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Cross-sectional study of perceived neighborhood collective efficacy and risk of adhd among a nationally-representative sample of children

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ABSTRACT

Objective: The development and severity of attention deficit hyperactivity disorder (ADHD) has been linked to a number of psychosocial risk factors. Research has shown that the amount of social capital in a community influences the physical and mental health of community members. We assessed the independent role of perceived neighborhood context, including physical and socioeconomic characteristics, and collective efficacy, a form of social capital, on ADHD prevalence.

Methods: Cross-sectional study utilizing the 2007 National Survey of Children's Health, a nationally representative dataset. The population of interest was children between the ages of four and seventeen living in randomly selected households. Multiple logistic regression models were used to assess the association between indices of perceived neighborhood socioeconomic conditions, built environment, and collective efficacy (study exposures) on risk of ADHD (outcome), controlling for pertinent individual and family risk factors.

Results: Nine percent of children in the US (ages 4-17) had ADHD as reported by their caregiver. Univariately, all 3 neighborhood characteristics were associated with risk of ADHD (p-value =.01, .04, and .0002 for socioeconomic conditions, built environment, and collective efficacy, respectively). After accounting for well-established risk factors for ADHD, perceived neighborhood socioeconomic conditions and built environment were no longer associated with ADHD, while collective efficacy remained significant (p=.0002). Lower level of perceived neighborhood collective efficacy was associated with increased risk of ADHD (OR: 1.7; 95% CI: 1.3-2.2, comparing the lowest with the highest level).

Conclusions: Our study suggests that perceived neighborhood collective efficacy may buffer the impact of individual-and family-level risk factors for ADHD in children.

Key Words: Collective efficacy, Attention deficit hyperactivity disorder, Social capital, Mental health children

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1. INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is an externalizing neurobehavioral disorder characterized by inattention, impulsivity, and hyperactivity. The disorder begins in childhood and causes difficulties in functioning across multiple settings such as school, daycare, and home.[1] According to the Center for Disease Control and Prevention (CDC), ADHD is increasing in prevalence in the U.S., from 7.8% in 2003 to 9.5% in 2007 to 11% in 2011,[2] an increase recently described as an epidemic.[3] ADHD is a major burden on our healthcare system with approximately 6.1% of children in the US currently on ADHD medications. ADHD disproportionately affects children living in poverty and those who receive Medicaid.[2]

While twin studies have demonstrated a strong genetic basis for ADHD, with estimates of 70%-80% heritability,[4] a number of individual- and family-level factors have also been found to be associated with ADHD incidence, including race/ethnicity, gender,[5] birth weight,[6] prenatal,[7,8] and secondhand smoke exposure,[9] lead poisoning,[10] poverty,[11] single parent households,[12] parenting practices,[13] maternal education level,[5] maternal mental health,[13] early traumatic experiences,[10,15] increased TV/computer exposure,[10,15] and household mobility.[16] The development of ADHD and its level of severity in a child likely represent an interaction between genetic susceptibility and environmental influences of place, family, and circumstance.[17]

Socioeconomic conditions and social relationships impact health, both through the support they provide, and through their impact on cognitive, emotional and behavioral processes.[18,19] Individuals, particularly children, growing up in poverty are at increased risk for a range of poorer health outcomes, including mental health outcomes.[20,21] In addition to the influence of family-level socioeconomic status (SES), children's mental health also appears to be modestly influenced by the neighborhoods they live in.[22] Neighborhood conditions appear to impact childhood behavior above and beyond any heritable liability,[23] and with control for parental SES.[24]

Despite the association between social adversity and ADHD, current evidence-based treatment guidelines for ADHD focus almost exclusively on individual behavioral modification and pharmacologic interventions, with little attention directed towards understanding how the neighborhood environment might influence the development and course of ADHD. Neighborhood influences, such as institutional resources, relationships, norms of behavior and social capital, are postulated to affect children and their families both directly and indirectly through parental behavior and family processes,[19] such as parental monitoring and maternal warmth.[25] We conceptualize that enhancing a family's ability to access, utilize, and recycle social capital and social networks through integration and interaction with neighborhoods is likely to mitigate the risk and severity of ADHD and improve the efficacy of current treatments for ADHD. To this end, it is crucially important to understand the role of neighborhood context, its physical, socioeconomic, and, in particular, its social capital characteristics, in promoting or lessening risk of ADHD. Such knowledge would provide an important basis for developing social interventions that may supplement current individually-directed therapeutic approaches.

Collective efficacy, a specific form of social capital that measures both perceptions of mutual trust (social cohesion) and the willingness to intervene for the common good (informal social control),[26,27] has been extensively studied in association with a number of childhood health outcomes including mental health. Studies of collective efficacy and childhood mental health have varied in their outcome measures,[28–31] but most have shown reduced odds of poor mental health as collective efficacy increased. None, however, have examined the relationship specifically between ADHD and collective efficacy utilizing a covariate package that included multiple variables previously related to ADHD risk. Furthermore, whether the association between ADHD prevalence and collective efficacy is modified by level of household income has not previously been examined.

The objectives of this study, therefore, were to assess 1) the independent role of perceived neighborhood context, including physical and socioeconomic characteristics, and collective efficacy, on ADHD prevalence; and 2) the association between collective efficacy and ADHD risk, stratified by household income. We hypothesized that perceived neighborhood environment, especially collective efficacy, would be significantly associated with ADHD prevalence, and that level of collective efficacy would differentially impact rates of ADHD depending on family income level. To test this hypothesis, we conducted a cross-sectional study utilizing the 2007 National Survey of Children's Health, a nationally representative dataset.

2. METHODS

2.1 Study design

The National Survey of Children's Health (NSCH) is a publicly available periodic survey designed to produce national prevalence estimates of the physical and emotional health of children (0-17 years old). The 2007 survey was sponsored by the Maternal and Child Health Bureau of the Health Resources and Services Administration and was conducted by

the CDC National Center for Health Statistics. Briefly, the survey was conducted via landline telephone of households in all states as well as the District of Columbia. Random-digit-dial was used to contact households. One child was selected at random within each household and the adult knowing the most about the child's health was interviewed. 91,642 interviews were completed and the overall response rate was 46.7%. Specifics regarding design and operation of the survey are available from the National Center for Health Statistics.[32] Verbal informed consent was obtained for each family interviewed; the NSCH was approved by the National Center for Health Statistics research ethics review board.

2.2 Study subjects

This study utilized the survey data from children of at least 4 years (maximum age of 17 years by the study design). Four years was chosen as the lower limit of age to consider ADHD, based upon established clinical practice guidelines.[33]

2.3 Primary outcome

ADHD prevalence was ascertained by asking caregivers "Has a doctor or other health care provider ever told you that (child's name) had Attention Deficit Disorder or Attention Deficit Hyperactive Disorder, that is, ADD or ADHD?"

2.4 Covariates

The following covariates were included based upon prior research supporting their association with ADHD: child age, gender, race/ethnicity (white *vs.* other), household poverty status measured as ratio of family income to federal poverty level (FPL; < 200% *vs.* $\geq$ 200%), family structure (two parent household *vs.* other), maternal education level (less than high school, high school graduate, more than high school), maternal mental health (fair/poor *vs.* excellent, very good and good), household smoking status (yes *vs.* no), television exposure (< 2 hours/day *vs.* $\geq$2 hours/day), and household mobility (ever having moved < 2 times *vs.* ever having moved $\geq$ 2 times).

2.5 Primary exposure

To examine the effects of caregiver reported neighborhood characteristics on ADHD prevalence, three composite variables were created, each derived from four questions within the survey: 1) neighborhood built environment; 2) neighborhood socioeconomic environment; and 3) collective efficacy. Use of these composite measures was previously reported by Singh *et al*;[34,35] Our collective efficacy measure was based upon the work of Sampson *et al*.[27]

The measure of neighborhood built environment included the following questions: (1) Do sidewalks or walking paths exist in your neighborhood? (2) Does a park or playground area exist in your neighborhood? (3) Does a recreation center, community center, or boys' or girls' club exist in your community? (4) Does a library or bookmobile exist in your community? Neighborhood socioeconomic conditions included: (1) How often do you feel (child's name) is safe in your community or neighborhood? (2) In your neighborhood, is there litter or garbage on the street or sidewalk (reverse scored)? (3) How about poorly kept or dilapidated housing (reverse scored)? (4) How about vandalism such as broken windows or graffiti (reverse scored)? Collective efficacy included the following statements: (1) People in this neighborhood help each other out; (2) We watch out for each other's children in this neighborhood; (3) There are people I can count on in this neighborhood; and (4) If my child were playing outside and got hurt or scared, there are adults nearby who I trust to help my child. In the NSCH there were four possible responses for each neighborhood question: definitely agree, somewhat agree, somewhat disagree, and definitely disagree. We dichotomized the four possible responses by making either of the agree responses a "yes" value and either of the disagree responses a "no" value; three questions, noted above, were reverse coded. Questions responded with a "yes" were counted in a given composite variable (scores ranged between 0 and 4), with 4 being the most favorable condition. Two less favorable responses (0 and 1) were combined to improve statistical power.

2.6 Data analysis

SAS 9.2. (SAS Institute Inc, Cary, NC) was used for all statistical analyses to adjust for the complex sampling weights in the NSCH dataset.[32] The SURVEYFREQ procedure was used to estimate the prevalence of ADHD with 95% confidence intervals (CI) and association of pertinent socio-demographic factors (including household income) and three neighborhood characteristics with risk of ADHD. To assess the independent role of each neighborhood characteristic on ADHD, the SURVEYLOGISTIC procedures were utilized, adjusting for all pertinent socio-demographic characteristics mentioned above. All neighborhood characteristics were treated as categorical variables without assuming any specific direction of association with ADHD. In addition, a multiple logistic regression model under the SURVEYLOGISTIC procedure was used to test all neighborhood characteristics simultaneously. Association of significant neighborhood characteristics (after accounting for pertinent variables) with ADHD was further investigated, stratified by household income (< 200 FPL *vs.* $\geq$ 200 FPL). While acknowledging a potential bias, this study did not consider missing information in the analyses, given that there was no obvious systematic difference in missing rates between subjects with and without ADHD (see Table 1).

Table 1. Sociodemographic characteristics of children with and without ADHD from the 2007 National Survey of Children's Health

	Subjects with ADHD (ever)	Control subjects (without ADHD)	*p*-value
Age, mean (years)	12.1	10.4	
4 - 6, %	2.8%	15.7%	<.0001
6 - 11, %	39.8%	41.7%	
12 - 17, %	57.5%	42.6%	
Gender, %			
Male	71.0%	49.1%	<.0001
Female	29.0%	50.8%	
Missing	0.1%	0.2%	
Race, %			
White	67.3%	64.6%	.01
Non-white	25.8%	25.1%	
Missing	6.9%	10.4%	
Household Income, %			
< 200% FPL	41.3%	33.9%	<.0001
≥ 200% FPL	52.3%	56.9%	
Missing	6.4%	9.2%	
Two-parent Household, %			
Yes	59.5%	74.5%	<.0001
No	40.0%	24.9%	
Missing	0.5%	0.7%	
Maternal education			
< 12 years	10.5%	11.3%	
12 years/H.S. degree	27.2%	23.5%	.0004
More than H.S.	52.2%	57.5%	
Missing	10.1%	7.7%	
Maternal mental health status, %			
Fair/Poor	15.8%	6.4%	<.0001
Good/Very Good/Excellent	74.3%	86.6%	
Missing	9.9%	7.1%	
Household smoking status (current), %	39.6%	24.7%	
Yes	59.7%	74.5%	<.0001
No	0.6%	0.1%	
Missing			
TV Exposure, %			
2 or more hours/day	56.0%	46.9%	<.0001
Less than 2 hours/day	39.1%	46.9%	
Missing	5.0%	6.2%	
Geographic mobility (ever), %			
Moved 2 or more times	60.2%	50.0%	<.0001
Moved less than 2 times	39.3%	49.5%	
Missing	0.5%	0.5%	

3. RESULTS

There were 73,224 individuals age 4-17 years in the sample, representing 57,523,099 children nationally. Pertinent socio-demographic characteristics of children with and without a diagnosis of ADHD are shown in Table 1. Overall, the prevalence of ever having ADHD was estimated at 9.5% (95% CI: 9.0-10.0). Lower household income (< 200% *vs.* ≥ 200% FPL) was negatively associated with risk of ADHD (41% of subjects with ADHD living at < 200% FPL compared to 34% of those without ADHD; *p*-value <.0001). All other pertinent socio-demographic characteristics included in Table 1 were also strongly associated with risk of ADHD. For example, children with ADHD were significantly less likely to be living in a two-parent household, just 60% compared to 75% of children without ADHD.

Table 2 presents results of the association between the three constructed neighborhood variables and ADHD. When looking at unadjusted comparisons of the composite measures, subjects with ADHD were less likely than those without ADHD to have the most favorable (answered "yes" for all 4 questions) socioeconomic conditions (60% *vs.* 65%, overall $p = .01$), built environment (44% *vs.* 46%, overall $p = .04$), and collective efficacy (70% *vs.* 77%, overall $p = .0002$).

Table 2. Neighborhood characteristics among children with and without ADHD from the 2007 National Survey of Children's Health

	Subjects with ADHD (ever)	Subjects without ADHD	*p*-value
Socioeconomic conditions (numbers)			
No variables	3.7%	2.8%	
Any 1 variable	5.0%	3.7%	.01
Any 2 variables	9.1%	8.2%	
Any 3 variables	21.9%	20.4%	
All 4 variables	60.2%	64.9%	
Built environment (numbers)			
No variables	5.6%	5.5%	
Any 1 variable	9.9%	7.7%	.04
Any 2 variables	16.3%	14.5%	
Any 3 variables	24.5%	26.4%	
All 4 variables	43.7%	45.9%	
Collective efficacy (numbers)			
No variables	6.4%	4.5%	
Any 1 variable	6.4%	3.9%	.0002
Any 2 variables	7.5%	5.2%	
Any 3 variables	9.5%	9.7%	
All 4 variables	70.2%	76.8%	

Table 3. Relationship between neighborhood characteristics (one characteristic at a time [univariate analysis] and all three characteristics simultaneously [multivariable analysis]) and ADHD among children from the 2007 National Survey of Children's Health, adjusting for demographic factors included in Table 1

	Univariate analysis		Multivariable analysis	
	Odds ratio (95% CI)	*p*-value	Odds ratio (95% CI)	*p*-value
Socioeconomic Conditions				
No or any 1 variable	1.4 (1.1, 1.9)		1.2 (0.9, 1.7)	
Any 2 variables	1.1 (0.9, 1.4)	.10	1.0 (0.8, 1.2)	.50
Any 3 variables	1.1 (0.9, 1.3)		1.0 (0.9, 1.2)	
All 4 variables	Reference		Reference	
Built Environment				
No or any 1 variable	1.2 (1.0, 1.5)		1.2 (1.0, 1.4)	
Any 2 variables	1.2 (0.9, 1.5)	.19	1.2 (0.9, 1.4)	.27
Any 3 variables	1.0 (0.9, 1,2)		1.0 (0.9, 1.2)	
All 4 variables	Reference		Reference	
Collective Efficacy				
No or any 1 variable	1.7 (1.3, 2.2)		1.5 (1.2, 2.0)	
Any 2 variables	1.7 (1.1, 2.5)	.0002	1.6 (1.0, 2.3)	.006
Any 3 variables	1.1 (0.9, 1.4)		1.1 (0.9, 1.3)	
All 4 variables	Reference		Reference	

With respect to the neighborhood composites, neither built

neighborhood conditions nor neighborhood socioeconomic conditions were associated with reduced odds of reporting ever having ADHD after accounting for all pertinent socio-demographic characteristics (p = .10 for socioeconomic conditions and 0.19 for built environment; see Table 3). Collective efficacy, however, was associated with odds of reporting ever having ADHD (p-value = .0002; see Table 3). When comparing these composite groups, having zero, one or two positive answers out of the four collective efficacy questions was associated with higher chances of reporting ever having ADHD when compared to those who had all four factors (OR: 1.7; 95% CI: 1.3-2.2 for 0 or 1 compared to all 4; OR: 1.7; 95% CI: 1.1-2.5 for 2 compared to all 4). The odds of reporting ever having ADHD did not differ between those who reported positive answers to three of the four factors and those who reported having all four factors (OR: 1.1; 95% CI: 0.9-1.4). These association patterns remained when all three neighborhood characteristics were tested simultaneously (see Table 3).

Results showing the association between level of perceived collective efficacy and risk of ADHD stratified by family-level SES (based on household income) are presented in Table 4. Accounting for all pertinent characteristics in Table 1, we found that low levels of perceived collective efficacy (0-1 out of 4 factors) were related to higher rates of ADHD among both poor (< 200%FPL: 14.7%; OR:1.4 [95% CI: 1.0-1.9] for comparing 0 or 1 *vs*. 4; overall p = .08) and non-poor (≥200%FPL: 15.3%; OR: 1.9 [95% CI: 1.3-2.8 for comparing 0 or 1 *vs*. 4, overall p = .0004]) families. While the association of collective efficacy with ADHD was stronger in non-poor families, the rates of ADHD diminished in both poor and non-poor families as perceptions of collective efficacy improved (see Table 4).

Table 4. Proportion of children aged 4-17 years ever diagnosed with ADHD in relation to level of perceived collective efficacy and socioeconomic status (based on household income) among families from the 2007 National Survey of Children's Health, accounting for socio-demographic factors in Table 1

	Level of Collective Efficacy (number of questions answered affirmatively)				
Socioeconomic status	0 or 1 out of 4	2 out of 4	3 out of 4	4 out of 4	overall p-value §
Low (< 200% FPL)					
Proportion of ADHD	14.7%	12.8%	8.8%	10.9%	.08
Odds ratio (95% CI) *	1.4 (1.0, 1.9)	1.2 (0.8, 1.8)	0.8 (0.6, 1.1)	Reference	
High (≥ 200% FPL)					
Proportion of ADHD	15.3%	14.4%	10.0%	8.1%	.0004
Odds ratio (95% CI) *	1.9 (1.3, 2.8)	2.0 (1.1, 3.8)	1.4 (1.0, 1.9)	Reference	

* Odds ratio and its 95% confidence interval (CI), compared to those with high level of collective efficacy (answered 4 out of 4 questions affirmatively);
§ Overall p-values for testing association of different levels of collective efficacy with ADHD.

4. DISCUSSION

In this study we demonstrated that individual perceptions of high neighborhood collective efficacy were associated with lower rates of ADHD, even after adjustment for multiple individual- and family-level covariates previously associated with ADHD risk. Unexpectedly, our study did not find a correlation between perceptions of neighborhood built environment or socioeconomic conditions and the odds of ADHD, even though neighborhood deprivation is associated with poor general health and mental health outcomes.[23,36]

Collective efficacy is a form of cognitive social capital that has been widely used in studies assessing the relationship between neighborhood or community context and health outcomes. Research has documented effects of collective efficacy on a number of health outcomes in children, including adolescent suicidality,[37] asthma,[38] obesity,[39] healthy activities,[40] general health,[41] neglectful and harsh parenting,[42] adolescent sexual risk behavior,[43] and mental health, including antisocial behavior at school entry,[30] internalizing problems among elementary school children,[29] and a composite childhood mental health scale.[44] However, to our knowledge, there are no studies specifically examining the role of collective efficacy on ADHD prevalence.

Our study findings expand upon several prior studies of children's mental health and collective efficacy. van der Linden *et al*. found that children from the most socioeconomically deprived neighborhoods were more likely to be referred to mental health services, but that high level of neighborhood collective efficacy mitigated this effect.[28] Odgers *et al*. found that children in socioeconomically disadvantaged neighborhoods had a higher overall rate of antisocial behaviors, but that high levels of collective efficacy in those neighborhoods was associated with a relative reduction in rates.[30] Xue *et al*. found that the prevalence of children with internalizing mental health disorders increased as socioeconomic status in their Chicago neighborhoods decreased.[29] How-

ever, this effect was mitigated in neighborhoods with high ratings of collective efficacy and community participation. More recently, Butler *et al*. studied the association between parent-reported neighborhood conditions and childhood internalizing and externalizing mental health conditions, using the same national data set as used in this study, the 2007 NSCH.[31] Although their study's design and results overlap considerably with the present study, a number of methodological differences exist. First, their study conceptualized and discussed neighborhood social capital in terms of social support and trust rather than the more specific formulation, collective efficacy, although both studies utilized the same 4 questions to create their respective composite social capital measures. Second, the Butler study hypothesized more generalized mental health effects of neighborhood conditions and grouped ADHD together with other disruptive behaviors, in contrast to our specific hypothesis regarding only ADHD. Finally, the present study utilized a covariate package that included multiple variables specifically related in previous studies to ADHD risk.

Our results suggest that the association between perceptions of collective efficacy and ADHD prevalence is similar regardless of family socioeconomic status. Prior research has shown that people living in deprived neighborhoods experience lower levels of social capital,[45] in line with our results (data not shown) showing lower levels of collective efficacy among those living at < 200% FPL. Our results also suggest that the potential influence of perceptions of better collective efficacy on ADHD prevalence is not confined solely to those with fewer resources. However, our results are based on an arbitrary binary classification of individual SES (poverty level 200%) and thus may not fully capture the different degree of effect modification by different levels of individual SES.

Two prior studies have examined childhood mental health outcomes in relation to measures of social capital and SES. Caughy *et al*. used census block data and family interviews to measure socioeconomic status and parental perceptions of neighborhood "psychological sense of community", the latter assessing general sense of community and level of interaction and familiarity with neighbors.[46] Parental scores corresponding to the lowest levels of familiarity with neighbors, an indicator of lower social capital, were associated with increased internalizing and externalizing child behaviors in wealthy families, but were protective against these behaviors in poor families, suggesting that social capital is not always protective and depends upon family SES. In contrast, Odgers found that collective efficacy measured at the neighborhood level was associated with reduced rates of childhood antisocial behavior for families living in deprived neighborhoods but not affluent ones.[30] Future research utilizing longitudinal datasets should examine whether ADHD risk is modified by collective efficacy among children from differing SES backgrounds.

Given the cross-sectional design of our study, the direction of the association between increased collective efficacy and reduced odds of ADHD cannot be determined. ADHD is known to negatively impact the social interactions of children.[47] Therefore, it is possible that caregivers of children with ADHD are more socially isolated because their children have more difficulty getting along with peers or because caregivers are concerned about how their child's externalizing behaviors will be interpreted by other members of the community. However, potential mechanisms in an opposite direction might also explain the relationship between collective efficacy and ADHD. Jensen *et al.* theorized that the increased levels of distractibility and impulsivity in ADHD are an adaptive response to a chaotic, unpredictable environment which requires children to be hyper vigilant and reactive.[48] This may partially explain why ADHD is more prevalent among low-SES children, since low-SES neighborhoods, in contrast to high-SES neighborhoods, are characterized by higher levels of stressors[49] and since strong correlations exist between neighborhood-level and family-level deprivation. High levels of collective efficacy within a community may suggest a more predictable, safe, and stable environment for the children residing there.

High level of collective efficacy may also represent a greater exposure to a wide range of childhood behaviors, occurring in everyday interactions with other children and parents in the community. This exposure may impact the ability of caregivers to interpret their child's behavior accurately on a continuum with other children in the community, which may then influence diagnosis. Although specific criteria must be met to diagnose ADHD, the determination of when behaviors begin to interfere with normal functioning is inherently subjective. Recent studies have demonstrated the importance of relative standards in ADHD diagnosis by showing that within a given grade level, the youngest children were more likely to be diagnosed with ADHD,[50] and treated with stimulants.[51] Another study showed that providing low-income mothers with video examples of typical children, children with ADHD, and children with ADHD plus a comorbidity, enabled them to more accurately characterize their own children's behaviors.[52] In communities with high levels of collective efficacy, this type of exposure to a wide range of childhood behaviors may be occurring in the context of everyday interactions with other parents and children in the community.

Increased levels of social capital may also act to reduce stress levels in parents and result in more positive parenting behaviors,[53] which may be protective in the development and severity of ADHD. Among children with ADHD, harsh parenting has been associated with increased oppositional behavior and conduct problems, and has been linked to impaired academic achievement and increased behavioral problems in school.[54]

Strengths of our study include the use of a nationally representative data set that allowed for the control of many risk factors that have previously been shown to affect ADHD prevalence. There are several limitations to this study that should be acknowledged. The cross-sectional design of the NSCH prevents interpretation of a causal relationship between collective efficacy and ADHD. Second, the prevalence of ADHD in our study was determined by caregiver report rather than a diagnostic interview and thus may be subject to recall bias and inconsistencies in diagnosis by community providers. Third, although we controlled for a large number of potential confounders, there were some variables that have been previously associated with ADHD which were not included in the survey data and thus could not be accounted for. These include low birth weight, lead exposure, family history of ADHD, and parenting practices. Fourth, because of the large numbers of parameters to estimate, we did not have adequate statistical power to estimate interactions between the three main exposures and other covariates. Fifth, while acknowledging the importance of racial and ethnic differences in ADHD prevalence, the relatively small proportion of subjects who fell into minority categories and limited categorization of race and ethnicity in the NSCH dataset did not allow us to pursue a more in depth exploration of this issue. Finally, our collective efficacy measure assessed individual perceptions of neighborhood social relationships, perceptions that may be confounded by individual personality traits for which we could not control.[55] These individual perceptions therefore did not represent an ecological or contextual neighborhood-level construct; this type of analysis was not possible with the data available from NSCH.

5. Conclusion

The development of ADHD is thought to be the result of complex gene-environment interactions. Our study provides evidence that perceived neighborhood collective efficacy may be an in important determinant of ADHD prevalence. Future research is needed to further characterize the relationship between social capital, individual- and family-level factors, and ADHD, and to explore the potential mechanisms that mediate their interaction. Future studies should also investigate ways to increase neighborhood social capital as a strategy to reduce the burden of ADHD.

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Conflicts of Interest Disclosure

The findings and conclusions in this article are those of the authors and do not necessarily represent the views of the National Center for Health Statistics, Centers for Disease Control and Prevention.

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