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Abstract. Background. The bioecological model of human development indicates that there are multiple layers of factors influencing child development (Bronfenbrenner, Morris, 2006). Purpose. This study investigated the effects of community locale, neighborhood social organization, utilization of community cognitive developmental resources, and home literacy on early childhood cognitive skills. Material and methods. Hierarchical linear regression was employed with a nationally representative sample of kindergarten children from across the USA. This enabled an examination of the effects of community locale (urban, suburb/large town, and small town/rural) on neighborhood social organization, as well as the effect of social organization on early cognitive skills (a composite of individually administered early reading, math and general knowledge scales), above and beyond the effects of accessing community cognitive developmental resources (e.g., concerts, zoos, aquariums, museums, and libraries) and home literacy (e.g., parent-child shared reading). Multiple statistical controls were utilized, including race/ethnicity status, gender,
and family SES. Results. Neighborhood social organization was lower in urban areas and social organization positively predicted early cognitive skills; however, family SES was the strongest predictor of social organization, indicating that dwelling in an urban area was only a notable disadvantage for families of lower income. Small town/rural residence was directly associated with lower cognitive skills, but this effect is partially mitigated by the higher levels of social organization in small town/rural neighborhoods. Conclusions. Because contextual effects on cognitive skills were above and beyond the positive effects of parental involvement and SES, the importance of the contextualized support of child development is discussed.

Keywords: urban environments, rural environments, neighborhoods, cognitive development, parental involvement, elementary school students.

The bioecological model of development recognizes that child development is influenced by multiple systems including the family, school, neighborhood and larger ecologies that encompass more immediate systems (Bronfenbrenner, Morris, 2006). In recent years, psychologists, sociologists and developmental scientists have conducted research that indicates that neighborhood social organization is related to children’s early cognitive development, partially via parenting practices and perceptions. For instance, Froiland, Powell, and Diamond (2011) found that the strength of neighborhood social networks in suburban neighborhoods predicts home literacy (e.g., parent-child shared reading and provision of children’s books), which, in turn, predicts expressive vocabulary. However, other studies have found a direct relation between neighborhood social organization and early childhood cognitive outcomes. For instance, Kohen, Brooks-Gunn, Leventhal and Hertzman (2002) found, among a national sample in Canada, that neighborhood social disorder (presence of garbage, dilapidated housing, violence and public intoxication) predicted lower verbal ability scores among preschool children. Despite evidence that urban areas are at-risk for greater levels of social disorder than suburban, small town and rural areas (e.g., Garbarino, 2001; Geis, Ross, 1998; Sampson, 1991), very little research has examined the extent to which early cognitive development is influenced by urban locale via social organization.

Urban, Suburban/Large Town and Small Town/Rural Neighborhoods

In considering the differences between urban and non-urban areas, psychologists, developmental scientists and sociologists may benefit
from knowing whether urban neighborhood residence is associated with early childhood cognitive skills. Among a nationally representative sample of children at the beginning of kindergarten, Durham and Smith (2006) found that children in non-metropolitan areas across the United States generally had lower reading scores at the beginning of kindergarten; however children of low SES actually exhibited better reading than their metropolitan counterparts in reading. Although the investigators did not examine social organization, it is possible that higher levels of social organization in non-metropolitan areas served as a protective factor for low SES children, whereas high SES children in urban areas are generally in neighborhoods that have very few signs of social disorder. At the same time, the generally lower scores in non-metropolitan areas could be partially explained by less access to all of the potentially cognitively stimulating amenities of thriving cities and suburbs, such as plays, concerts, zoos, aquariums, libraries and museums. If families in small town and rural areas access these resources less frequently, this could contribute to an early cognitive disadvantage for children in small town/rural areas. In looking at the literacy development of kindergarten through third-graders, Aikens and Barbarin (2008) found no effects for suburban residence on a composite measure of literacy. However, they combined urban and small town/rural census tracts together as “non-suburban,” thus making it impossible to detect different relations between literacy and small town/rural and urban neighborhoods.

Because town and rural areas are generally associated with lower early literacy skills, but may play a protective role for low SES children (Durham, Smith, 2006), it is important to determine whether early cognitive development is influenced by variables that are likely to significantly differ by locale such as neighborhood social organization and access to community cognitive developmental resources.

**Neighborhood Social Organization**

In urban neighborhoods that have lower social organization, families speak less with neighbors, in order to protect themselves from potential negative influences in the community (APA, 2005) and they may have less salutary communication with neighbors and be exposed to more violence (Garbarino, 2001). Indeed, neighborhood social
disorder predicts negative emotional outcomes, such as perceived pow-
erlessness, depression and anxiety (Ross, Mirowsky, 2009), which could
hamper cognitive development of adults and children in the neighbor-
hood. Families in suburban/large town, small town or rural areas may
be less overloaded with noise and interpersonal stimuli and have more
attention remaining (Segal, McCauley, 1986; van den Berg, Hartig, Staats,
2007) for salutary and cognitively stimulating interactions with neigh-
bors than those from urban neighborhoods.

Hypotheses

Hypothesis 1: home literacy, accessing community cognitive deve-
lopmental resources and neighborhood social organization would each
be positively related to early cognitive skills, when controlling for family
SES, race/ethnicity status and gender.

Hypothesis 2: residence in a small town or rural area would be nega-
tively associated with cognitive skills, when controlling for key neighbor-
hood, family and child factors.

Hypothesis 3: residence in a small town/rural or suburban/large
town area would be positively associated with neighborhood social
organization, when controlling for family SES and race/ethnicity status.

METHOD

Participants

This study involved a nationally representative sample of 21,409
kindergarten children from across the nation and their parents. 45 %
of the children represented ethnic/racial minority backgrounds and
49 % of the children were female. Through the use of a sample weight
(i.e., BYPWO, a cross-sectional weight), the data are representative of
the nation’s kindergartners in 1998. The data were collected by resear-
chers from the National Center for Education Statistics (NCES) as a part
Families were equally sampled (20 % from each) across all five levels
of a socioeconomic status (SES) measure. 41 % of children were from
suburbs/large towns, 21 % were from small town/rural areas, and 38 %
were from urban areas.
Measures

Neighborhood Social Organization
A neighborhood social organization variable was summed from six items addressing the following areas: how safe it is for children to play (1 = not at all safe; 2 = somewhat safe; 3 = very safe); presence of litter (1 = big problem; 2 = somewhat of a problem; 3 = no problem); sale of drugs; violent crime; burglary; and vacant homes. The latter four items were coded in the same way as presence of litter. Higher scores represented more social organization. Internal consistency for the scale was acceptable (Cronbach’s Alpha = .76).

Community Locale
The following community locale variables were derived from the dataset: small town/rural and suburban/large town (each dummy coded with urban as the reference). These locale distinctions were derived from the U.S. Census by the NCES.

Accessing Community Cognitive Developmental Resources
Accessing community cognitive developmental resources is a variable derived from Principal Components Analysis involving scores from the following four items: visited a play or concert, visited the library, visited a zoo/aquarium; and visited a museum recently.

Home Literacy
A home literacy factor was created using Principal Components Analysis in SPSS version 18. The home literacy factor was derived from parent’s ratings on five items involving the following: how often parents read to their children; how often parents tell their children stories; how many children’s books they have at home; how often children read to themselves; how many records, tapes and CD’s the family has at home. Items related to the number of children’s books at home and shared reading frequency were used to measure home literacy because they are strong indicators of home literacy resources (Bracken, Fischel, 2008; Bus, van IJzendoorn, Pellegrini, 1995) and the general home learning environment (Lundberg, 2002).
Cognitive Skills

Child assessments included individually administered (in the fall of kindergarten) composite tests of reading, math, and general knowledge. Each of these tests were based on Item Response Theory (IRT scores) and were quite comprehensive. For instance, the Reading scale involved items addressing receptive vocabulary, letter-word identification, print familiarity, phonemic awareness and comprehension. The General Knowledge scale entails items addressing early knowledge of natural sciences and social studies. The Math scale involves items addressing counting, shape knowledge, ordinality, relative size, adding, subtracting and multiplication/division. These three IRT scales were entered into a Principal Components Analysis in order to create the Cognitive Skills factor. Each of these cognitive skills is predictive of future cognitive and academic development. For example, early math and reading are strong predictors of achievement in upper elementary school and middle school (Duncan et al., 2007).

Data Analysis Plan

The hypotheses were tested via hierarchical linear regression, with control variables (i.e., family SES, African-American, Latino, Asian, and gender) entered at Step 1. Hierarchical linear regression enabled the investigator to examine the unique predictive contribution of variables on a continuum from proximal (e.g., home literacy) to more distal (e.g., geographic locale; see Table 1).

RESULTS

Positive predictors of cognitive skills for kindergartners

Hypothesis 1 stated that home literacy, accessing community cognitive developmental resources and neighborhood social organization would each be positively related to early cognitive skills, when controlling for SES, race/ethnicity and gender. Neighborhood social organization predicted higher cognitive skills, above and beyond the significant positive effects of accessing community cognitive developmental resources, home literacy and statistical controls (see Table 1). Interestingly, the regression coefficient for social organization increased
from Step 4 to Step 5, suggesting that the effect of social organization was slightly more pronounced when accounting for locale. The effect of accessing community cognitive developmental resources was also significant above and beyond the positive effects of home literacy and the effects of the control variables. Thus, all aspects of hypothesis 1 were supported.

### Table 1. Summary of hierarchical regression analyses for variables predicting cognitive skills

<table>
<thead>
<tr>
<th>Predictor</th>
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<tbody>
<tr>
<td><strong>Step 2</strong></td>
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<tr>
<td>Home literacy</td>
<td>.14*</td>
<td>.02</td>
<td>.14</td>
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<tr>
<td><strong>Step 3</strong></td>
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<tr>
<td>Home literacy</td>
<td>.14*</td>
<td>.02</td>
<td>.13</td>
</tr>
<tr>
<td>Community resource use</td>
<td>.03*</td>
<td>.01</td>
<td>.03</td>
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<tr>
<td><strong>Step 4</strong></td>
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<tr>
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<td>.14*</td>
<td>.02</td>
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<tr>
<td>Community resource use</td>
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<td>.01</td>
<td>.03</td>
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<tr>
<td>Social organization</td>
<td>.02*</td>
<td>.01</td>
<td>.03</td>
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<tr>
<td><strong>Step 5</strong></td>
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<td>Community resource use</td>
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<td>.01</td>
<td>.03</td>
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<tr>
<td>Social organization</td>
<td>.02*</td>
<td>.01</td>
<td>.04</td>
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<tr>
<td>Suburban/large town</td>
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<td>.03</td>
<td>.01</td>
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<tr>
<td>Small town/rural</td>
<td>-.14*</td>
<td>.04</td>
<td>-.06</td>
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</tbody>
</table>

*Note:* controls entered at Step 1 are family SES, child gender, African-American, Latino, and Asian (omitted from the table). \( R^2 = .24 \) for Step 1; \( \Delta R^2 = .016 \) for Step 2, .001 for Step 3, .001 for Step 4 and .004 for Step 5 \( (p < .05) \). *p < .05.

### Small/town rural residence and cognitive skills

Hypothesis 2 stated that residence in a small town/rural area would be negatively associated with cognitive skills, when accounting for key neighborhood, family and child factors. As predicted, residence in small town/rural neighborhoods directly predicted lower cognitive scores at Step 5 in hierarchical linear regression (see Table 1). This means that the negative effect of small town/rural residence was found, even when accounting for neighborhood social organization, accessing community cognitive developmental resources, home literacy and the statistical control variables (e.g., SES).
Association between locale and neighborhood social organization

Residence in suburban/large town neighborhoods and small town/rural neighborhoods (vs. urban neighborhoods) significantly predicted better social organization, when controlling for family SES, race/ethnicity status, and child gender (see Table 2). Interestingly, the regression coefficients for African-American, Latino, and Asian all reduced once locale was entered in Step 2. In fact, Asian was no longer a significant predictor once accounting for suburban/large town and small town/rural residence. The strongest predictor of social organization was family SES, followed by small town/rural residence and then suburban/large town residence. These findings indicate that parents perceive social organization to be higher when they are more affluent and educated, as well as when they live in non-urban neighborhoods. African-American and Latino families are at a greater risk than white families for residing in a socially disordered neighborhood, whereas Asian families are at no greater risk than white families for residing in socially disordered neighborhoods.

Table 2. Summary of hierarchical linear regression analysis for variables predicting neighborhood social organization

<table>
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<tr>
<th>Predictor</th>
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<td>.14</td>
<td>-.03</td>
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<tr>
<td>Gender</td>
<td>-.02</td>
<td>.05</td>
<td>-.01</td>
</tr>
<tr>
<td><strong>Step 2</strong></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Family SES</td>
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<td>.02</td>
<td>.22</td>
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<tr>
<td>African-American</td>
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<td>-.11</td>
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<td>-.09</td>
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<td>.14</td>
<td>-.02</td>
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<tr>
<td>Gender</td>
<td>-.02</td>
<td>.04</td>
<td>-.01</td>
</tr>
<tr>
<td>Suburban/large town</td>
<td>.43*</td>
<td>.05</td>
<td>.13</td>
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<tr>
<td>Small town/rural</td>
<td>.60*</td>
<td>.06</td>
<td>.15</td>
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Note: $R^2 = .10$ for Step 1; $\Delta R^2 = .02$ for Step 2 (ps < .05). *p < .05.
Locale and Accessing Community Cognitive Developmental Resources

In order to determine if the small town/rural early cognitive disadvantage is influenced by accessing community and cognitive developmental resources, a hierarchical linear regression was conducted with accessing community cognitive developmental resources as the outcome (see Table 3). These results revealed that small town/rural residence was negatively associated with accessing community cognitive developmental resources, above and beyond the positive effects of home literacy and family SES.

Table 3. Summary of hierarchical regression analyses for variables predicting accessing community cognitive developmental resources

<table>
<thead>
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<th>Predictor</th>
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<tbody>
<tr>
<td>Step 2</td>
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<tr>
<td>Home literacy</td>
<td>.25*</td>
<td>.02</td>
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<td>Step 3</td>
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<tr>
<td>Home literacy</td>
<td>.25*</td>
<td>.02</td>
<td>.25</td>
</tr>
<tr>
<td>Suburban/large town</td>
<td>.00</td>
<td>.03</td>
<td>.00</td>
</tr>
<tr>
<td>Small town/rural</td>
<td>-.18*</td>
<td>.04</td>
<td>-.07</td>
</tr>
</tbody>
</table>

Note: controls entered at Step 1 are family SES, child gender, African-American, Latino, and Asian (omitted from the table). $R^2 = .07$ for Step 1; $\Delta R^2 = .05$ for Step 2, .01 for Step 3 ($p < .05$). *$p < .05$.

DISCUSSION

Like suburban children in the United States, children from small towns and rural areas reside in neighborhoods with higher levels of social organization than urban neighborhoods (see Table 1). However, the cognitive benefits of higher levels of social organization in small town/rural neighborhoods are counteracted by the direct negative association between small town/rural residence and early cognitive skills. Furthermore, parents from small town/rural neighborhoods were the least likely to access community cognitive developmental resources, which was related to early cognitive skills. This suggests that only children in suburban/large town neighborhoods have a contextual advantage over children from urban neighborhoods, qua early cognitive development, and this advantage is indirect via social organization.
Children in suburbs and large towns have an indirect academic advantage over children from cities due to greater neighborhood social organization. Psychologists in urban areas should pay close attention to the neighborhoods that their students live in, advocating for greater social organization and support for children, especially when many of their students are from low SES backgrounds (SES predicts social organization, see Table 1). Although children in suburbs often benefit from greater social organization, there are now more low SES families in the suburbs than in urban areas (Berube, Kneebone, 2006). Thus, psychologists in suburbs can also examine the level of social organization in the neighborhoods that their low SES child clients reside in. This is because, even in the suburbs, low SES children and parents benefit from living in neighborhoods with more social organization (Froiland et al., 2011).

**Limitations**

Although relatively comprehensive, the composite measure of home literacy in this study was based on parent self-report and did not include objective observations of the home literacy environment. In future studies, a particularly useful aspect of home literacy to examine is the extent to which parents interact in a controlling vs. autonomy supportive way with their children during shared reading time. Research indicates that parental autonomy support (e.g., communication entailing empathy and inspirational explanations of the value of learning) enhances children’s intrinsic motivation to learn and positive emotions surrounding learning at home (Froiland, 2011); furthermore, controlling parental involvement often backfires, as it is associated with academic anxiety (Froiland, 2011) and lower achievement levels (Cooper, Lindsay, Nye, 2000).

Another potential limitation of this study involves the use of parent’s perceptions of neighborhood social organization, rather than independent observations. However, the fact that neighborhood social organization could be predicted by locale is in harmony with previous findings (e.g., Sampson, 1991).

**Implications**

Interventions aimed at improving at-risk young children’s cognitive development may benefit from attention to geographical, neighborhood, and family supports for early cognitive development. This is the second recent study to indicate that low-income children have more difficulty
with early cognitive development in urban areas (Durham, Smith, 2006) and at least the second national study (the other was in Canada) to indicate that social disorder predicts lower cognitive skills (Kohen et al., 2002). Since urban areas also pose mental health risks for children (e.g., through exposure to community violence; Bradshaw, Rodgers, Ghandour, Garbarino, 2009), especially poor children (Wandersman, Nation, 1998), psychologists, developmental scientists and sociologists may wish to further advocate for low-income children and their parents in urban areas in a time in which many city governments are focusing on gentrification, rather than strengthening their support to the communities and low SES residents that may need the most help (Peck, 2005; Wacquant, 2008). The focus in urban areas, especially low SES urban neighborhoods, would be to enhance social organization. One potential intervention target for children in small town and rural areas could be encouraging community visits to cognitively stimulating amenities in large towns or cities, such as museums, zoos, aquariums, and plays, as well as insuring that families have adequate access to and satisfaction with local libraries.

Further development of research on child development in the context of neighborhoods is important if psychologists are to respond to the call to apply ecological systems theories by creating synergistic support for children in the home, school, and community (Christenson, 2004). Such research may require the additional input of geographers, sociologists and economists, in order to pinpoint advantages of space and the potential savings to society for creating more psychosocially healthy communities.

While ecologically minded child psychologists consider the family, school, classroom and child when conducting early childhood assessments, the current findings further suggest the importance of considering the neighborhood contexts of early cognitive development. Moreover, many studies indicate that neighborhoods influence the emotional and physical health of children and adults (Leventhal, Brooks-Gunn, 2000). It may be worthwhile for community scientists to strive toward discovering ways in which to include brief neighborhood observations or assessments into multi-systemic preventive interventions. In fact, leading school psychology trainers have recommended that school psychologists encourage parents to share knowledge about their community so that Response to Intervention teams can understand children’s skill development and behavior in light of multiple germane contexts.
(Reschly, Coolong-Chaffin, Christenson, Gutkin, 2007). More generally, it is important for applied psychologists and sociologists to further advocate for children’s optimal development by supporting policies and research that seek to help at-risk children thrive in a range of neighborhoods and spaces. Based on the findings with this national representative sample of students, neighborhood social organization, access to community cognitive developmental resources and home literacy are alterable factors that influence early cognitive skills. Thus, systematic interventions and policy to enhance these positive characteristics should be developed.

References


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Pagrindiniai žodžiai: miesto aplinka, kaimo aplinka, gyvenamasis rajonas, kognityvinis vystymasis, tėvų įsitraukimas, pradinės mokyklos mokiniai.

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