Research Article

Neighborhood Effects on Social Participation of Children With and Without Disabilities

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Abstract: Few studies have examined how neighborhood characteristics affect the social participation of children with and without disabilities. Analysis of survey data from 20 low-income U.S. neighborhoods confirmed that neighborhood safety and stability influence social participation. Furthermore, children with disabilities have lower odds of social participation, though disparities vary by location.

Keywords: disability studies, health, developmental studies

Disabled activists and disability studies scholars have long argued that disability is not an inherent trait within individuals, but, rather, is an experience that results from interaction between individuals and their environment. Thus various aspects of the environment, including built features, sociocultural norms, political context, and economic resources, can hinder or foster disabled individuals' participation in society (Field & Jette, 2007). Consequently, it is important to understand how different environments, such as residential, work, and community, affect the participation of people with disabilities. The current paper addresses this topic with a specific focus on neighborhood environments where families reside, and their influence on participation of children with and without disabilities.

There is growing interest in the effects of residence in poor urban neighborhoods on a variety of health and wellbeing outcomes (Browning & Cagney, 2002; Bernard et al., 2007; Mujahid & Diez Roux, 2010). Neighborhood influence is especially important in the developmental ages; children are less mobile than adults, and therefore local neighborhoods serve as their primary social context (Moren-Cross et al., 2006). Childhood exposure to neighborhood risk factors such as poverty and protective factors such as social capital can have effects that extend into adulthood (Danese & McEwen, 2011). Developmental specialists recognize that risk and protective factors accumulate at local levels of geography to influence child and family outcomes (Leventhal & Brooks-Gunn, 2011). Together, these developments have spurred studies of neighborhood effects on an array of children's outcomes.

Although a vast body of evidence links neighborhood disadvantage with negative effects on children's health, behavioral, and academic outcomes, little is known about how neighborhood conditions affect children's social participation (Coulton & Irwin, 2009). Lesser still is known about neighborhood-based differences in social participation of children with and without disabilities. For example, Coulton and Irwin (2009) found that neighborhood safety and parent involvement had positive effects on children's participation in out-of-school

activities. However this study did not assess disability-based differences in participation.

Several studies have demonstrated that children with disabilities participate less frequently in social activities compared with their non-disabled peers (Michelsen et al., 2009; Galvin et al., 2010; King et al., 2010; Solish et al., 2010; Bedell et al., 2013). Few studies have examined the role of neighborhood contextual factors in relation to social participation of children with disabilities. In a study of 427 children with physical disabilities living in Ontario, Canada, King and colleagues (2006) found that children's social participation was indirectly influenced by parental perceptions of physical inaccessibility of their community, unsupportive community attitudes, and inadequate institutional services and assistance. Forsyth and colleagues (2007) used similar measures of contextual factors with a sample of 600 severely disabled children and their families living in the United Kingdom. They found that children's social participation was influenced to a similar extent by their impairments and environmental factors such as physical accessibility, social supports, and transportation services. Conversely, Hammal and colleagues (2004) found that children's district of residence more than their impairments explained the social participation of 476 children with cerebral palsy from Northern England.

These studies provide evidence of neighborhood effects on social participation of children with disabilities. However, comparable studies in the United States are lacking. Moreover, the literature is beset by limitations such as lack of comparative analysis between children with and without disabilities, lack of samples drawn from neighborhood-based designs, and lack of both census-based measures of structural disadvantage and subjective measures of neighborhood conditions (Leventhal & Brooks-Gunn, 2000).

The World Health Organization (WHO) considers participation a chief indicator of child health and development regardless of impairment or functional ability (WHO, 2007). Thus social participation outcomes allow comparisons of neighborhood effects between children with and without disabilities. With child and family services increasingly offered at the local level (Leventhal & Brooks-Gunn, 2000), evaluating neighborhood-based differences in outcomes for children with and without disabilities is critical for promoting human rights and equity and for planning effective interventions (Michelsen et al., 2009).

Our study represents an attempt to address gaps in this area. Using secondary survey data from a neighborhood-based sample, we compared children with and without disabilities on social participation rates and barriers. We examined whether social participation differences between children with and without disabilities varied by neighborhood of residence. We also assessed the effect of neighborhood factors and child's disability on social participation accounting for other child and household-level variations.

Method

Data Sources

Our main data source was the Making Connections Cross-Site Survey, sponsored by the Annie E. Casey Foundation (AECF) and conducted by the Urban Institute and the National Opinion Research Center (NORC) at the University of Chicago. This survey was conducted between 2002 and 2011 in select low-income neighborhoods in 10 cities, nine of which were among the 50 largest U.S. metropolitan areas (Coulton, Chan & Mikelbank, 2010).

In each participating city, AECF and its local partners selected designated areas (survey sites) in which a large proportion of the population was socially and economically disadvantaged (Coulton & Irwin, 2009). Survey sites included declining neighborhoods in older industrial cities (Louisville, Milwaukee, Indianapolis), poor neighborhoods with growing immigrant populations (Des Moines, Hartford, Providence), predominantly Hispanic communities experiencing persistent poverty (San Antonio), and growing, diverse neighborhoods facing housing pressures (Denver, Oakland, Seattle) (Coulton et al., 2010). Comparisons with census data suggest that the Making Connections sample approximates nationally representative urban samples on several indicators (Rawlings et al., 2007).

List-assisted probability sampling was used to obtain a representative sample of households and children in each survey site. We refer to Coulton et al. (2010) for sampling frame details. Within each site, an equal probability sample of households was selected (Coulton et al., 2010). A roster of all children and adults was compiled for each household. One child per household was randomly selected as the focus child using Kish's method, and the adult who knew the child best completed the survey (NORC, 2010).

The survey was conducted in-person or via telephone in English or another language prevalent in the survey site (Coulton et al., 2010). Data were collected over three waves with a weighted response rate ranging from 69% to 79%. 'New households' were added to baseline samples at subsequent waves. These included new families that had moved into originally sampled addresses plus a subsample of newly constructed residential buildings (NORC, 2010).

We created a data set comprising data from all households that completed the survey in wave 1 and stayed in the same survey site at wave 2, plus baseline data from 'new households' sampled at wave 2. This yielded a cross-sectional sample representative of children (N = 2,295) living in survey sites at waves 1 and 2 from 2002 to 2007. We obtained data on neighborhood indicators by census tracts from the 2005-2009 American Community Survey (ACS). These data were linked with the survey data based on locations of households.

Dependent Variable Measure

Social participation. Respondents were asked if, in the last year, their child participated in organized out-of-school activities such as sports, music, dance, language classes, and youth clubs. Responses were dichotomized to indicate some participation versus none. For children with some participation, respondents reported frequency of participation as daily, 2-3 times a week, weekly, or less than weekly. For children with no participation, respondents reported reasons for non-participation.

Independent Variable Measures

Child characteristics. Sociodemographic variables included gender, age, and race/ethnicity. Child's *race/ethnicity* was determined based on the adult respondent's race/ethnicity. Child's *health status* was based on the adult respondent's rating of the child's general health on a five-point scale ranging from excellent to poor. *Disability status*, a dichotomous variable, was determined by a question that asked whether a health professional had ever told the respondent that their child had a physical, learning, mental, or chronic health condition that limits his/her participation in age-expected activities. Respondents were asked to report their child's primary health condition. Child's *health insurance coverage* was a dichotomous variable measuring whether the child was covered under any health insurance.

Household characteristics. We included a continuous measure of *household size*. We also included measures of household economic resources and household-neighborhood connectedness. *Household income* was defined as total annual income from any sources. *Household hardship* was derived from four questions which asked if, in the previous 12 months, the respondent and their family had experienced: difficulty filling a prescription for drugs, difficulty paying mortgage/rent/utility bills, repossession of belongings due to non-payment of bills, or insufficient money to buy food. A response of 'yes' to any question was classified as 'some hardship'; a response of 'no' to all questions was classified as 'no hardship'. *Home ownership* was dichotomized based on whether any household member owned or held a mortgage on the property where he/she lived. Similarly *vehicle ownership* was dichotomized based on whether any household member owned a dependable vehicle. *Household education* level was based on the highest level of education attained by the respondent.

Households' connectedness with their neighborhood was measured using two variables. First we used a continuous measure of the total number of years each respondent had lived in that neighborhood. Second, a measure of household neighborhood commitment was generated using three questions that asked if, in the previous 12 months, any household member had taken steps to address neighborhood problems or for neighborhood improvement. Examples included getting together with neighbors, talking to a religious leader, or speaking with a local political official. A response of 'yes' to any question classified the household as 'committed'; a response of 'no' to all questions classified the household as 'not committed'.

Neighborhood characteristics. Our data set included 20 project-designated sub-areas (henceforth referred to as neighborhoods) across the 10 survey sites (1 to 4 neighborhoods per site). The mean number of households per neighborhood was 114 (range 19-244). Previous analysis of Making Connections data has shown moderate reliability for neighborhood scales aggregated at this geographic level (Coulton et al., 2004). Following Coulton and Irwin's (2009) methods, we used two types of neighborhood measures: perceptions and structural variables.

Neighborhood perception variables. Multi-item scales measured perceptions of four neighborhood attributes: social cohesion and trust, shared expectations for informal social control, neighborhood safety, and disorder and incivility. The *social cohesion* scale comprised five items (e.g. "I live in a close-knit neighborhood", "People in my neighborhood can be trusted") with five response options ranging from 'strongly disagree' to 'strongly agree'. The *informal social control* scale included five items (e.g. "If a fight broke out in front of their house, how likely is it that your neighbors would do something about it?") with five response options ranging from 'very unlikely' to 'very likely'. The *safety* scale contained six items (e.g. "I feel safe at home at night", "On Halloween, most children go trick-or-treating") with seven response options ranging from 'very strongly disagree' to 'very strongly agree'. The *disorder and incivility* scale comprised seven items about gang activity, prostitution, graffiti, and related activities with seven response options ranging from 'does not occur' to 'very common'.

All scales demonstrated acceptable reliability at the individual level (Cronbach's $\alpha >$ .70). The composite score for each scale was the average rating across all items. Individual responses were aggregated to obtain a neighborhood level rating for each perceived attribute.

Neighborhood structural variables. We included six variables associated with structural disadvantage and social disorganization (Browning & Cagney, 2002; Coulton & Irwin, 2009). Structural variable measures included: *percent families below poverty level, percent population (20-64 years) unemployed, percent owner-occupied housing units, percent single parent households, percent households that moved in last five years,* and *racial/ethnic mix* (percent population that is Non-Hispanic White, African American, and Hispanic).

Data for these variables were extracted at the census tract level from the 2005-2009 ACS estimates for small areas. These five-year estimates, known to be reliable for small geographic areas (U.S. Census Bureau, 2008), offer the closest overlap with survey period, which spanned 10 years from 2002 to 2011. Census tract data were summed within neighborhoods and weighted by census tract population size to obtain neighborhood level structural variables. The mean number of census tracts per neighborhood was seven (range 1-26).

Data Analysis

Cross tabulations and χ^2 tests were used to assess differences in rates of social participation and barriers to social participation between children with and without disabilities. To assess the effect of child, household, and neighborhood factors on social participation we estimated multivariate logistic regression models using the SAS surveylogistic procedure and the Taylor series linearization method for variance estimation. Survey site was specified as the stratum variable and neighborhood was specified as the primary sampling unit. This procedure is recommended to account for complex survey design and survey weighting for binary outcomes. In addition, finite population correction factor was specified since the sample fractions in some neighborhoods exceeded 5% of the neighborhood population.

Three models were estimated – the first included child level covariates, the second included child and household level covariates, and the third model included covariates at child, household, and neighborhood levels. All child level factors were conceptually important and therefore were included in multivariate analyses. All household characteristics except household income (omitted due to low response rate) were included in multivariate analyses. The household hardship variable served as a proxy measure of household financial status. Neighborhood characteristics were selected using the purposeful selection strategy (Hosmer & Lemeshow, 2000). We conducted bivariate logistic regressions between each neighborhood characteristic and social participation and selected covariates based on the Wald test and *p*-value cut-off point of 0.3. We also tested for interactions between disability status and each child, household, and neighborhood level variable. Interaction terms were selected for multivariate analyses based on the Breslow-Day test and *p*-value cut-off point of 0.05.

The Hosmer-Lemeshow Goodness-of-Fit test was used to assess the adequacy of each model. To test the sensitivity of the final model, which included covariates at all three levels, we estimated a logistic regression model with the dependent variable (child's social participation) specified as 'weekly' and 'less than weekly'.

Finally, to compare rates of social participation for children with and without disabilities by place of residence, we estimated a separate logistic regression model which included child and household level covariates along with interaction between child's disability status and survey site. Neighborhood level variables were excluded to avoid problems with multicollinearity.

Children with missing responses for any independent variable were excluded in multivariate analyses. All analyses were conducted using SAS 9.2 software. The Office for the Protection of Research Subjects at the University of Illinois at Chicago reviewed and approved this study under the expedited category.

Results

We analyzed data for 2,295 children aged 3 to 17 years. Data were provided by adult caregivers, who were mostly parents (87%), predominantly female (81.7%), and largely young adults (average age = 33.2, SE = 0.45).

Sample Description

Descriptive characteristics of the sample are summarized in Table 1. Of the 2,295 children, 15.6% (n = 341) were identified as having a disability. Specific diagnostic condition was available for only 66% (n = 226) of children with disabilities. The most prevalent conditions included chronic health conditions such as asthma, diabetes, and heart conditions (n = 81), ADD/ADHD or other behavior disorders (n = 69), learning disabilities (n = 32), speech impairments (n = 23), neurodevelopmental disabilities such as autism, cerebral palsy, and spina bifida (n = 8), sensory impairments (n = 8), and mental or emotional illness (n = 5). Sixty caregivers classified their child's primary condition as 'other'.

Table 1: Sample Characteristics (Weighted Analysis)

Characteristics	All [a] **(n=2295)**	Without Disability [a] **(n=1939, 84.4%)**	With Disability [a] **(n=341, 15.6%)**	Test statistic, *p*-value
	% (SE)	% (SE)	% (SE)	
Gender (n=94 missing)				
Male	48.4 (1.6)	46.5 (1.7)	57.2 (5.0)	$\chi^2 = 4.03$
Female	51.6 (1.6)	53.5 (1.7)	42.8 (5.0)	$p = 0.04$
Child Age (n=23 missing)				
Preschool	25.9 (1.4)	27.6 (1.5)	17.4 (2.8)	$\chi^2 = 6.07$
Elementary School	37.3 (1.5)	37.5 (1.6)	35.0 (4.1)	$p = 0.11$
Middle School	27.3 (1.5)	25.7 (1.6)	36.7 (4.5)	
High School	9.4 (1.1)	9.2 (1.0)	10.9 (4.3)	
Race (n=27 missing)				
Non-Hispanic White	14.3 (0.9)	13.5 (0.9)	18.8 (3.0)	$\chi^2 = 14.2$
Non-Hispanic Black	26.4 (1.1)	26.7 (1.2)	24.8 (3.2)	$p = 0.007$
Hispanic	39.5 (1.5)	41.2 (1.6)	30.3 (3.9)	
Asian	4.6 (0.4)	5.2 (0.5)	1.6 (0.6)	
Other	15.1(1.4)	13.4 (1.3)	24.6 (5.4)	
Health Status (n=9 missing)				
Excellent	46.3 (1.5)	50.0 (1.7)	26.6 (4.1)	$\chi^2 = 22.57$
Good-Very Good	46.1 (1.5)	45.1 (1.7)	51.3 (4.6)	$p < 0.0001$
Poor-Fair	7.6 (1.0)	4.9 (0.8)	22.1 (4.5)	
Child Insurance Coverage (n=28 missing)				
Yes	85.8 (1.3)	84.4 (1.5)	92.7 (1.9)	$\chi^2 = 9.7$
No	14.2 (1.3)	15.6 (1.5)	7.3 (1.9)	$p = 0.002$
Household Hardship (n=29 missing)				
Some hardship	56.5 (1.6)	54.6 (1.7)	67.1 (3.9)	$\chi^2 = 6.81$
No hardship	43.5 (1.6)	45.4 (1.7)	32.9 (3.9)	$p = 0.009$

Household Income (n=242 missing)				
$0-$9,999	28.1 (1.7)	25.8 (1.7)	40.7 (5.2)	$\chi^2 = 10.9$
$10,000-$19,999	27.7 (1.5)	28.1 (1.7)	25.5 (3.8)	$p = 0.01$
$20,000-$29,999	20.5 (1.3)	21.2 (1.4)	17.2 (3.1)	
$30,000 or more	23.7 (1.3)	24.9 (1.4)	16.6 (2.8)	
Home Ownership (n=12 missing)				
Yes	30.2 (1.4)	29.7 (1.5)	34.1 (4.1)	$\chi^2 = 0.93$
No	69.8 (1.4)	70.3 (1.5)	65.9 (4.1)	$p = 0.34$
Car Ownership (n=32 missing)				
Yes	69.4 (1.5)	72.0 (1.5)	56.8 (4.8)	$\chi^2 = 6.97$
No	30.6 (1.5)	28.0 (1.5)	43.2 (4.8)	$p = 0.008$
Highest level of educational attainment in household (n=36 missing)				
Less than high school	38. 6 (1.6)	37.0 (1.7)	47.9 (4.7)	$\chi^2 = 5.79$
High school/GED	34.9 (1.5)	36.2 (1.6)	27.4 (3.8)	$p = 0.06$
Greater than high school	26.5 (1.2)	26.7 (1.4)	24.7 (3.2)	
Neighborhood Commitment (n=32 missing)				
Committed	32.5 (1.4)	31.9 (1.5)	36.0 (4.1)	$\chi^2 = 0.83$
Not committed	67.5 (1.4)	68.1 (1.5)	64.0 (4.1)	$p = 0.36$
Years in Neighborhood (n= 1 missing) [b]	8.95 (.38)	8.77 (0.36)	9.97 (1.44)	$F = 0.65$ $p = 0.42$
Household Size [b]	4.87(0.07)	4.83 (0.06)	5.04 (0.28)	$F = 0.52$ $p = 0.47$

a Frequencies in the 'All' column are not always the exact sum of frequencies in the 'With Disability' and 'Without Disability' columns due to missing data on disability status (n=15)

b Data reported as mean and standard error

Neighborhood Description

The average neighborhood safety rating (N = 20) was 4.34 (SD = 0.37) on a seven-point scale, with a higher score indicating greater perceived safety. The average disorder and incivility rating was 2.82 (SD = 0.43) on a six-point scale, with a higher score indicating greater disorder. The average ratings for informal social control and social cohesion were 3.24 (SD = 0.22) and 3.08 (SD = 0.20) respectively, both measured on a five-point scale with a higher score signifying better conditions.

Neighborhoods experienced poverty rates ranging from 11.4% to 83.4% (mean = 33.6%, SD = 15.6). The average unemployment rate ranged from 7.4% to 28.1% (mean = 14.9%, SD = 6.0). The proportion of single parent households ranged from 8.8% to 63.4% (mean = 22.9%, SD = 12.2). Residential stability varied across neighborhoods. On average, 36.4% (SD = 18.1) of housing units were owner-occupied (range 6.4%-62.7%) and 39.4% (SD = 6.4) of neighborhood residents had moved in the last five years (range 26.8%-50.3%). The average neighborhood was 26.7% Non-Hispanic White (SD = 21.4), 27.9% African American (SD = 25.7), and 36.1% Hispanic (SD = 26.2) with the remainder classified as 'Other' race.

Social Participation Rates

Half of all children in our sample (50.3%) reported some participation in organized out-of-school social activities. Site-specific participation rates varied from 43.9% in San Antonio to 62.8% in Denver. Participation rates (dichotomized as 'some' versus 'none') varied between children with and without disabilities. Fifty-two percent of children without disabilities reported some social participation compared with 42% of children with disabilities, $\chi^2 = 3.84$, $p = 0.05$. Among children with some participation, we compared children with and without disabilities in terms of frequency of social participation (daily, 2-3 times per week, weekly, less than weekly) and found no significant differences, $\chi^2 = 2.67$, $p = 0.45$.

Barriers to Social Participation

On average, children in both groups reported 1.2 barriers to social participation (SD = 0.08 for children with disabilities, SD = 1.19 for children without disabilities). The most common barriers (unweighted) included child being too young to participate in out-of-school activities (n = 309), lack of opportunities in the area (n = 151), transportation problems (n = 148), and inability to afford program fees (n = 143).

The proportion of respondents reporting age (child not old enough) as a barrier was higher for children without disabilities (33.8% compared to 12.9% of children with disabilities, $p < 0.0001$). Proportion of respondents reporting disability as a barrier was higher for children with disabilities (19.0% compared to 4.8% of children without disabilities, $p < 0.01$). Other barriers reported more frequently for children with disabilities included program unavailability, unaffordability, waiting lists, and safety concerns. These differences were not statistically significant.

Effect of Child, Household, and Neighborhood Factors on Social Participation

Model 1: Child level factors. Our first estimated model included child level characteristics (Table 2). In this model, gender and health status were not significantly associated with social participation. On the other hand, age, race, disability status, and health insurance coverage significantly predicted social participation.

Compared to middle school aged children, children in other age groups had significantly lower odds of social participation. Significant differences in social participation rates were associated with child's race and ethnicity. Compared to White children, social participation odds were 42% lower for Hispanic children and 48% lower for children of 'Other' race. Social participation odds were not significantly different for White and Black children or White and Asian children.

Having a disability was negatively associated with social participation. Social participation odds for children without disabilities were 1.85 times the odds for children with disabilities. Having health insurance coverage was positively associated with social participation. Social participation odds for insured children were 1.78 times the odds for

uninsured children with disabilities.

Model 2: Child plus household level factors. Household level variables were added to Model 1 (Table 2). In this combined model, four household characteristics had positive effects on social participation – home ownership, vehicle ownership, education level, and neighborhood commitment. Children living in families that owned their home had 42% higher social participation odds while children living in households that owned a dependable vehicle had 51% higher social participation odds. Similarly, participation odds for children from households with a greater than high school education were double the odds for children from households with a less than high school education. When household members demonstrated neighborhood commitment, children's social participation odds increased 85%. Other household level variables such as size, hardship, and length of time in the neighborhood did not significantly predict social participation.

The addition of household level variables did not change coefficients for child level variables except race/ethnicity. In the combined child and household model, the coefficient for Hispanic race/ethnicity (compared to White race/ethnicity) was no longer significant. The negative effect on social participation of belonging to this racial/ethnic group (seen in the Model 1) could be attributable to household level socio-economic characteristics correlated with race/ethnicity.

Model 3: Child, household, and neighborhood level factors. Neighborhood level variables were added to Model 2 (Table 2). Length of time in the neighborhood was dropped from this model as it was not statistically significant and impaired model fit. This combined model had the best fit among all three models as indicated by results of the Hosmer-Lemeshow Goodness-of-Fit test, supporting the combined effects of child, household, and neighborhood factors on social participation.

The neighborhood variables measuring disorder and incivility, poverty level, housing occupancy, and racial/ethnic mix were statistically insignificant in this model. Neighborhood safety had a significant positive effect on social participation. A unit increase in perceived safety was associated with three times higher social participation odds. Conversely, residential instability had a significant negative effect. Social participation was 93% less likely with every unit increase in the percentage of households that moved in the last five years.

The addition of neighborhood level variables did not cause notable changes in coefficients for child and household level variables except child gender. Being female was significantly associated with 34% higher odds of social participation. This suggests that gender-based participation differences might be attributable to neighborhood characteristics that hinder participation of boys more than girls.

Table 2: Logistic regression models showing the relationship between individual, household and neighborhood characteristics and the probability of social participation.

Characteristics	Model 1 OR (95% CI)	Model 2 OR (95% CI)	Model 3 OR (95% CI)
Child Level			
Gender: Females vs. Males	1.23 (0.93 - 1.62)	1.31 (0.99-1.74)	1.34 (1.01-1.78)*
Child Age:			
Preschool vs. Middle School	0.11 (0.07 - 0.17)+	0.09 (0.06-0.14)+	0.09 (0.05-0.13)+
Elementary School vs. Middle School	0.46 (0.32 - 0.66)+	0.41 (0.29-0.59)+	0.41 (0.29-0.6)+
High School vs. Middle School	0.55 (0.32 - 0.95)*	0.49 (0.29-0.82)**	0.48 (0.28-0.82)**
Race/Ethnicity:			
Black vs. White	1.08 (0.72 - 1.62)	1.15 (0.74-1.77)	1.31 (0.82-2.08)
Hispanic vs. White	0.58 (0.38 - 0.87)**	0.69 (0.44-1.08)	0.73 (0.43-1.25)
Asian vs. White	0.7 (0.4 - 1.21)	1.06 (0.57-1.97)	0.92 (0.48-1.76)
Other vs. White	0.52 (0.29 - 0.93)*	0.55 (0.31-0.99)*	0.6 (0.32-1.13)
Disability:			
Without Disability vs. With Disability	1.85 (1.17 - 2.93)**	1.68 (1.1-2.59)*	1.68 (1.08-2.6)*
Child Health:			
Excellent vs. Poor/Fair	1.73 (0.96 - 3.1)	1.69 (0.92-3.1)	1.68 (0.9-3.12)
Good/Very Good vs. Poor/Fair	1.52 (0.86 - 2.67)	1.53 (0.86-2.74)	1.55 (0.86-2.81)
Child Insurance Coverage:			
Insured vs. Uninsured	1.78 (1.15 - 2.76)**	1.73 (1.07-2.8)*	1.79 (1.09-2.94)*
Household Level			
Household hardship: None vs. Some		0.93 (0.69-1.25)	0.93 (0.68-1.26)
Home ownership: Yes vs. No		1.42 (1.01-1.98)*	1.47 (1.04-2.17)*
Vehicle ownership: Yes vs. No		1.51 (1.05-2.16)*	1.5 (1.03-2.17)*
Household education:			
>High School vs. <High School		1.97 (1.35-2.87)***	2.01 (1.38-2.95)***
High School/GED vs. <High School		1.41 (0.98-2.03)	1.43 (0.99-2.06)
Neighborhood Commitment:			
Committed vs. Not committed		1.85 (1.36-2.51)+	1.88 (1.38-2.54)+
Years in Neighborhood		1.01 (0.99-1.02)	
Household Size		0.95 (0.86-1.02)	0.94 (0.86-1.02)
Neighborhood Level			
Perceived safety rating			3.12 (1.24-7.75)*
Perceived disorder and incivility rating			2.02 (0.98-4.16)
% families below poverty			0.55 (0.14-2.19)
% owner-occupied housing units			0.36 (0.1-1.28)
% households that moved in last 5 years			0.07 (0.004-0.98)*
% Hispanic population			0.82 (0.46-1.87)
Hosmer Lemeshow Goodness-of-Fit Test	$\chi^2 = 19.83$, $p = 0.01$	$\chi^2 = 18.53$, $p = 0.02$	$\chi^2 = 14.37$, $p = 0.07$

*p<0.05 **p<0.01 ***p<0.001 +p<0.0001

Sensitivity analysis. All three models estimated the probability of 'some participation' versus 'no participation'. To assess the robustness of Model 3, we re-estimated this model with social participation dichotomized as 'weekly' and 'less than weekly' (results not shown). Coefficients of independent variables were similar regardless of how social participation was

classified, but association strength for some variables changed.

Among child level variables, age and disability were significant predictors for both ways of categorizing social participation. Gender was not a significant predictor when social participation was defined as 'weekly' versus 'less than weekly'. Race/ethnicity significantly predicted social participation dichotomized as 'weekly' versus 'less than weekly'. Black children had higher odds of weekly participation compared to White children. Health status also emerged as a significant predictor. Being in poor or fair health predicted lower odds of weekly participation compared to being in excellent, good, or very good health.

Among household level variables, vehicle ownership, education level, and neighborhood commitment significantly predicted social participation regardless of whether it was dichotomized as 'some' versus 'none' or 'weekly' versus 'less than weekly'. Home ownership was not a significant predictor for the latter categorization of social participation. Among neighborhood level variables, safety was not a significant predictor when social participation was defined as 'weekly' versus 'less than weekly', while percent of households that moved in the last five years was a significant predictor for both ways of categorizing participation.

Social Participation of Children With and Without Disabilities by Place of Residence

In three of the ten sites – Des Moines, Hartford, and Oakland –social participation odds were lower for children without disabilities. This difference was significant only in the Hartford site where participation odds were 77% less likely for children without disabilities, OR = 0.23, 95% CI [0.07 – 0.77], $p < 0.05$. In the remaining seven sites – Denver, Indianapolis, Louisville, Milwaukee, Providence, San Antonio, and Seattle –social participation odds were higher for children without disabilities. This difference was significant in San Antonio and Milwaukee where the odds of social participation for children without disabilities were five times the odds for children with disabilities, San Antonio OR = 4.72, 95% CI [1.67 – 13.29], $p < 0.01$, Milwaukee OR = 5.21, 95% CI [1.41 – 19.28], $p < 0.05$.

We compared neighborhood characteristics (previously listed under 'Neighborhood Description') at these sites with the cross-site averages. There were no notable differences on any indicators except for racial/ethnic mix. The percent Hispanic population in the San Antonio site was 90.6% compared with the cross-site average of 36.1%. In the Milwaukee site the percent African American population was 74.3% compared with the cross-site average of 27.9%.

Discussion

Ours is one of the first studies to compare social participation rates of children with and without disabilities using a neighborhood-based sample of low-income children. We found near significant differences between the two groups across neighborhoods. However,

participation rates in both groups were markedly lower than what has been reported in the literature. Only 52% percent of children without disabilities and 42% of children with disabilities reported some social participation. In other words, half of all children without disabilities and 58% of children with disabilities were not participating in any organized social activities outside of their homes and schools. In contrast, previous studies have found that non-participation rates in a variety of social activities range from 6% to 44% for children with disabilities and from 0.5% to 20% for children without disabilities (Law et al., 2006; Imms et al., 2008; Michelsen et al., 2009; Bedell et al., 2013). The overall low participation rates in our study, across all sites and all children, highlight the distinctiveness of our data.

Previous studies have included children from middle and high income households and communities. Our findings indicate that household and neighborhood disadvantage hinder social participation of all children, although disparities persist for children with disabilities. Most notably, we found that a child's disability or health status was not the only significant predictor of social participation. Multiple indicators of neighborhood and household socioeconomic resources also contributed to odds of social participation. Thus our study supports the disability studies contention that environmental factors play an important role in influencing participation of individuals with disabilities.

Two neighborhood factors were significantly associated with children's social participation beyond the influence of household and child characteristics. The first was residential turnover. Social participation was negatively affected by the percentage of households that had moved in the previous five years. Previous research shows that the overall residential stability of a neighborhood, more than an individual family's residential tenure, influences parenting behaviors to promote youth participation in school and community activities (Cantillon, 2006). Stable neighborhoods foster social ties and friendship networks, which promote effective parental support and monitoring strategies (Cantillon, 2006). Parents who have a greater sense of comfort from knowing other children and adults around their children may be more willing to support their children's participation in social activities (Coulton & Irwin, 2009).

Perceived safety was the second significant neighborhood level predictor of social participation. Other studies have found that perceived neighborhood safety positively influences children's participation in recreational programs and out-of-school activities (Molnar et al., 2004; Coulton & Irwin, 2009). In our study, higher safety ratings were associated with higher social participation odds categorized as 'some' versus 'none'. However this association was insignificant when social participation was categorized as 'weekly' versus 'less than weekly', indicating that neighborhood safety may be a predictor of extreme social participation outcomes. Thus, safety concerns, where they exist, may exert a stark influence on children's social participation.

Parents might seek to enroll their children in programs outside their unsafe neighborhood (Jarret, 1999). However, this may require families to traverse unsafe

neighborhood streets, conferring an advantage to families with dependable means of transportation. This likely explains our finding that indicators of household socioeconomic resources, such as home and vehicle ownership, significantly predicted social participation even after introduction of neighborhood factors in the regression model. Furthermore, families reported transportation as a participation barrier for 15% of children with and without disabilities.

A related finding was that households raising children with disabilities, as compared to households raising children without disabilities, were significantly less likely to own a dependable vehicle and fared worse on most socioeconomic indicators. Therefore, it is likely that in unsafe neighborhoods, families of children with disabilities face greater barriers to accessing extralocal resources, further restricting their social participation. Consistent with this interpretation, we found that respondents representing children with disabilities more frequently reported safety concerns as a barrier to their child's participation.

A unique contribution of our study relates to effects of child's disability status on social participation, after taking into account household and neighborhood disadvantage. Having a disability was negatively associated with social participation across all models and specifications of social participation. This suggests that in similar situations of household and neighborhood disadvantage, children with disabilities fare poorly on social participation outcomes compared with children without disabilities. One possible explanation is that severity of a child's primary condition precludes participation in organized social activities. In our study, child's overall health rating served as a proxy indicator for severity of the underlying condition. Health status was a significant predictor only when social participation was categorized as 'weekly' versus 'less than weekly'. This suggests that severely disabled children might be precluded from participating more frequently in organized social activities; however severity of their condition does not explain why they would have lower odds for at least 'some' level of social participation.

The above finding points to the possibility of environmental barriers, such as lack of inclusive and accessible local resources, as another explanation for lower odds of participation among disabled children. Results of interaction analyses between child disability status and place of residence yielded interesting insights in this regard. Children without disabilities had higher adjusted odds of social participation in seven of ten survey sites. Participation odds were significantly higher for children without disabilities in two sites, San Antonio and Milwaukee. Conversely, participation odds were significantly lower for children without disabilities in one site, Hartford. These contrasting findings merit further discussion.

Neighborhood indicators for the San Antonio and Milwaukee sites did not differ from cross-site averages or from the Hartford site except for racial/ethnic mix. The San Antonio site represents one of the poorest neighborhoods in the country with a predominantly Hispanic population (Brischetto et al., 2000) while the Milwaukee site represents a classic white flight neighborhood with a predominantly African American population (Bartos et al., n.d.). In

contrast the Hartford site includes a more mixed racial/ethnic population. The Hartford site also represents multiple neighborhoods (Coulton, Chan, & Mikelbank, 2010) of which some have high risk scores on socioeconomic indicators, but others fare well on poverty, health, and education indicators (Colantonio & Martin, 2013). Previous analysis of second wave data from the Making Connections survey also shows lowest unmet need for welfare services in the Hartford site and highest demand in the San Antonio and Milwaukee sites (Price & Hayes, 2009). Therefore, these sites likely varied in degree of disadvantage with more detrimental effects for children with disabilities.

Previous research suggests that racial homogeneity is conducive to neighborhood collective efficacy (Lindblad et al., 2013), which positively influences child outcomes (Xue et al., 2005; Moren-Cross et al., 2006). The San Antonio and Milwaukee sites represent the most racially homogenous neighborhoods in this study, yet disparities in social participation between children with and without disabilities were greatest in these sites. It is likely that collective efficacy supports social participation for children without disabilities but does not facilitate participation of children with disabilities, thereby widening disparities. Participation of children with disabilities might be more contingent on availability, accessibility, affordability, and quality of social and recreational resources (Leventhal & Brooks-Gunn, 2000). Racially homogenous African American or Hispanic neighborhoods are often characterized by concentrated disadvantage (Sampson, Raudenbusch, & Earls, 1997) and poor availability of amenities such as public transit (McKenzie, 2013) and recreational facilities (Moore et al., 2008). Lack of such amenities and services at the neighborhood level have been shown to impede social participation of children with disabilities (Law et al., 2006; Law et al., 2007). Indeed, in our study, program unavailability and unaffordability were cited more frequently as participation barriers for children with disabilities.

Site-specific disparities in social participation of children with and without disabilities can also be traced to state-level disability-related policies and programs. For example, Michelsen and colleagues (2009) analyzed national disability policies to explain regional differences in participation of children with and without disabilities across seven European countries. In the United States, The Case for Inclusion is an annual ranking of how well state Medicaid programs serve American children and adults with intellectual and developmental disabilities. Between 2007 (the earliest year for which data are available) and 2012, Connecticut consistently ranked among the top ten states. On the other hand, Wisconsin and Texas ranked far lower, with Texas consistently being one of the worst performing states (United Cerebral Palsy, 2007; 2012). This suggests a lack of infrastructure to support people with disabilities in Wisconsin and Texas, with negative trickle-down effects for children with disabilities living in the Milwaukee and San Antonio survey sites.

Overall, our findings suggest the need for future research to illuminate the mechanisms responsible for social participation disparities between children with and without disabilities. One way to identify mechanisms would be to qualitatively examine participation profiles of a small sample of children with disabilities in ‘best’ and ‘worst’ performing sites

(Hammal et al., 2004). Backward mapping, which involves identifying local community barriers and assets and tracing them to state-level policies, could be another useful strategy (Law et al., 2007).

Limitations

Our study had a few limitations. First, not all neighborhoods in the metropolitan survey sites were represented. In addition, the study sample was not nationally representative, although it closely resembles the profile of urban poor communities in the United States. While we analyzed several relevant child, household, and neighborhood characteristics, it is possible that unmeasured neighborhood variables might account for some findings (Leventhal & Brook-Gunns, 2000). Also, social participation, a complex and varied phenomenon, was captured through a simple dichotomous measure of participation in organized out-of-school activities. This was a limitation in the survey questionnaire, although broadly applicable measures of children's social participation are lacking (King, 2013). Finally, no causal inferences can be drawn due to the cross-sectional nature of our analyses.

Conclusions

Our study makes an important contribution to the literature on neighborhood effects, disability status, and children's social participation. It is among the first studies to document neighborhood effects on social participation of children with and without disabilities and to examine interactions between child disability status and place of residence. Primarily, our study highlights the importance of understanding environmental factors at the neighborhood level that could hinder the participation of children with disabilities. We found low social participation rates for all children, with neighborhood safety, residential stability, and household socioeconomic indicators playing an important role. At the same time, adjusted participation odds were lower for children with disabilities overall and in most individual survey sites. These findings suggest that measures to strengthen neighborhood foundations, such as stability and safety, can facilitate the social participation of all children. At the same time, disadvantaged neighborhoods also need targeted after-school programs and social and recreational resources that are inclusive of and accessible to children with disabilities.

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