Poverty and Academic Achievement Across the Urban to Rural Landscape: Associations with Community Resources and Stressors

PORTIA MILLER, ELIZABETH VOTRUBA-DRZAL, AND REBEKAH LEVINE COLEY

Poor children begin school with fewer academic skills than their nonpoor peers, and these disparities translate into lower achievement, educational attainment, and economic stability in adulthood. Child poverty research traditionally focuses on urban or rural poor, but a shifting spatial orientation of poverty necessitates a richer examination of how urbanicity intersects with economic disadvantage. Combining geospatial administrative data with longitudinal survey data on poor children from kindergarten through second grade ($N \approx 2{,}950$), this project explored how differences in community-level resources and stressors across urbanicity explain variation in achievement. Resources and stressors increased in more urbanized communities and were associated with academic achievement. Both mediated differences in poor children's achievement. Mediation was both direct and indirect, operating through cognitive stimulation and parental warmth.

Keywords: urbanicity, poverty, community context, achievement

Almost thirteen million children in the United States live in poverty according to the most recent estimates (Fontenot, Semega, and Kollar 2018). Poor children begin school almost a full school year behind their high-income peers on core academic skills (Garcia 2015). These disparities persist as they progress through school (Duncan and Magnuson 2011; Reardon 2011). The hardships faced by poor children are often compounded because they are more likely than their advantaged counterparts to live in economically disadvantaged, chaotic, and underresourced communities (Bischoff and Reardon 2014), and community disadvantage is linked to lower academic achievement (Sastry and Pebley 2010). Boosting poor children's achieve-

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ment is critical because gaps translate into diminished school success, lower educational attainment, and less economic stability in adulthood (Duncan et al. 2007; Magnuson and Votruba-Drzal 2009).

In addressing inequalities in poor children's development, it is important to consider the changing geography of poverty. Research on child poverty traditionally focuses on the urban poor, and a small literature considers the rural poor, but in recent years the spatial location of poor families has shifted dramatically (Allard 2017). Economically disadvantaged families have moved away from rural areas and inner cities toward suburbs and smaller towns. From 2000 to 2010, suburban poverty rose by 50 percent and grew at twice the rate of that in central cities. Suburbs are now home to the largest number of poor people (Kneebone and Berube 2013). Research finds that economic disparities in achievement differ for children living in urban, suburban, and rural communities, yet the contextual forces driving such disparities have not been systematically examined (Miller, Votruba-Drzal, and Setodji 2013).

One major reason researchers have not yet examined the intersection between poverty and place, and its implication for children and families, is that comprehensive data on community contexts are rarely included in longitudinal studies following children. Until recently, administrative data on community context have not been readily available at a national scale to combine with rich, longitudinal studies of children and families. Yet, with technological advances and the advent of geographic information systems (GIS) software, a wealth of administrative data is now publicly available at the zip code, census tract, and block level. These data can be used to create measures of key neighborhood and community processes, which can then be appended to longitudinal studies of children and families. This study uses these new methods and the burgeoning of publicly available geocoded administrative data, providing a unique example of how, even in the absence of data on community context at the individual level, researchers can leverage administrative data at the community level to study the lives of children and families.

This article attends to current gaps in the literature by combining administrative data with nationally representative longitudinal data on the well-being of children and families to examine whether community resources and stressors explain differences in poor children's achievement across urban, suburban, and rural areas. Using data from a broad array of publicly available administrative data sources on communities, geocoded and matched to children's addresses, we show that both resources and stressors were heightened in more urbanized communities. Moreover, differences in community context were pathways through which urbanicity was indirectly linked to children's achievement. Together, these results enhance understanding of how poverty and place intersect to predict children's early development (Galster and Sharkey 2017).

URBANICITY DIFFERENCES IN ECONOMIC DISPARITIES IN DEVELOPMENT

Recent evidence suggests that links between family income and child development may vary across urban, suburban, and rural areas. Studying a nationally representative sample of young children, Portia Miller, Elizabeth Votruba-Drzal, and Claude Messan Setodji find that for disadvantaged children, economic disparities in kindergarten reading and math skills were greatest in large urban cities, roughly 0.15 standard deviations (SD) per $10,000 increase in income, and smallest in rural areas, 0.05 SD (2013). In another study using parallel methods with nationally representative data on older children, family income had stronger relations with eighth-grade achievement in urban cities and weaker links in suburban and rural communities (Miller and Votruba-Drzal 2015). Although these studies provided evidence of urbanicity differences in income-achievement gaps, they did not identify the processes through which differences in children's development across urbanicity may be shaped.

Theoretical Framework

To understand how poverty shapes child development, we rely on two theories—resource and investment theory and stress theory. In brief, *resource and investment theory* posits that income dictates the resources available for invest-

ment in children, with poor children receiving fewer family and community investments, which hinders their early development (Becker 1981; Duncan and Brooks-Gunn 2000). Parents make a range of important investments in children by providing cognitive stimulation, educational activities, and warm and sensitive caregiving that promote young children's early cognitive development (Bassok et al. 2016; Kalil and Mayer 2016). Community contexts also provide opportunities for investments in children such as quality educational and cultural resources, social and health services, and recreational facilities that in turn provide enrichment directly to children and may also enhance parents' in-home investment behaviors. For example, access to nature and green spaces are linked to better attention skills (Wells and Evans 2003). Similarly, educational resources improve parenting (Brotman et al. 2011; Gutman and McLoyd 2000). Community-level socioeconomic advantage is another resource that has been tied to parental investments in children and to children's achievement (Kohen et al. 2008; Leventhal, Dupéré, and Shuey 2015).

The *family and environmental stress* model posits that poverty contributes to disparities in achievement by exposing children to stressors that impede healthy development. Within the home, economic pressure, coupled with other life stressors more commonly experienced by poor families, may lead to increased psychological distress and interparental conflict (Conger et al. 2002; McLoyd 1990). Financial stress also leads to harsher and less responsive parenting, in turn predicting numerous maladaptive outcomes for children like decreased cognitive and language skills (Chazan-Cohen et al. 2009; Farah et al. 2008). Beyond the family system, poor families face greater environmental stress at the community level in the forms of pollution, substandard housing, noise, lack of green space, and dangerous, dilapidated, and impoverished neighborhoods (Evans 2004). Such stressors hinder young children's cognitive development by triggering stress response systems and impeding children's self-regulatory skills (Kim et al. 2013; Shonkoff 2010). These in turn have implications for multiple domains of development including academic functioning (Evans and Kim 2013; Persico, Figlio, and Roth 2016). In addition to affecting children directly, neighborhood stressors shape children's development indirectly via parental functioning (Chung and Steinberg 2006; Coley, Lynch, and Kull 2015; Sharkey et al. 2012).

Last, bioecological theory also informs our conceptual framework. Bioecological theory argues that the processes that drive children's development transpire at multiple contextual levels, including the family and broader community level (Bronfenbrenner and Morris 2006). More specifically, it asserts that more distal contexts may shape children by influencing the quality of proximal processes within children's most immediate settings. Reflecting this framework, we assert that urbanicity is a macrocontext that may affect the proximal processes, such as access to resources and exposure to stressors, that drive children's development. This study tests how community resources and stressors vary across urban, suburban, and rural communities, and whether such variation is systematically associated with differences in parenting and, ultimately, poor children's achievement.

Differences in Resource and Stress Processes Across Urbanicity

Differences in resources and stressors across urbanicity may alter the way poverty shapes academic development. First, community resources such as museums, hospitals, libraries, and recreational centers are often more plentiful in urban cities than in suburbs and rural areas (Allard 2008; Gordon and Chase-Lansdale 2001; Lichter 2012). Beyond these broadly promotive community resources, the availability of resources that are particularly salient to disadvantaged populations, such as food banks and welfare offices, also appear lower in rural and suburban communities than in urban ones (Allard 2004, 2008; Murphy and Wallace 2010). That said, some research has shown that a strong sense of community in rural places may enhance access to limited resources for those in need (Tieken 2014). Breaking with this pattern, however, access to socioeconomically advantaged neighbors is limited in urban inner cities, where concentrated poverty and isolation of the poor are pervasive problems (Massey 1996; Wilson 1987). Suburban and rural areas,

on the other hand, are generally more socioeconomically integrated (Evans and Kutcher 2011; Massey 1996).

Limited availability and accessibility of important resources in rural areas, and to a lesser extent suburban areas, may in turn impede the early development of poor rural and suburban children relative to urban peers. Rural and suburban children living in poverty may have fewer academic skills than their more urban counterparts because they receive fewer experiences, such as trips to cultural attractions and libraries, that have been linked to academic growth (Guo and Harris 2000; Duncan and Brooks-Gunn 2000). Lack of resources in rural and suburban areas may indirectly inhibit poor children's achievement if their parents are unable to draw from resources like libraries and social service organizations and hence are less able to provide stimulating, warm, and responsive parenting that enhances academic outcomes (Gutman and McLoyd 2000; Yeung, Linver, and Brooks-Gunn 2002).

Community stressors may also differ across urbanicity. Poor children in large cities and rural areas often experience chronic environmental risks that may be less prevalent in suburbs (see Evans 2004). Poor children are disproportionately exposed to environmental toxins and pollutants, though environmental justice research has not carefully compared differences in pollution exposure across the urban-rural continuum (Evans 2004). Urban areas have heightened prevalence of dangerous and dilapidated neighborhoods with relatively high rates of concentrated disadvantage (Amato and Zuo 1992). Heightened exposure to crime and violence has also been documented in large, inner-city communities (Amato and Zuo 1992; Burdick-Will 2016). These environmental risks may produce maladaptive physiological and psychological responses in urban children living in poverty (Evans and Kutcher 2011; Persico, Figlio, and Roth 2016; Shonkoff 2010). They may also inhibit disadvantaged urban children's academic functioning by increasing parental distress and, in turn, decreasing parenting quality (Evans and Saegert 2000; Linares et al. 2001; Wachs and Camli 1991). Although environmental risks are present in rural areas, rural children may enjoy relatively greater proximity to nature than their urban peers, which may buffer them from other sources of stress (Wells and Evans 2003). Consequently, the physical stressors of inner cities likely put poor urban children at a disadvantage relative to suburban and, to a lesser extent, rural peers.

RESEARCH AIMS

This study adds to the child poverty literature by examining differences in poor children's achievement across urban cities, suburbs, and rural areas. Second, it uses a range of administrative data to test whether poverty is differentially linked to children's achievement across urbanicity through differences in resources and stressors experienced by poor urban, suburban, and rural children. In so doing, it provides a comprehensive assessment of the mechanisms underlying urbanicity-related differences in poor children's academic development. Although pieces of the frameworks on which this article is based have been tested, extant work has not comprehensively compared the resources to which poor children have access or the stressors to which they are exposed across diverse urban, suburban, and rural communities. Research has drawn from contextual data such as the decennial census and American Community Survey (ACS) (Sastry and Pebley 2010) or data collected at a local level (Sharkey et al. 2012). It has not, however, fully exploited the rich array of national publicly available administrative data sources to compare and contrast the role of urbanicity in the lives of children living in poverty. This study is an exceptional example of how administrative data and rich, longitudinal data on children and families can be merged to create a fuller picture of the contexts in which child development unfolds.

METHOD

Data on children and families were drawn from the Early Childhood Longitudinal Study, Kindergarten Class of 2010–2011 (ECLS-K:2011), which followed a nationally representative cohort of more than eighteen thousand children entering kindergarten in the fall of 2010. This study analyzed data from the restricted use data files, which contain children's zip codes and census tracts of residence. Data were collected twice a year during the fall and spring of kin-

dergarten, first grade, and second grade and annually thereafter from parents, teachers, school administrators, and direct child assessments.[1] The analytic sample includes the approximately 2,950 children who remained in the study through second grade and lived in families whose income to needs ratio was less than 100 percent of the federal poverty level at kindergarten or first grade.[2] Sampling weights were applied in all analyses to adjust for attrition and allow results to be generalized to a nationally representative kindergarten cohort. Missing data were imputed using multiple imputation in Mplus 6 to create ten imputed datasets (Asparouhov and Muthén 2010). Parameter estimates were averaged over the ten fitted models, and standard errors were computed using the average of the standard errors over the set of analyses and the between-imputation variation of parameter estimates (Rubin 1987).

Measures

Achievement. Children's knowledge and skills in reading, math, and science were measured with direct assessments at wave 6 (spring of second grade). The assessments drew items from several well-validated, standardized instruments to create highly reliable, age-appropriate composites of reading (α = 0.91), math (α = 0.94), and science (α = 0.83) skills scored using item response theory procedures (Tourangeau et al. 2017). An achievement composite was created by standardizing and averaging the reading, math, and science scores (α = 0.87).

Urbanicity. Urbanicity was delineated using rural-urban commuting area codes created by the Economic Research Service of the U.S. Department of Agriculture, which uses measures of population density, urbanization, and daily commuting. Urbanicity was categorized as large urban city (areas within the incorporated city limits of urbanized areas with populations of at least 750,000); small urban city (areas within incorporated city limits anchoring an area with between fifty thousand and 749,999 people); suburb (places inside urbanized areas but outside principal city limits); or rural area (places with fewer than fifty thousand residents). Children's urbanicity was measured at each wave, and more than 97 percent of children in the ECLS-K:2011 remained in the same urbanicity across all waves. Children who moved to a different urbanicity during the study were coded to the urbanicity where they lived a majority of waves. In the full sample, fewer than one hundred children spent equal time in different urbanicity categories and were excluded from our analytic sample.

Community characteristics. Seven measures of community resources and stressors were derived from national administrative data sources available at the zip code or census tract level. Using GIS software, we aggregated community measures to an appropriate geographic area determined on the basis of research and validation checks. This aggregation was done for two reasons. First, many community resources and stressors affect families beyond the specific zip code or census tract in which they live. For instance, families often access health care that is in a census tract and zip code outside their own (Wing and Reynolds 1988). Second, census tracts and zip codes vary widely in size across the United States, and aggregation by radius (such as a three-mile radius from the centroid of a zip or tract) helps make our community measures more uniform. We created and tested community measures at several different radii based on research, then used regression models to predict child or family measures to assess predictive validity in this sample (Miller et al. 2014). The radii tested ranged from the smallest geographic area measured, which was the census tract or zip code alone, to much larger areas, the largest being twenty-five miles from the zip or tract centroid. It is important to note that prior work by the authors showed that the most predictive radii does not differ across urbanicity (Votruba-Drzal et al. 2018). After the best measures were established, they were merged into the ECLS-K:2011 data via children's census tracts or zip codes of residence and averaged over the kindergarten and first grade waves.

Resources. Drawn from the 2010 U.S. Eco-

1. Response rates for waves 1 through 6 were 87 percent, 85 percent, 89 percent, 88 percent, 84 percent, and 87 percent, respectively.

2. The National Center for Education Statistics requires that all Ns be rounded to the nearest fifty.

nomic Census, *cultural resources* included counts of the number of important enriching resources such as museums, libraries, zoos, botanical gardens, and performing arts attractions within a twenty-mile radius of children's home zip codes, logged to increase normality. *Social service resources*, including services such as food banks, child and youth services, shelters, and family services drawn from the same data were also summed within a twenty-mile radius: because such services typically have limited capacity, the total was divided by the number of residents. A measure of *parks* was created using current data on the location of public parks and gardens from TomTom North America, Inc. published by ESRI. We used a dichotomous indicator for whether at least one park was available within a one-mile radius of children's home census tracts. This is a measure of public parks, not green space. Last, a measure of *socioeconomic advantage* was created with ACS data (2010–2014 five-year estimates) by standardizing and averaging the percentage of residents with college degrees, professional or managerial jobs, high incomes (greater than $100,000), and median income within a three-mile radius of children's census tracts ($\alpha = .95$).

Stressors. The Federal Bureau of Investigation's Uniform Crime Reporting database, which provides monthly reports on known criminal offenses and arrests by precinct zip code, was used to assess *violent crime*. Counts of murder, manslaughter, assault, rape, and robbery in 2010 were summed across a five-mile radius of each child's zip code. *Pollution* was assessed using data from the 2011 Environmental Protection Agency's (EPA) Toxic Release Inventory (TRI), aggregating the amount of chemicals hazardous to human development as designated by the EPA, released within a one-mile radius of children's home zip code. *Neighborhood disadvantage* was assessed with a composite of ACS data (2010–2014 five-year estimates) delineating percentage of individuals in poverty, receiving public assistance, unemployed, without a high school degree, and in female-headed households within three miles of children's census tracts ($\alpha = 0.92$).

Parenting. Parenting measures were drawn from the ECLS-K:2011. *Cognitive stimulation* in the home environment was reported by parents at waves 1 through 4, capturing activities such as reading books, participating in lessons or programs, and taking trips to the zoo or museum, with kindergarten (sixteen items; $\alpha = 0.80$) and first grade (ten items; $\alpha = 0.56$) measures averaged. *Parental warmth* was assessed at wave 2 via parent report (for example, parent and child "have warm, close times together"; parent "shows child love even when in bad mood"; parent expresses affection by "hugging, kissing, and holding"; 8 items; $\alpha = .56$). *Parental harshness* was also assessed via wave 2 parent reports of corporal punishment which, due to skewedness was dichotomized to indicate whether the parent spanked the child in the past week.

Child and family demographic characteristics. Numerous child and family demographic factors were included as covariates. Child characteristics include age in months at assessment, child gender, race-ethnicity (white, African American, Hispanic, Asian, Native American, or multiracial), and primary language. We also included measures of children's language skills, twenty items, $\alpha = 0.91$ (PreLAS) (Duncan and DeAvila 2000) and executive functioning skills, the average of dimensional change card sort (Zelazo 2006) and numbers reversed subtest of the Woodcock-Johnson III Tests of Cognitive Abilities (Woodcock, McGrew, and Mather 2001), assessed at kindergarten entry. These measures were included to control for unmeasured, time-invariant differences in children and families that affect children's achievement and behavior (Duncan and NICHD SECC 2003), thus helping reduce concerns of omitted variable bias.

Family characteristics that are correlated with family income, urbanicity, and child development also served as covariates, including highest level of parental education (less than a high school degree, high school degree or GED, some college or vocational school, or a bachelor's degree or greater), stable marital status, stable maternal employment, and the number of children under the age of eighteen in the household (averaged across wave).

Data Analysis

Structural equation models (SEM) were run in Mplus Version 6 software using maximum like-

lihood estimation (Muthén and Muthén 2008). Several community characteristics were rescaled so that their variances were of similar scale to other variable variances, which is necessary when using maximum likelihood estimation. Specifically, social service availability was multiplied by a factor of ten, toxic releases divided by one hundred, and crime divided by one thousand.

Three sets of models were estimated. First, to test the hypothesis of urbanicity-related differences in the achievement of poor children, we predicted achievement with urbanicity, controlling for all demographic covariates including kindergarten language and executive functioning skills. Next, we tested urbanicity-related differences in community characteristics in a similar manner, using freely estimated covariances among community characteristics. Finally, we assessed whether community and parenting characteristics mediated associations between urbanicity and children's functioning, testing the full model presented in figure 1 and allowing freely estimated covariances between community characteristics and between parenting measures. To account for nesting of children within schools and communities, cluster adjustments were made at the school level for all analyses (Preacher, Zyphur, and Zhang 2010).

Overall fit of each model was assessed using chi-square values, the root mean square error of approximation (RMSEA), a measure of relative fit better suited for larger sample sizes, the comparative fit index (CFI), and the Tucker-Lewis index (TLI). RMSEA values below 0.06 and CFI and TLI values above 0.95 support good model fit (Hu and Bentler 1999). Nonsignificant paths were eliminated from the models (with the exception of covariates) to improve model fit. Once the most parsimonious model was established, estimates of indirect effects were calculated using the model indirect command in Mplus to test whether community and family characteristics mediated links between urbanicity and child outcomes (Preacher, Zyphur, and Zhang 2010). Throughout this article, we use the term *effect* in the statistical sense to describe indirect effects (associations between predictor and outcome operating through another variable), direct effects (associations between predictor and outcome without a mediating variable), and effect sizes (size of associations). These terms do not imply causality.

RESULTS

Descriptive statistics for the analytic sample and for each urbanicity group separately are presented in the online appendix (table A). To understand the context of poverty across urbanicity, it is vital to consider the varying demographic profiles of poor families living in different urbanicities. For instance, low-income African American families disproportionally resided in urban areas, and the majority of poor families in rural areas were white. Conversely, poor Latino families tended to live in large cities or suburbs, and these places had relatively more English-language learners. Parental education was also lower in more urbanized communities.

After adjusting for these differences in child and family demographics as well as for children's skills in kindergarten, we found that poor children in suburbs had 0.13 of a standard deviation higher academic skills than those in rural areas (table 1). Notably, although few differences in child achievement across urbanicity emerged, urbanicity may operate through contrasting resource and stress processes to shape children's development, a hypothesis tested through our second research aim.

Indeed, as standardized estimates show in table 2, differences in community resources and stressors across urbanicity were stark. Considering community resources, poor children living in large urban cities had the most cultural resources and park availability in their communities and poor rural children had the fewest. Small city and suburban children living in poverty fell in the middle, with suburbs having more cultural resources. Poor children living in large urban settings also had the greatest social service availability, significantly greater than poor children in small cities and suburbs. In contrast, suburban children had the highest levels of neighborhood socioeconomic advantage and rural children had the lowest.

Differences were marked in community stressors as well. Violent crime and neighborhood disadvantage both showed the highest rates in large urban settings and lowest in rural areas. On the other hand, children in small ur-

Table 1. Relations Between Urbanicity and Child Achievement

	Unadjusted Coefficient	Adjusted Coefficient
Small urban	0.10	−0.03
	(0.07)	(0.06)
Suburban	0.09	0.04[a]
	(0.06)	(0.05)
Rural	0.07	−0.08[a]
	(0.07)	(0.06)

Source: Authors' calculations.
Note: N ≈ 2,950. Standard errors in parentheses. Urbanicity groups are compared with large urban areas. Post hoc analyses tested the significance of differences between other urbanicity groups. Within each column, coefficients with shared superscript letters are different from each other at the $p < .05$ level. Adjusted models controlled for the following covariates: race, gender, age, English language status, kindergarten language skills, kindergarten executive functioning, highest level of parental education, number of children in the house, maternal employment, and maternal marital status.

ban cities were exposed to the most pollutants, followed by suburban children; pollution rates were lower in large urban and rural communities.

RESOURCE AND STRESS PROCESSES MEDIATING URBANICITY DIFFERENCES IN ACHIEVEMENT

Figure 1 presents the standardized coefficients in the final path model testing mediation of urbanicity's links to poor children's achievement, with small urban, suburban, and rural children relative to their large urban counterparts. Arrows represent significant paths, with dashed arrows signaling associations significant at $p < .10$. In initial model specifications, we freely estimated all paths from urbanicity to community variables, parenting, and child outcomes. Notably, urbanicity did not have direct effects on parenting or child achievement. Nonsignificant paths were eliminated from the model, resulting in excellent fit: $\chi 2(30) = 61.22$, RMSEA = 0.02, CFI = 1.00, TLI = 0.96.

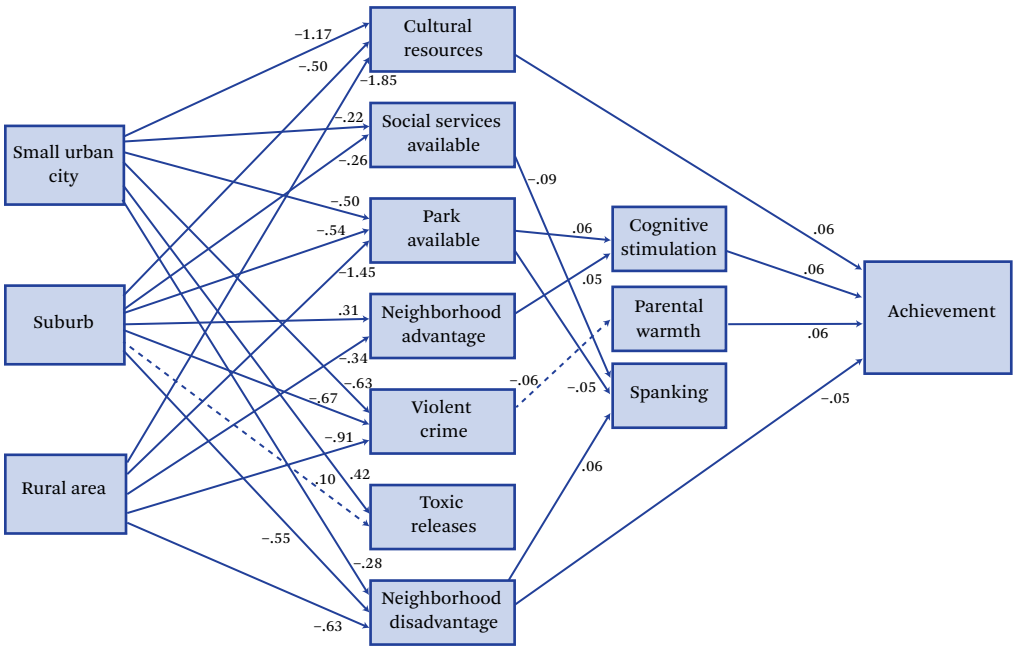
Holding all else constant, including kindergarten language and executive functioning skills, parental cognitive stimulation and warmth were

Table 2. Adjusted Differences in Community Characteristics

	Resources				Stressors		
	Cultural Resources β	Social Services Availability β	Park Availability β	Neighborhood Advantage β	Violent Crimes β	Toxic Releases β	Neighborhood Disadvantage β
Small urban	−1.17***[ab]	−0.23*	−0.51***[a]	−0.06[ab]	−0.59***[a]	0.43**[a]	−0.27*[ab]
	(0.07)	(0.11)	(0.08)	(0.10)	(0.12)	(0.13)	(0.11)
Suburban	−0.50***[ac]	−0.26***	−0.54***[b]	0.32**[ac]	−0.68***[b]	0.11*	−0.55***[a]
	(0.07)	(0.08)	(0.07)	(0.09)	(0.10)	(0.06)	(0.09)
Rural	−1.84***[bc]	−0.10	−1.44***[ab]	−0.33**[bc]	−0.91***[ab]	0.03[a]	−0.64***[b]
	(0.06)	(0.16)	(0.08)	(0.10)	(0.10)	(0.04)	(0.11)

Source: Authors' calculations.
Note: N ≈ 2,950. Standard errors in parentheses. Urbanicity groups are compared with large urban areas. Post hoc analyses tested the significance of differences between other urbanicity groups. Within each column, coefficients with shared superscript letters are different from each other at the $p < .05$ level. Controls included in models are race, gender, age, English language status, kindergarten language skills, kindergarten executive functioning, highest level of parental education, number of children in the house, maternal employment, and maternal marital status.
*$p < .05$; **$p < .01$; ***$p < .001$

Figure 1. Full Path Model of Urbanicity's Links to Achievement



Source: Authors' calculations.

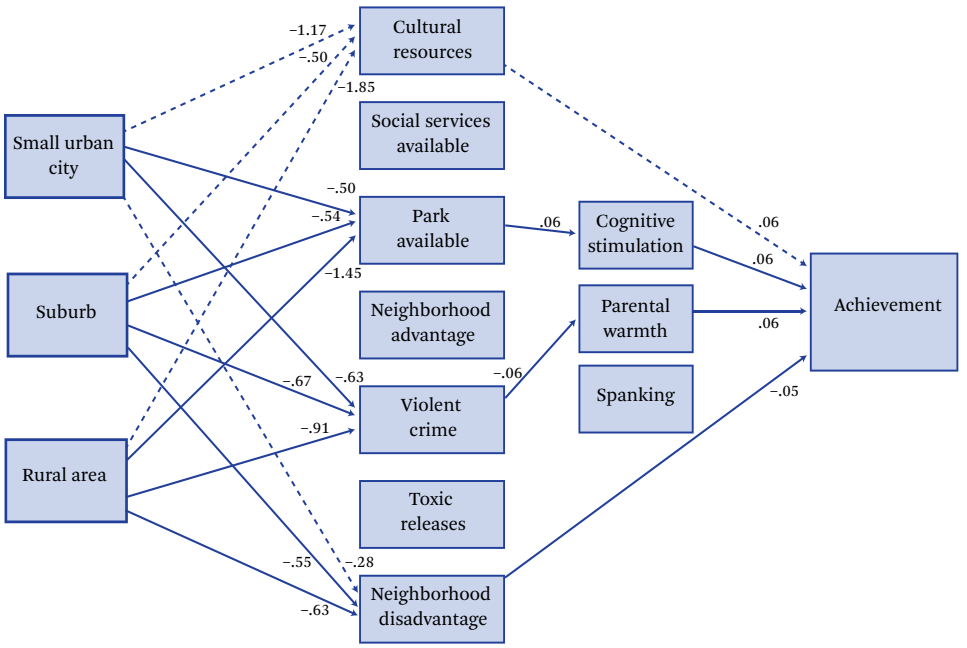
Note: N ≈ 2,950. Arrows illustrate significant paths in model ($p < .05$ or $p < .10$ if dashed line). Standardized path coefficients presented within figure. Urbanicity groups are compared with large urban cities. $\chi 2(30) = 61.22$, RMSEA = 0.02, CFI = 1.00, TLI = 0.96.

associated with greater child achievement, both with small effect sizes (0.06 SD units). Considering community contexts, cultural resources were directly positively associated with children's achievement, whereas neighborhood disadvantage showed a direct negative relation, again with small effect sizes (0.06 and 0.05 SD, respectively). Park availability and neighborhood advantage were positively associated with achievement through parental cognitive stimulation. In contrast, violent crime in the neighborhood was indirectly associated with achievement through lower levels of parental warmth. Although several community resources and stressors (social service availability, parks, and neighborhood disadvantage) were associated with parental spanking, spanking did not show significant associations with children's achievement. All highlighted associations were small in size, averaging less than 0.10 of a standard deviation after a broad array of covariates and children's earlier skills were taken into account.

Community and family processes helped explain associations between urbanicity contexts and children's achievement. Figure 2 highlights numerous significant indirect effects from urbanicity to poor children's achievement. Relative to residence in a large city, living in a small city, suburb, or rural area was negatively associated with achievement through decreased cultural resources (−0.5 SD, −0.02 SD, −0.08 SD, per urbanicity, respectively) as well as through decreased park availability (−0.002 SD, −0.002 SD, −0.01 SD, respectively) and in turn lower home cognitive stimulation. However, there were positive indirect effects of residence in small cities, suburbs, or rural areas, relative to large cities operating through lower neighborhood disadvantage (0.01 SD, 0.03 SD, 0.03 SD, respectively) as well as through less violent crime and in turn greater parental warmth (0.003 SD, 0.003 SD, 0.004 SD, respectively).

Urbanicity also had indirect effects on poor children's achievement when comparing small cities, suburbs, and rural areas (see online appendix, figures A and B). The suburbs where

Figure 2. Indirect Effects of Urbanicity on Achievement



Source: Authors' calculations.

Note: N ≈ 2,950. Arrows illustrate significant indirect effects ($p < .05$ or $p < .10$ if dashed line). Standardized path coefficients presented within figure. Urbanicity groups are compared with large urban cities. $\chi 2(30) = 61.22$, RMSEA = 0.02, CFI = 1.00, TLI = 0.96.

poor children lived had more cultural resources and less concentrated disadvantage than small cities, which resulted in significant positive indirect effects (0.03 SD and 0.01 SD, respectively) on suburban children's achievement. Relative to their peers in small cities, poor rural children had fewer cultural resources (−0.03 SD) and parks (−0.003 SD), but also less violent crime (0.002 SD) and disadvantage (0.02 SD), resulting in counteracting indirect effects of rural residence. Last, living in a rural area had negative indirect effects compared to a suburban area that stemmed from reduced access to cultural resources (−0.06 SD), parks (−0.003), and socioeconomically advantaged neighbors (−0.002). This was only partially counteracted by a positive indirect effect stemming from decreased violent crime in the rural areas (0.001 SD).

DISCUSSION

The academic skills that children have in their early school years set the stage for future success in life. Research has consistently shown that children living in poverty tend to have deficits in these early skills (Duncan and Magnuson 2011). Yet studies have not explored whether poor children's early skills differ across urban, suburban, and rural areas, despite increasing evidence that urbanicity is an important developmental context (Miller, Votruba-Drzal, and Setodji 2013; Rudolph et al. 2014). Using a nationally representative sample of poor children starting kindergarten in 2010 linked with a broad array of administrative data on both resources and stressors within communities, this study finds that although children's levels of achievement look mostly similar across large urban cities, small urban cities, suburbs, and rural areas, the processes by which economic disadvantage is associated with poor children's development vary notably depending on place. These identified processes have important implications for efforts to improve contextual supports for disadvantaged children and target scarce public resources.

Differences in Community Context Across Urbanicity and Their Links to Achievement

Using a wealth of data characterizing various aspects of communities, this study uncovered several systematic differences in the neighborhoods of poor children across urbanicity. Much as hypothesized, the urban inner-city neighborhoods that disadvantaged children resided in tended to be flush with both resources (cultural and natural) and stressors (crime and concentrated poverty); rural areas tended to have fewer resources but also fewer stressors; and small cities and suburbs tended to fall in between. There were some exceptions to this general pattern. Social service availability was lowest in small cities and suburban communities, and neighborhood socioeconomic advantage was highest in suburbs. These findings are consistent with the literature on suburbs (Massey 1996; Murphy and Wallace 2010). Another exception was surprising. Pollution in small cities and suburbs was, on average, greater than in large cities or rural areas. This is probably due to the measure of pollution used, which captures toxic releases from businesses and industries but misses other sources of pollution, such as automobiles or residential buildings. Because this measure taps into pollution most associated with manufacturing, our results are consistent with where manufacturing is currently taking place in the United States—small Rust Belt cities and suburbs (Hollander et al. 2009; Lewis 2008). To our knowledge, these findings are the first attempt to characterize the differences in community contexts of poor children across the urban-rural continuum using multiple indicators and nationally representative data.

Further, as hypothesized, these community characteristics were related to poor children's academic development. The quantity of community cultural resources such as zoos, libraries, and museums were directly and positively related to achievement. Meanwhile, the level of concentrated disadvantage in neighborhoods had direct negative links to achievement. Community resources and stressors also related to poor children's achievement through their links with several aspects of parenting; resources such as social services, parks, and socioeconomically advantaged neighbors were associated with more stimulating and warm parenting and less harsh parenting, and stressors such as violent crime and concentrated disadvantage were linked to less warm parenting and more physical punishment, respectively.

These results may have implications for improving academic outcomes for disadvantaged children. Policies targeted to community type may be most effective at narrowing achievement disparities. Our results suggest that in urban inner cities it is important to focus on strategies that reduce or buffer children from neighborhood stressors. For instance, in high crime communities, successful policies may include programs that decrease school violence and foster feelings of safety in school (Astor, Benbenishty, and Estrada 2009). For example, evidence from a study in this issue indicates that safe schools buffer the negative effects of neighborhood violence on achievement (Laurito et al. 2019). Similarly, programs like Chicago's Safe Passage Program, which employs community members to watch streets and routes children use to travel to and from school, has been linked to decreased crime and increased school attendance (Chicago Public Schools 2018). On the other hand, effective policies to improve poor children's achievement in underresourced suburbs and rural areas may involve providing important resources to children and families. For instance, library outreach programs such as bookmobiles have been successfully used to provide services to rural populations (Boyce and Boyce 1995). Expanding these programs, as well as using this model to deliver other cultural resources to poor rural families could have positive impacts on the academic development of poor rural children. Similarly, increasing social service availability in suburbs where poverty is burgeoning may help decrease parental stress and improve parenting quality, leading to improvements in poor children's achievement.

Implications for Research on Children, Families, and Communities

A striking lesson from this research is that the adequate and complete study of the macrosystems in which children develop requires a si-

multaneous examination of multiple forces shaping development. Simply looking at mean differences by urbanicity or differences adjusted by demographic characteristics obscured a more complex picture of the role of urbanicity in children's achievement, in which neighborhood processes can be simultaneously supportive of and detrimental for children's development. For instance, positive links between increased cultural and natural resources and child achievement in large cities were countered by negative associations between violence and disadvantage and achievement. Moreover, the community context measures were intercorrelated. This further highlights the importance of accounting for various aspects of children's communities and the biases likely to underlie studies assessing the effect of one characteristic in isolation.

What does this imply for existing research on neighborhood effects? Extant studies of links between community characteristics and child development have generally assessed a single aspect or a group of similar indicators of community in isolation. For instance, several studies examining neighborhood socioeconomic disadvantage or advantage do not consider these factors in conjunction (Sastry and Pebley 2010; Xue et al. 2005). Results of this study suggest that neighborhood advantage and disadvantage may play distinct roles, through different mechanisms, in the development of children's academic skills. Moreover, given that these aspects of neighborhoods are correlated with other community characteristics such as pollution, violence, and cultural resources, it is hard to know whether prior studies were identifying true associations between neighborhood socioeconomic status and outcomes, or whether results are biased due to the failure to consider other key neighborhood characteristics. In this respect, this study improves on past literature by examining several aspects of communities simultaneously to reveal which features of children's neighborhoods are most predictive of subsequent development. Future research using methods allowing causal conclusions is necessary to expand knowledge on the causal roles of individual community resource and stress characteristics.

Role of Administrative Data in Studies of Children and Families

This study is a prime example of how administrative geospatial data from various agencies can be leveraged to create measures of community characteristics that can inform and expand studies of children's development. Studies of neighborhood effects on children and families often use data on neighborhoods reported by the families, and studies that use independent administrative data have overwhelmingly been limited to the use of data from the decennial census (Chung and Steinberg 2006; Sastry and Pebley 2010). Although census data have several strengths, many aspects of community context—such as crime rates, pollution, and resource availability—are not available via decennial censuses. This study provides a unique example of how administrative data from a variety of sources can be combined with nationally representative data on children and families to gain a more complete understanding of how multiple aspects of communities simultaneously operate in relation to parenting practices and children's achievement.

Other research has richly studied targeted aspects of communities at local levels. For instance, using data from the Chicago School Readiness Project and the Chicago Police Department, Patrick Sharkey and his colleagues geocoded all homicides in the city of Chicago to pinpoint the exact date and location and then determined whether a homicide occurred close to children's homes prior to children's assessment (2012). This study is an excellent examination of considering both the spatial and temporal aspects of children's contexts. Future research of this nature in other cities and communities across the United States is needed to explore the generalizability of findings. To do so, we need more data of this richness to be collected at a national level to expand the breadth of our research on neighborhood contexts.

This study makes clear that, although additional work is needed to create valid and comprehensive data on children's communities, currently available administrative data serve a useful purpose in the study of child development. All community resources and stressors explored here, with the exception of pollution,

relate to child and family functioning in some way. Moreover, these indicators generally operated in accordance with research and our hypotheses, which lends credence to their worth. For instance, having a park within a mile of children's homes positively predicted cognitive stimulation—a variable that includes activities such as playing outside, discussing nature, and exercising that we may expect to increase when parks are easily accessible (Wells and Evans 2003). Neighborhood violent crime was linked to decreased parental warmth, as documented in smaller studies (Pinderhughes et al. 2001), though this study replicates the association using administrative as opposed to parent-reported data on neighborhood danger. The presence of cultural resources such as libraries, museums, and zoos had a direct relation to children's learning; the availability of social services that are often vital to poor families predicted better parenting. These associations between community factors and children and families have long been conjectured but not until now empirically demonstrated on a national scale.

Although administrative data were immensely useful for characterizing differences in poor children's communities, this study would not be possible without rich, longitudinal data with measures of child and family processes and information (through secure data agreements) on children's census tract or zip code. Administrative data are unlikely to include measures of processes occurring within children's microsystem, such as parenting quality or home learning environment, or validated measures of children's physical, behavioral, or cognitive development (Bronfenbrenner and Morris 2006). To the extent that researchers can use administrative data in conjunction with survey and observational data containing measures of processes and individual functioning, we can propose and test more contextually rich conceptual models of multiple forces affecting child development. Indeed, efforts currently under way in the American Opportunity Study will make such linkages between administrative data and rich longitudinal data on children and families much easier and, it stands to reason, more common in the literature (Grusky et al. 2019).

Limitations

Limitations to this study must be acknowledged. First, these results are correlational and, hence, must be interpreted with caution. Accordingly, although the correlational design of this study provides a rich description of the community and family contexts of poor children across urbanicity, it is possible that the observed associations between urbanicity, community characteristics, parenting, and achievement were caused by some unmeasured features of the parents or children in our sample. Notably, attempts were made to limit endogeneity bias by controlling for children's kindergarten language and executive functioning skills, as well as for characteristics of parents and families when predicting children's second-grade achievement scores. Nonetheless, future work in this area should try to leverage experimental and quasi-experimental designs to better address selection effects.

Second, despite the overall strengths and comprehensiveness of data used in this study, measurement weaknesses were also apparent. For instance, the pollution variable did not capture sources of pollution other than that associated with business. Moreover, the TRI is not a direct measure but instead is self-reported by businesses, which could certainly lead to underreporting. Similarly, the FBI's Uniform Crime Reporting is a voluntary program, and many jurisdictions do not make these reports. This leads to a great deal of missing data on crime, which had to be imputed. In addition, these data are reported at the precinct level and do not pinpoint the precise location of the crimes that were committed. Last, the administrative data varied in terms of the geographic level available, and though census tract data are preferable because tracts are smaller than zip codes, several indicators were available only at the zip code level. Thus, our community measures created using zip code data—cultural resources, social service availability, pollution, and crime—were less precise than the other measures available at the tract level. Given these notable measurement limitations, it is somewhat remarkable that the majority of our community measures showed reliable associations with child and family functioning and their use marks an ad-

vancement to prior literature on poverty and place.

We must also note that the effect sizes obtained from our results were consistently small. Although moderate to large differences emerged in community resources and stressors across urbanicity contexts, links with family processes and child achievement were small. We argue that results still have practical importance. First, estimates may be deflated because of high levels of measurement error, particularly in community characteristics. As noted, administrative data on communities currently available at a national scale have drawbacks that may weaken the signal when examining links to child and family functioning. Second, estimates may be conservative because we controlled for language skills and executive functioning in kindergarten when predicting second-grade skills. To the extent that urbanicity's associations with achievement stem from connections with cognitive and behavioral skills that children acquire prior to school entry, our estimates will be downwardly biased.

CONCLUSION

Research is beginning to explore how the lived experiences of economic disadvantage differ depending on place. Links between poverty and children's development differ depending on whether they live in cities, suburbs, or rural areas, but no studies had examined what aspects of communities contribute to these differences. This study contributes to the literature by systematically exploring differences in community processes across the large urban cities, small urban cities, suburbs, and rural areas in which poor children reside, and by assessing whether such differences explain variation in children's achievement. Results show that children in poverty experience very different community contexts depending on urbanicity, which are associated with differences in children's achievement both directly and through parenting. Moreover, results suggest that the most effective policies aimed at improving poor children's academic skills may differ across the rural-urban continuum. Policies buffering poor children and families from neighborhood stressors may be the best way to narrow achievement gaps in large inner cities, and increasing resources in resource-deprived rural areas may be most helpful in improving the achievement of disadvantaged rural children.

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