***vs.*** Family with >0 transitions Transition = Each time a parent/stepparent enters or leaves household	Absolute Income Mobility
Manning et al. 2014	Survey of Income and Program Participation (S.I.P.P.)	Descriptive	Two-biological parent family **(Simple**) vs. Family with stepparent, single-parent (**Complex Parent**) ***vs.*** Family with half- or step-sibling arrangements **(Complex Sibling**)	Education of Parent Race/Ethnicity Poverty

Brown et al. 2015	Survey of Income and Program Participation (S.I.P.P.)	Cross-Sectional Correlational	Family with step or half siblings (**Complex**) ***vs.*** Family with only full siblings (**Simple**)	Family Income to Needs Ratio Receipt of Public Assistance

C. Purpose of the Present Study

The purpose of the present study was to examine geographic patterns of family (parent and sibling) complexity across the United States and determine if these patterns correlate with intergenerational mobility at the state level. In contrast to the previous studies that measure educational, economic and mobility outcomes for individual children in complex parent or sibling arrangements, the present study will examine the association between state-level family complexity and intergenerational mobility. The present study will use family structure data from the most recent Survey of Income and Program Participation (S.I.P.P.) [7] as well as Chetty et al's [2] intergenerational mobility data to build upon Chetty et al.'s previous findings about the relationship between family structure and intergenerational mobility. The present study goes beyond Chetty et al's [2] earlier research to examine a wider variety of simple and complex family structures as defined by Manning et al. [5].

II. METHODS

The present study used the 2014 Survey of Income and Program Participation (S.I.P.P), a nationally representative panel study providing information on both individuals and households across the United States collected over a four year period. Sponsored by the U.S. Census Bureau, the 2014 S.I.P.P. began with a stratified sample of approximately 53,000 households identified through the 2010 decennial census. The purpose of the S.I.P.P is to provide a nationally representative sample for evaluating:

1) annual and sub-annual income dynamics;

2) movements into and out of government transfer programs;

3) family and social context of individuals and households; and

4) interactions among these items.

For the purposes of the present study, the first wave of the 2014 S.I.P.P. dataset was used. The S.IP.P. database consists of entries uniquely identifying each of the individuals in the survey by a combination of their household identifier and person number.

The present study also employed a dataset published by Chetty et al. [2] with intergenerational income mobility measures based on millions of anonymous pre-tax earnings records. A core sample of all children in the U.S. born between 1980-82 is used, measuring their adult income in 2011-12 when they are approximately 30 years old. The dataset includes an absolute upward mobility index score measuring the expected economic outcomes of children born to a family earning an income of approximately $30,000 (the 25th percentile of the income distribution). Absolute mobility measures are provided in the dataset for commuting zones (i.e., geographical aggregations of counties) in each state across the U.S. Children are assigned to a commuting zone based on their location at age 16 (no matter where they live as adults), so that their location represents where they grew up. Children and their parents are ranked based on their positions in the national income distribution, so the statistics measure how well children do relative to those in the nation as a whole rather than those in their own particular community [2].

The present study extracted family complexity (parent and sibling) levels from the S.I.P.P. dataset [7] as the independent variable to correlate with the dependent variable of statewide intergenerational mobility rankings as derived from the dataset available through Chetty et al.'s study [2]. The present study does not seek to correlate family complexity type with individual household income information collected by the S.I.P.P., but rather to analyze how family complexity in each state as derived from the S.I.P.P. is related to the overall upward mobility in that state as determined by other studies.

Manning et al. [5] emphasized the importance of measuring both the relationship between children and parents as well as the relationship of children with their siblings in studying types of family complexity in a household. In a manner similar to the research conducted by Manning et al. [5], the present study used the household relationship matrices from the 2014 S.I.P.P. dataset (Wave 1) to identify types of relationships between children, their parents and their siblings within each family..

Using the unique household and person identifiers in the S.I.P.P., the analytic sample for the present study was first limited to household relationship matrices with individuals under 18 years of age, yielding 11,545 family

households with children. Since the primary respondent for the survey identified the relationships of each member of the household to one another, the type of parents as well as the type of siblings were then identified for each family. Each household family with children was characterized into the following types: (1) Simple 2-parent biological family; 2) Family with parent complexity (stepparent, single-parent); and/or (3) Family with sibling complexity (half or step-sibling).

State-level mobility rankings were derived using the mobility estimates for each county published in the dataset by Chetty et al. [2]. For each state ranking, a weighted average of the different county mobility estimates was calculated based on the population of each county.

Python was used to clean the original S.I.P.P. dataset and merge the table with complexity categories for each state with state mobility data derived from Chetty et al. [2]. R was used to conduct a bivariate linear regression analysis to predict the relationship between the prevalence of each average family complexity type in a state and its mobility ranking. It was hypothesized that the prevalence of simple 2-parent biological families would be positively associated with a state's mobility ranking, while the prevalence of families with parent complexity, sibling complexity and both parent/sibling complexity would be negatively associated with mobility ranking.

III. RESULTS

A. *Descriptive Statistics*

As the independent variable, family complexity was categorized and extracted from the S.I.P.P. data set [7]. Table 1 shows descriptive statistics for the prevalence of each family complexity type across the 50 states in the U.S.

TABLE 1. PREVALENCE OF FAMILY COMPLEXITY TYPES FOR STATES IN THE U.S.

Family Complexity Type	**Mean**	**Standard Deviation**	**Range**
Simple 2-Parent Biological Families	0.55	0.096	0.33 - 0.79
Parent Complexity	0.46	0.093	0.21 - 0.74
Sibling Complexity	0.13	0.036	0.038 - 0.21
Both Parent and Sibling Complexity	0.12	0.036	0.038 - 0.21

Absolute mobility rankings by state were compiled from mobility scores published in Chetty et al.'s data set [2] and served as the dependent variable for statistical analyses. The state of North Dakota was ranked 1st in mobility while the state of South Carolina was ranked 50th. The heat map in Figure 1 below shows the mobility levels for each county used to derive the state rankings.

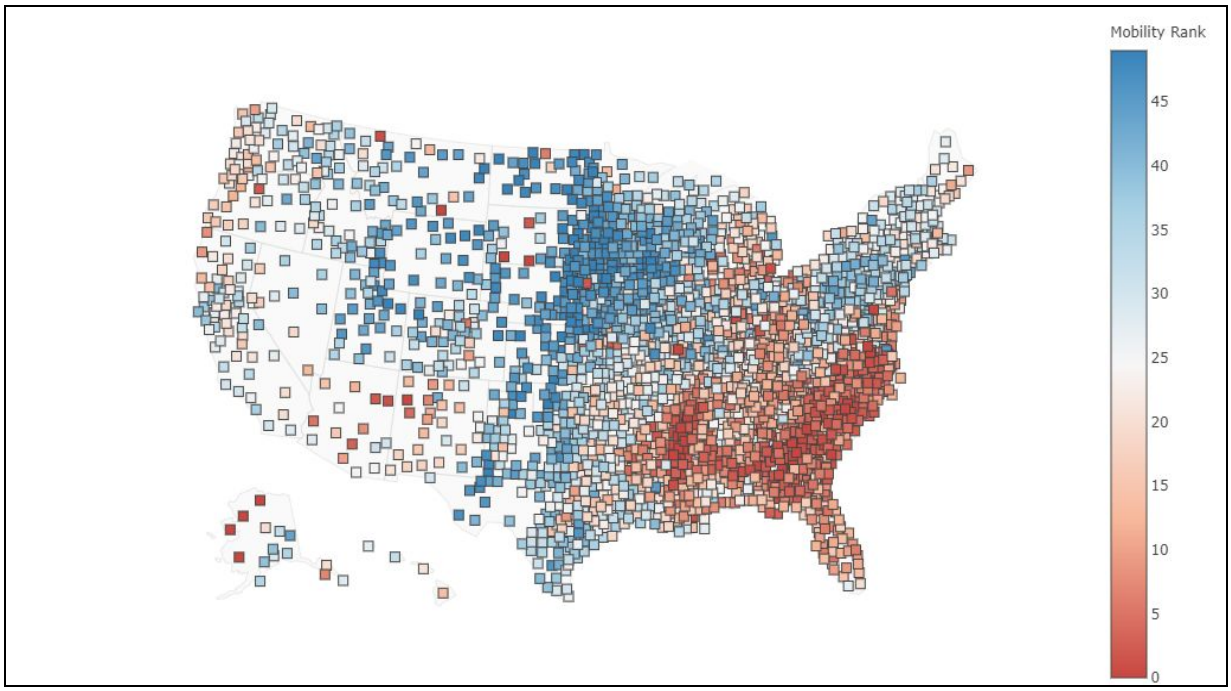

Fig. 1. Mobility levels by county across the United States obtained from Chetty et al. [2] dataset. A rank of 50 represents the highest mobility.

B. Regression Analysis

As expected, the linear regression analysis showed a significant positive relationship between the prevalence of simple 2-parent biological families and a state's mobility ranking ($\beta = 0.30$, CI = [0.012, 0.57], $p = 0.0412 < 0.05$). Figure 2 shows the standardized model of this relationship using z scores.

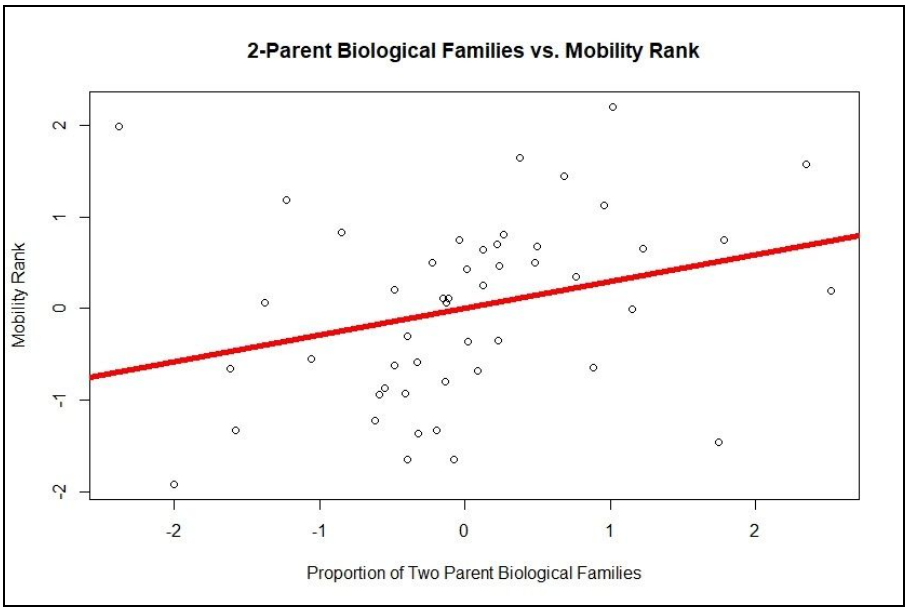

Fig. 2. Standardized relationship between prevalence of children with 2-parent biological families and mobility rank using z scores.

As hypothesized, the analysis also found a significant negative relationship between the prevalence of families with parent complexity and a state's mobility ranking (($\beta = -0.40$, CI = [-0.67, -0.13], $p = 0.0042 < 0.05$). Figure 3 Shows the standardized model of this relationship using z scores.

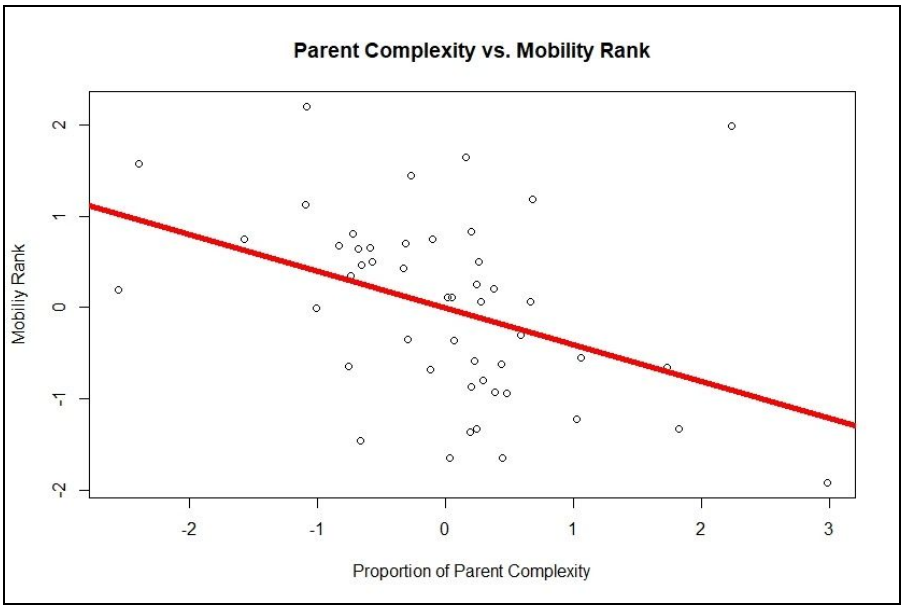

Fig. 3. Standardized relationship between prevalence of parent complexity and mobility rank using z scores.

Furthermore, the analysis showed a significant negative relationship between the prevalence of families with sibling complexity and state mobility ranking ($\beta = -0.37$, CI = [-0.65, -0.09], $p = 0.0104 < 0.05$), rejecting the null hypothesis. Figure 4 shows the standardized model of this relationship using z scores.

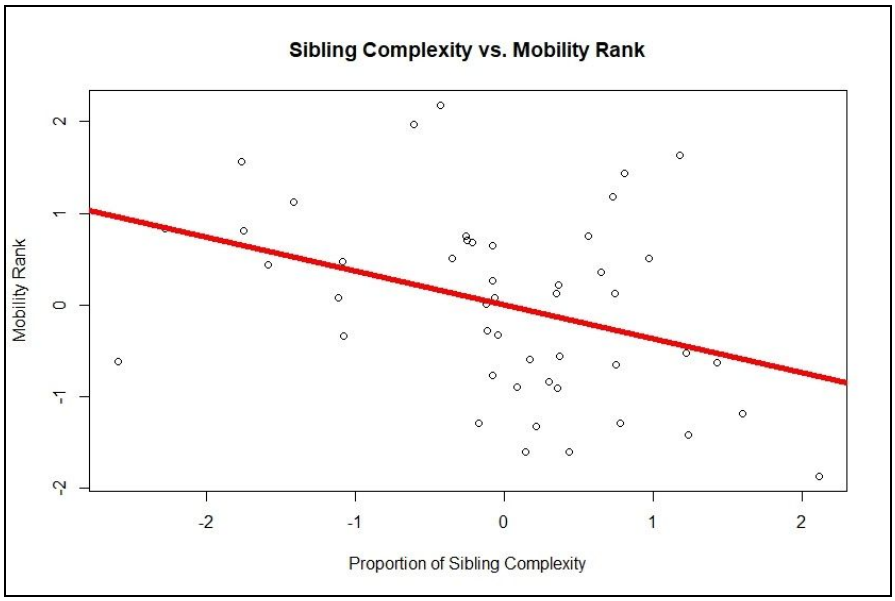

Fig. 4. Standardized relationship between prevalence of sibling complexity and mobility rank using z scores..

Finally, the examination of the relationship between the prevalence of families with both parent and sibling complexity revealed an even stronger and significant negative relationship with mobility ranking ($\beta = -0.43$, CI = [-0.70, -0.15], $p = 0.00289 < 0.01$). Figure 5 shows the standardized model of this relationship using z scores.

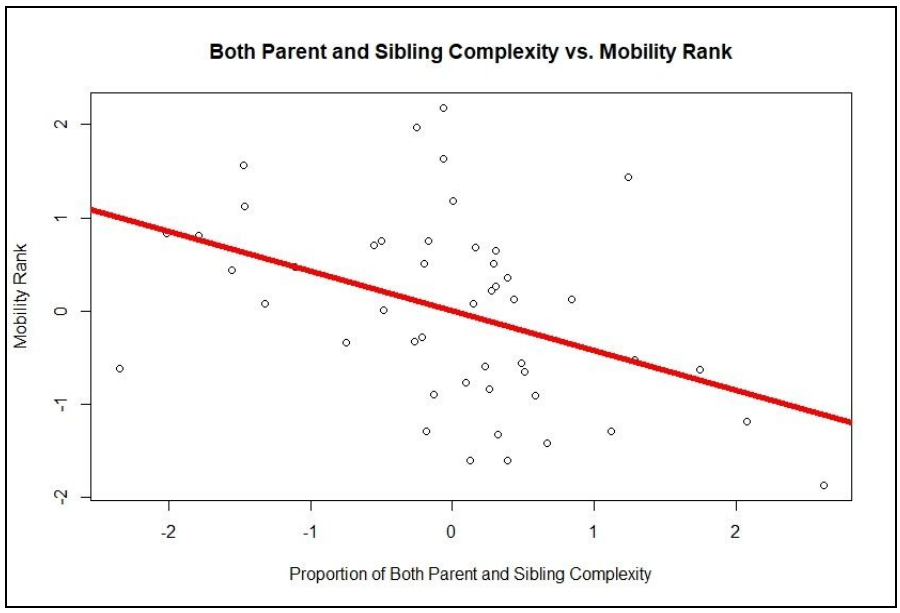

Fig. 5 Standardized relationship between prevalence of both parent and sibling complexity and mobility rank using z scores.

IV. DISCUSSION

Key Findings

Previous research by Chetty et al. [2,3] found a positive relationship between the prevalence of simple two-parent biological families and community level intergenerational mobility. Chetty et al [2,3] utilized U.S. Census Bureau and federal income tax records to examine this relationship. The present study replicated Chetty et al's [2,3] results using family data from the most recent S.I.P.P. This study confirmed the *childhood exposure effect*--that children had higher rates of upward mobility when they lived in a state that overall had a greater prevalence of simple two-parent biological families.

The present study went beyond Chetty et al.'s [2,3] research by examining the prevalence of several types of alternative family structures and their association with intergenerational mobility. A greater prevalence of families with parent complexity *or* sibling complexity was negatively associated with state level intergenerational mobility; and the negative relationship with intergenerational mobility was even greater with increasing prevalence of families with *both* parent and sibling complexity. Thus, the findings of the present study suggest children living in states with a high prevalence of complex family arrangements may experience lower rates of upward economic mobility.

While the negative association between intergenerational mobility and the prevalence of families with only sibling complexity did not reach statistical significance, the results suggest that this relationship should be further explored. Other researchers have found that children in families with complex sibling arrangements have fewer economic resources [6]. A recent study also found that children residing in families with complex sibling arrangements were less engaged in school and community activities associated with achievement, independent of poverty or race [8]. Sibling complexity may result in transitions that produce the tension and stress identified by Bloome et al. in alternative family arrangements [4]. These findings seem to suggest that a high prevalence of families with complex sibling arrangements may create a less than ideal community environment for children to achieve upward mobility.

Limitations

There were several limitations of the present study. The present study used state level data, however, an examination at the county level might be more sensitive to the relationships under examination. Furthermore, the present study used overlapping but not identical cohorts from the two datasets used. This method may have also reduced the sensitivity of the results.

Although efforts were taken to reduce bias in the 2014 version of S.I.P.P., some bias likely remains as with any self-report survey tool. Respondents may not have accurately recalled all household members as requested over the past four-month period. They may also have not included certain individuals living in the household or accurately represented certain relationships due to a perceived sense of stigma. While the use of only Wave 1 data eliminated certain types of bias associated with longitudinal surveys, this time-limited sample does not reflect how the fluidity of families and their living arrangements might affect the results.

It is most important to recognize that this correlational study is unable to determine a causal effect. It is likely that there are other variables that mediate these relationships and should be examined to more fully understand underlying processes.

Future Directions

Future studies should attempt to match cohorts for family complexity and mobility data. An analysis at the county level would also be interesting and potentially yield a much stronger relationship as well as provide insight into relationships between mobility and family complexity for each state and not nationwide. It would be interesting to see if some states have much stronger or weaker relationships between family complexity and mobility and examine this relationship. In addition, future studies should examine potential factors that may mediate the relationships observed in this study.

As future studies explore the factors that influence the relationship between family complexity and upward mobility, they can inform social programs and policy to help these families overcome challenges and contribute positively to the upward mobility of children in their community.

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