

# The protective role of community cohesion across rural and urban contexts: implications for youth mental health

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**Background:** Exposure to adversity (e.g., negative life events) and socioeconomic disadvantage can increase the risk for internalizing and externalizing symptoms, but many youth demonstrate resilience. Risk and protective factors may vary depending on geographic contexts (i.e., urban vs. rural areas). We hypothesized that community cohesion would mitigate the effects of adversity and disadvantage on youth mental health symptoms, especially among rural communities. **Method:** Data were drawn from the Adolescent Brain Cognitive Development (ABCD) Study ( $n = 10,812$ ), a longitudinal study in the United States. At baseline (9–10 years old), neighborhood socioeconomic disadvantage was measured with the Area Deprivation Index, and youth reported on the total number of negative life events they had experienced. At the 2-year follow-up, caregivers reported on cohesion within their community, and at the 3-year follow-up, they reported on their child's internalizing and externalizing symptomatology. A multiple-group path model was used to compare effects for youth living in urban versus rural areas. **Results:** In the urban subsample, results indicated a significant interaction between neighborhood disadvantage and community cohesion ( $\beta = -.03$ ,  $p = .004$ ), such that higher disadvantage was associated with higher externalizing (but not internalizing) symptomatology at low and medium, but not high, levels of cohesion. We identified similar patterns of results in the rural subsample, and the interaction neared conventional significance thresholds ( $\beta = -.09$ ,  $p = .052$ ). There was no significant interaction with adversity. **Conclusions:** Community cohesion may serve as a protective factor for youth experiencing neighborhood disadvantage by mitigating effects on externalizing symptoms.

## Key Practitioner Message

### *What is known?*

- Exposure to adversity and socioeconomic disadvantage can increase the risk for youth mental health problems, but community cohesion may be protective.

### *What is new?*

- Differences between youth in rural versus urban areas were examined. Results suggest that community cohesion is a significant protective factor for youth experiencing neighborhood socioeconomic disadvantage.

### *What is significant for clinical practice?*

- Strengthening community cohesion may help promote positive mental health outcomes. However, more research with rural youth is necessary.

**Keywords:** Mental health; adversity; resilience; adolescence

## Introduction

Exposure to adversity (e.g., negative life events) and socioeconomic disadvantage can increase the risk for youth mental health problems, such as internalizing and externalizing symptoms (e.g., McLaughlin et al., 2012; Wade, Wright, & Finegold, 2022). At the same time, many youth demonstrate resilience and adaptation despite conditions of adversity (Luthar, Cicchetti, & Becker, 2000). Community-level factors can help promote resilience and may be of particular

importance during the period of adolescence as youth experience increasing autonomy and spend more time outside of their homes (White et al., 2021). Community cohesion, the sense of mutual trust, support, and unity in a community, can promote youth well-being and offset the effects of stress and adversity (Gary, Stark, & LaVeist, 2007; Van Gundy, Stracuzzi, Rebellon, Tucker, & Cohn, 2011). However, the specific types of risk and protective factors and the ways in which they shape the development of psychopathology can vary depending on the context of place, such as urban versus rural

geographic areas (Didkowsky & Ungar, 2016). Indeed, Ecological Systems Theory emphasizes how the multiple levels of a child's environment interact to dynamically shape adjustment over time (Bronfenbrenner, 1977). Specifically, the influence of proximal risks, such as adversity, and more distal risks, such as economic disadvantage, may vary depending on macro-level contexts (e.g., geographic area). However, additional research is needed to clarify specifically how risk and protective factors operate across rural and urban contexts, a critical step in identifying potential intervention targets and mitigating disparities in youth mental health.

### *Adversity, socioeconomic disadvantage, and mental health*

Broadly, adversity can be conceptualized as experiences that require adaptation and are outside the normal expected environment (Lacey & Minnis, 2019). Many studies have demonstrated how exposure to adversity (e.g., witnessing violence, losing a family member, or being subjected to abuse or neglect) can increase the risk for internalizing and externalizing symptomatology (McLaughlin et al., 2012; Wade et al., 2022). Socioeconomic disadvantage is intertwined with adversity exposure in complex ways, and youth who experience disadvantage are often exposed to greater levels of adversity (Kurani et al., 2022). However, these are distinct constructs, and socioeconomic disadvantage does not necessarily (in and of itself) constitute adversity (Amso & Lynn, 2017). While disadvantage is often examined at the family level, neighborhood-level disadvantage can provide insight into the broader contexts of disadvantage that youth may be facing and acknowledge the sociopolitical stratification that can contribute to individual differences in development and mental health (Webb, Cardenas-Iniguez, & Douglas, 2022). For example, the Area Deprivation Index (a census-tract based metric of a residential area's disadvantage) has been linked to externalizing symptoms among youth, such that greater disadvantage was associated with higher symptoms (Beyer et al., 2024; Maxwell, Taylor, & Barch, 2023). Findings for internalizing symptoms have been less consistent (White et al., 2021). Despite some evidence for heightened risk, many youth who experience adversity or disadvantage will not experience negative mental health impacts, and certain protective factors may mitigate impacts on youth internalizing and externalizing symptomatology.

### *Protective role of community cohesion*

Community cohesion refers to the shared sense of trust, unity, and support within a neighborhood (Sampson, 2008). Higher levels of community cohesion have been associated with lower internalizing (Donnelly et al., 2016; Solmi, Colman, Weeks, Lewis, & Kirkbride, 2017) and externalizing (Kingsbury et al., 2015; Marçal & Maguire-Jack, 2022; Pei, Wang, Wu, Shockley McCarthy, & Wu, 2020) symptoms among youth. Some prior studies have specifically examined how community cohesion may moderate the effects of stress and adversity on mental health outcomes (Jaffee, Caspi, Moffitt, Polo-Tomás, & Taylor, 2007; Rivera & Doom, 2023; Silk, Sessa, Sheffield Morris, Steinberg, & Avenevoli, 2004). For example, in a large national sample of Canadian adolescents, Kingsbury, Clayborne, Colma, & Kirkbride

(2020) found that youth who had experienced any stressful life events (relative to youth who had not experienced any) were more likely to report later suicidal ideation, aggression/conduct disorder, and property offenses. These effects were stronger for youth in low-cohesion neighborhoods relative to high-cohesion neighborhoods, suggesting that high cohesion may buffer the effects of stressful life events. Similar evidence for this protective effect has been observed for internalizing symptoms, but only after age 11 (Riina, Martin, & Brooks-Gunn, 2014). While these findings provide compelling support for the protective role of community cohesion, research has overwhelmingly focused on urban contexts; additional research is necessary to evaluate whether these processes generalize to youth in rural areas.

### *Rural and urban settings*

Youths' geographic contexts can contribute to individual differences in mental health. Macro-level variations in cultural norms, expectations, and resources across geographic areas may shape the risk and protective factors that youth experience and the relative impacts on mental health. For example, there is evidence that rural youth experience elevated rates of suicide (Fontanella et al., 2015) and substance use (Warren, Smalley, & Barefoot, 2017) and are less likely to receive mental health services (Lipari, Hedden, Blau, & Rubenstein, 2016). Furthermore, there may be differences in the degree of community cohesion, with some findings indicating slightly higher cohesion in rural communities relative to urban (Avery, Hermsen, & Kuhl, 2021). The benefits of community cohesion, including fostering a sense of belonging and enhancing social support, are likely beneficial to most youth. We speculate that the higher levels of cohesion typically observed in rural areas may amplify this protective effect compared to urban areas. That is, while there is evidence that higher adversity and economic disadvantage are broadly associated with higher symptoms, the moderating role of community cohesion may be pronounced for youth in rural areas that tend to have higher cohesion. However, additional research is necessary to clarify how these factors drive differences in mental health outcomes, characterize variation across geographic contexts, and identify sources of resilience for youth in rural and urban communities.

### *Present study*

Large, multi-site studies have the potential to provide insight into risk and protective processes across a wide range of geographic contexts. For example, the Adolescent Brain Cognitive Development (ABCD) Study includes nearly 12,000 youth across 21 different sites in the United States (Casey et al., 2018). Though the majority of youth participating in the study reside in urban or suburban regions, there is also a proportion of rural youth (approximately 10% of the sample). To date, no study has examined this subset of youth and their unique sociocultural experiences, which represent a valuable opportunity to examine risk and protective factors across rural and urban contexts. We hypothesized that community cohesion would moderate the effects of adversity, such that the effects of socioeconomic disadvantage and adversity on mental health symptoms

would be weaker for youth living in communities with greater cohesion. We also predicted that the protective role of community cohesion would be stronger for youth in rural versus urban contexts. Hypotheses and planned analyses were preregistered on AsPredicted (protocol #1553441; [https://aspredicted.org/H2B\\_ZFT](https://aspredicted.org/H2B_ZFT)).

## Method

### Participants

Data were drawn from the 5.1 release (doi: [10.15154/z563-zd24](https://doi.org/10.15154/z563-zd24)) of the Adolescent Brain Cognitive Development (ABCD) Study ( $N = 11,868$ ), a longitudinal study of youth development in the United States (Casey et al., 2018). Beginning in 2017, participants were recruited from the catchment areas around each of the 21 nationally distributed study sites. Recruitment was largely school-based, with school selection informed by factors such as race/ethnicity, gender, urbanicity, and socioeconomic status to increase representation and minimize selection bias (full recruitment procedures are detailed in Garavan et al., 2018). The present analysis uses data from the baseline assessment (9–10 years of age), 1-year follow-up (10–11 years of age), 2-year follow-up (11–12 years of age), and 3-year follow-up (12–13 years of age). Youth participants' race (as reported by caregivers) was white (52%), Black (15%), Hispanic (20%), Asian (2%), or another race (10%). Median household income fell between \$75,000 and \$99,999. Procedures were approved by the Institutional Review Board, and all caregivers provided written informed consent, and children provided written assent (see Clark et al., 2018 for complete ethics and oversight in the ABCD Study).

### Measures

**Demographic information.** At baseline, caregivers completed a demographic interview where they reported information including their child's age, sex assigned at birth, and race and ethnicity. They also provided their child's primary residential address, which was used to geocode variables including neighborhood economic disadvantage and urbanicity (see details below).

**Neighborhood disadvantage.** Neighborhood disadvantage was indexed with the Area Deprivation Index (ADI), a composite metric of neighborhood-level disadvantage. This metric is part of the ABCD Study Linked External Data (LED), which uses geospatial location data to characterize the built and natural environments that youth are embedded in (Fan et al., 2021). The ADI is based on census-tract-level data, and higher levels reflect greater disadvantage (Table S1 includes the specific metrics that make up the composite).

**Adversity.** Adversity exposure was assessed with the Life Events Scale (Grant, Compas, Thurm, McMahon, & Gipsen, 2004; Hoffman et al., 2019) which was administered at the 1-year follow-up and indexes the total number of negative events that a child reported they have experienced during their lifetime. The measure includes 26 items such as, 'Someone in my family died', 'Was a victim of crime/violence/assault', and 'Family member had a mental or emotional problem'. All items are listed in Table S2. We used a sum score of the total number of events that children endorsed as negative, with higher scores reflecting greater exposure to negative/adverse events. This measure has demonstrated strong predictive validity and test-retest reliability (Brand & Johnson, 1982; Tiet et al., 1998).

**Community cohesion.** At the year-2 follow-up, caregivers reported on the degree of cohesion (e.g., trust, unity, support) within their community using the PhenX Neighborhood Collective Efficacy scale (Gonzalez et al., 2021). The cohesion subscale includes five items (listed in Table S3) which participants were asked to rate on a scale from 1 = *strongly disagree* to 5 = *strongly agree*.

Example items include, 'This is a close-knit neighborhood' and 'People in this neighborhood can be trusted'. We used the average of the subscale items, with higher scores reflecting greater community cohesion. The cohesion subscale demonstrated strong reliability in the sample at the year-2 follow-up ( $\alpha = .80$ ).

**Rurality and urbanicity.** The latitude and longitude of participants' residential addresses at baseline were geocoded by the ABCD Data Analysis Informatics and Resource Center (DAIRC). These data were used to create a categorical metric of 'Urban Area' based on US Census data. A census block is categorized as 'urban' if it includes greater than 2500 people, and 'rural' if it includes less than 2500 people (US Census Bureau, 2023).

**Internalizing and externalizing symptomatology.** Caregiver reports of their child's internalizing and externalizing symptoms were collected using the Child Behavior Checklist (CBCL; Achenbach & Rescorla, 2001). Symptoms and behaviors were rated on a 3-point Likert-type scale: 0 = *Not True*, 1 = *Somewhat or Sometimes True*, and 2 = *Very True or Often True*. We used raw sum scores from the year-three follow-up, with higher values indicating greater symptomatology. The CBCL has demonstrated strong psychometric properties in the ABCD Study (see Stewart et al., 2024).

### Analytic plan

Data were merged and cleaned, and descriptive statistics and correlations were performed in R (R Core Team, 2021). Predictor variables (i.e., neighborhood disadvantage, negative life events, and community cohesion) were grand mean-centered prior to analysis. The hypothesized model (see Figure 1) was tested in Mplus version 8.8 (Muthén & Muthén, 2017) using maximum likelihood estimation with robust standard errors (MLR). Code for the main analyses is available on the Open Science Framework (<https://osf.io/6d7su/>). We estimated (1) the main effects of neighborhood disadvantage, negative life events, and community cohesion on both internalizing and externalizing symptomatology, (2) the interactions between neighborhood disadvantage and cohesion and between negative life events and cohesion, and (3) the effects of sex and age as covariates. All possible paths were estimated (i.e., just-identified model) and so model fit could not be evaluated. The effects were estimated in a multiple-group model in order to compare rural and urban youth, and equality constraints were imposed on certain paths in order to evaluate whether the strength of the effects was significantly different between the two groups (using Wald tests of parameter constraints). Significant interactions were probed (using methods from Stride, Gardner, Catley, & Thomas, 2015) to determine the specific nature of the interaction, examining the effects of neighborhood disadvantage across low ( $-1SD$ ), medium (mean), and high ( $+1SD$ ) levels of community cohesion. To account for the sampling structure in the ABCD Study, we specified stratification by study site and clustering of siblings within families (using TYPE = COMPLEX), which adjusts the standard errors to account for the non-independence of observations.

The proportion of missing data ranged from 0% to 14.94% across all variables in the model. Missingness on model variables was related to observed data (race and sex), consistent with the assumption of missing at random.

random. Thus, full information maximum likelihood (FIML) estimation was used to handle missing data. Finally, we conducted preregistered sensitivity analyses to evaluate the influence of outliers. Specifically, we excluded any participants with internalizing or externalizing scores  $>3.29SD$  from the mean.

## Results

Table 1 includes descriptive statistics for the sample, and Figure 2 illustrates the correlations among key study variables across rural and urban youth. All variables were normally distributed, with levels of skewness less than 3 and kurtosis less than 10. We used analysis of variance (ANOVA) with a conservative correction for multiple testing (Bonferroni) to compare means on key study variables (Table 1). Youth living in rural areas had significantly higher levels of neighborhood disadvantage and community cohesion relative to youth living in urban areas. There were no significant group differences on negative life events or internalizing or externalizing symptomatology. There were 1056 cases with missing data on the grouping, stratification, or clustering variables and thus were excluded from the path model, resulting in an analytic sample of  $n = 10,812$  (rural  $n = 964$ ; urban  $n = 9848$ ).

### Main effects

The estimated model included all possible paths and thus was just identified (i.e.,  $\chi^2 = 0.00$ ,  $df = 0$ ). All parameter estimates are presented in Table 2. There was a significant main effect of neighborhood disadvantage on externalizing symptomatology for both urban ( $\beta = .03$ ,  $SE = 0.01$ ,  $p = .01$ ) and rural ( $\beta = .13$ ,  $SE = 0.04$ ,  $p = .02$ ) youth, suggesting that for a one-unit (i.e., 1SD) increase in disadvantage there was a .03 and .13 increase in externalizing symptomatology, respectively. This effect was significantly stronger for rural youth relative to urban youth (Wald  $\chi^2(1) = 6.49$ ,  $p = .01$ ). There was no main effect on internalizing symptomatology. For urban (but not rural) youth, there was a significant positive main effect of negative life events on both internalizing ( $\beta = .08$ ,  $SE = 0.01$ ,  $p < .001$ ) and externalizing ( $\beta = .13$ ,  $SE = 0.01$ ,

$p < .001$ ) symptomatology. For both rural and urban youth, higher community cohesion was associated with lower internalizing and externalizing symptomatology. This effect was not significantly different between groups for internalizing (Wald  $\chi^2(1) = 2.95$ ,  $p = .09$ ) or externalizing (Wald  $\chi^2(1) = 0.83$ ,  $p = .36$ ) symptomatology.

### Interaction effects

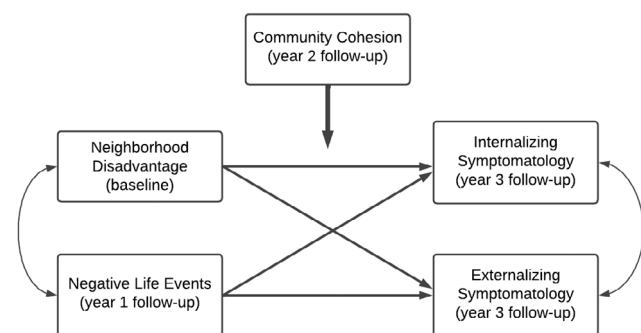
For urban youth, there was a significant interaction between neighborhood disadvantage and community cohesion on externalizing symptomatology ( $\beta = -.03$ ,  $SE = 0.01$ ,  $p = .004$ ). This effect neared conventional significance thresholds for rural youth ( $\beta = -.09$ ,  $SE = 0.05$ ,  $p = .052$ ); however, the strength of the effect was not significantly different between groups (Wald  $\chi^2(1) = 2.05$ ,  $p = .15$ ). For urban youth, higher neighborhood disadvantage was associated with higher externalizing symptomatology at low ( $b = 0.17$ ,  $SE = 0.04$ ,  $p < .001$ ) and medium ( $b = 0.08$ ,  $SE = 0.03$ ,  $p = .01$ ), but not high ( $b = -0.001$ ,  $SE = 0.04$ ,  $p = .98$ ), levels of community cohesion. Similarly, for rural youth, higher neighborhood disadvantage was associated with higher externalizing symptomatology at low ( $b = 0.14$ ,  $SE = 0.04$ ,  $p < .001$ ) and medium ( $b = 0.06$ ,  $SE = 0.03$ ,  $p = .03$ ), but not high ( $b = -0.01$ ,  $SE = 0.04$ ,  $p = .75$ ), levels of community cohesion. There was not a significant effect of the interaction between negative life events and community cohesion for either group.

### Sensitivity analysis

We conducted preregistered supplemental sensitivity analyses to examine the influence of any outliers on the results. Excluding outliers resulted in an analytic sample of  $n = 8984$  (rural  $n = 783$ ; urban  $n = 8201$ ). Most results, including the primary finding (i.e., the significant interaction between neighborhood disadvantage and community cohesion on externalizing symptomatology), remained unchanged. Some small changes were observed in the main effects in the rural group. Specifically, the impact of neighborhood disadvantage on internalizing symptomatology became significant ( $\beta = -.09$ ,  $SE = 0.05$ ,  $p = .048$ ), and the effect on externalizing symptomatology became non-significant ( $\beta = .06$ ,  $SE = 0.04$ ,  $p = .15$ ). We also conducted additional sensitivity analyses including caregiver income and education as additional covariates. The main pattern of results remained the same and is reported in the Supporting Information.

## Discussion

Delineating how adverse experiences and disadvantage shape development is crucial to identifying potential intervention targets and mitigating disparities in youth mental health. However, evidence from this area of research has overwhelmingly been conducted with youth in urban or suburban regions, potentially obscuring important variation across geographic contexts. Here, we highlight rurality and urbanicity as one aspect of youths' physical environments that interact with risk and protective factors to shape mental health. Among youth in the ABCD Study, our findings suggest that community cohesion may serve as a protective factor for youth experiencing neighborhood disadvantage by mitigating effects on externalizing symptoms.



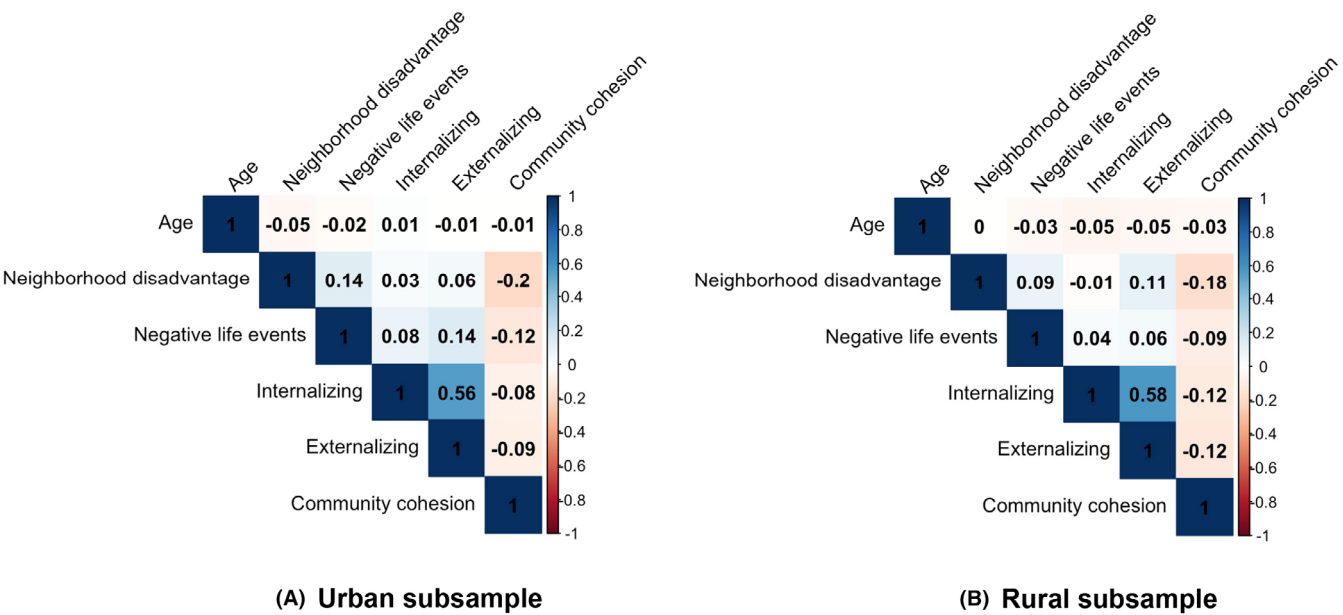
**Figure 1.** Conceptual model illustrating the hypothesized associations among negative life events, neighborhood disadvantage, and internalizing and externalizing symptomatology, moderated by community cohesion. A multiple-group model was estimated to examine differences in these associations between youth in rural and urban areas



**Table 1.** Descriptive statistics for key study variables for the full sample and rural and urban subsamples

Variable	Full sample ( <i>n</i> = 11,878)			Urban subsample ( <i>n</i> = 9850)			Rural subsample ( <i>n</i> = 964)			Urban versus rural group difference
	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	<i>M</i>	<i>SD</i>	Range	Cohen's <i>d</i>
Neighborhood disadvantage	94.64	21.16	1.07–125.75	94.05	21.93	1.07–125.75	96.82	14.68	1.07–120.97	<b>−.13</b>
Negative life events	2.45	2.29	0.00–20.00	2.46	2.28	0.00–20.00	2.29	2.24	0.00–13.00	.08
Community cohesion	3.71	0.70	1.00–5.00	3.70	0.70	1.00–5.00	3.85	0.65	1.00–5.00	<b>−.22</b>
Internalizing symptomatology	5.14	5.94	0.00–49.00	5.17	5.97	0.00–49.00	5.05	5.96	0.00–42.00	.02
Externalizing symptomatology	3.90	5.53	0.00–49.00	3.91	5.50	0.00–48.00	3.85	5.48	0.00–49.00	.01

Cohen's *d* values in bold are significant after Bonferroni correction for multiple testing.



**Figure 2.** Correlations among study variables for (A) youth in urban areas and (B) youth in rural areas

**Table 2.** Parameter estimates for the multiple-group model

Independent variable	Urban						Rural					
	Internalizing			Externalizing			Internalizing			Externalizing		
	Coefficient	<i>SE</i>	<i>p</i>	Coefficient	<i>SE</i>	<i>p</i>	Coefficient	<i>SE</i>	<i>p</i>	Coefficient	<i>SE</i>	<i>p</i>
(Intercept)	.53	.17	.002	.85	.17	<.001	1.57	.52	.003	1.64	.53	.002
Age	.02	.01	.13	−.004	.01	.70	−.05	.03	.13	−.06	.03	.10
Sex	<b>.08</b>	<b>.01</b>	<b>&lt;.001</b>	<b>0.08</b>	<b>.01</b>	<b>&lt;.001</b>	<b>.11</b>	<b>.04</b>	<b>.004</b>	<b>−.08</b>	<b>.03</b>	<b>.02</b>
Neighborhood disadvantage	.01	.01	.55	<b>.03</b>	<b>.01</b>	<b>.01</b>	−.05	.04	.26	<b>.13</b>	<b>.04</b>	<b>.02</b>
NLE	<b>.08</b>	<b>.01</b>	<b>&lt;.001</b>	<b>.13</b>	<b>.01</b>	<b>&lt;.001</b>	.04	.04	.30	.04	.04	.98
Cohesion	−.07	.01	<.001	−.07	.01	<.001	−.14	.04	.001	−.10	.04	.01
NLE × cohesion	.00	.01	.98	−.01	.01	.38	−.03	.04	.50	−.02	.05	.75
Neighborhood disadvantage × cohesion	−.002	.01	.86	−.03	.01	.004	.01	.04	.80	−.09	.05	.052

Regression coefficients are standardized and significant effects (*p* < .05) are presented in bold. NLE, negative life events.

Findings suggest some descriptive differences between youth in rural versus urban areas. Youth living in rural areas had significantly higher levels of

neighborhood disadvantage and community cohesion relative to youth living in urban areas. Prior research has similarly illustrated heightened social and economic

disadvantage in rural communities in the United States (USDA Economic Research Service, 2024; albeit with some variation depending on year and metric used, see Nolan, Waldfogel, & Wimer, 2017), which is tied to social determinants of health such as educational and occupational opportunities, housing conditions, and healthcare access (US Department of Health and Human Services, 2024). At the same time, rural communities are often perceived to be more cohesive and harmonious, which is corroborated by the present findings as well as prior work (e.g., Avery et al., 2021).

Our primary hypothesis was partially supported. In the urban subsample, results indicated a significant interaction between neighborhood disadvantage and community cohesion, such that higher neighborhood disadvantage was associated with higher externalizing symptomatology at low and medium, but not high, levels of community cohesion. Thus, while neighborhood disadvantage may increase the risk for externalizing symptoms, high community cohesion seems to serve a protective role. This finding aligns with theoretical and empirical work demonstrating the benefits of social capital for youth mental health and well-being (Donnelly et al., 2016; Pei et al., 2020; Sampson, 2008), as well as the important interplay between different levels of youths' environments (Bronfenbrenner, 1977). This effect was specific to externalizing symptoms. We speculate that community cohesion may protect youth from externalizing problems through the collective encouragement of positive, prosocial behaviors, and discouragement of negative behaviors such as aggression or rule-breaking. The interaction between neighborhood disadvantage and community cohesion neared the conventional significance threshold in the rural subsample ( $p = .052$ ). When comparing the effect sizes for this interaction effect between the rural and urban groups, there was no significant difference, suggesting that the effects were comparable in magnitude across the two groups. Thus, the buffering role of community cohesion may be consistent, regardless of rural or urban contexts. Future research, ideally with a larger proportion of rural youth, will be important to clarify the robustness of these associations and the specific patterns of the interactions. Nonetheless, these findings broadly align with evidence from rural communities that indicate strong, collective interest in the prevention of youth mental health disorders (Smith et al., 2025) which may manifest as proactive efforts by adults to mentor, support, and look out for the well-being of youth in their communities to mitigate externalizing behaviors. Internalizing symptoms are inherently less observable than externalizing symptoms, potentially limiting the capacity of community members to identify and address these issues across both rural and urban contexts. This reduced visibility may partly account for the lack of an observed protective effect on internalizing symptoms.

There was not a significant interaction between community cohesion and negative life events for either group. This result is inconsistent with findings from Kingsbury et al. (2015) which showed that the effect of stressful life events on adolescent mental health was moderated by community cohesion. This discrepancy may be attributed to differences in study sample (e.g., Canadian vs. US youth; generational differences) and analytic decisions (e.g., dichotomization of adversity and

mental health variables in Kingsbury et al.). While there was no moderating effect, there was a significant main effect within the urban (but not rural) subsample, such that more negative life events were associated with higher internalizing and externalizing symptoms. Findings comparing the degree of youth adversity exposure between rural and urban areas have been relatively mixed and depend on the types of adversities that are being considered, as well as the operational definition of 'rural' (Crouch, Radcliff, Merrell, & Bennett, 2021). It is possible that the measure of adversity used here does not account for the full range of stressors that youth in rural areas may be experiencing; expanded measures that account for salient stressors (e.g., geographical isolation, limited access to mental healthcare) would be helpful in further clarifying these differences.

This study benefits from a large national sample, longitudinal design, and incorporation of multiple measurement methods (i.e., parent report, youth report, and geocoded data). Nonetheless, the present study should be interpreted in light of some limitations. First, while the ABCD Study can provide preliminary insight into variability in developmental outcomes across geographic areas, the sample is primarily composed of youth in urban or urbanized regions (Fan et al., 2021). The ABCD sample is large and diverse, but is not nationally representative, and targeted studies are critical to better understand youth development and mental health in rural contexts. Furthermore, it is unclear whether these findings would generalize to youth living outside of the United States. Second, we used a relatively broad index of adversity (lifetime number of negative events). While this was an important first step in delineating interactions with community cohesion and variation across geographic areas, key factors such as type, timing, and chronicity of adversity could not be accounted for. Finally, we focused on community cohesion as a potential protective factor; however, other aspects of youths' physical environments that vary across geographic contexts (e.g., access to green space, neighborhood safety) may also moderate associations between adversity and mental health, and these will be important considerations for future research. Future studies will also be important in delineating the longer-term effects of these processes on youth mental health, as data were only available through ages 12–13 and other symptom patterns may emerge later in development. Indeed, in a multilevel approach, Riina et al. (2014) found that the protective effect of neighborhood cohesion on internalizing symptoms only emerged after age 11. The ongoing, longitudinal design of the ABCD Study means that we will be able to conduct additional analyses in the future to account for these timing-related considerations and capture how risk and protective processes fluctuate across adolescence.

## Conclusion

Taken together, our findings highlight important risk and protective factors influencing youth mental health across rural and urban communities. Results suggest that community cohesion is a significant protective factor for youth experiencing neighborhood socioeconomic disadvantage in urban areas, and future research will be important to examine the robustness

of this association for youth in rural areas. Reducing systemic inequities that are tied to youths' place of residence (i.e., neighborhood disadvantage) should be a key focus for policymakers and practitioners in the prevention of mental health problems. For youth who are already experiencing disadvantage, fostering community cohesion may serve as a compensatory mechanism to offset risks, particularly for externalizing symptoms. Interventions designed to strengthen community cohesion have shown promising preliminary results (Orazani, Reynolds, & Osborne, 2023; Shen et al., 2017) and could be strategically scaled to support resilience. These interventions might include facilitating participation in community service, creating opportunities for community members to come together in social events, and increasing social interactions. By fostering a sense of belonging and collective efficacy, such programs may help reduce the prevalence of youth mental health problems, both as preventive measures and as targeted supports for youth living in disadvantaged neighborhood contexts.

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## Conflict of interest statement

The authors have no conflicts of interest to report.

## Ethics statement

Procedures were approved by the Institutional Review Board, and all participants provided informed consent or assent.

## Data availability statement

Data were drawn from the 5.1 release (doi:[10.15154/z563-zd24](https://doi.org/10.15154/z563-zd24)) of the Adolescent Brain Cognitive Development (ABCD) Study, which can be accessed by individuals with an active data use agreement.

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## Supporting information

Additional Supporting Information may be found in the online version of this article:

**Table S1.** Census-tract estimates used to derive a composite of Area Deprivation Index (ADI) in the ABCD Study (Fan et al., 2021).

**Table S2.** Items from the Life Events Scale (Grant et al., 2004; Hoffman et al., 2019).

**Table S3.** Items from the cohesion subscale of the PhenX Neighborhood Collective Efficacy Scale (Gonzalez et al., 2021).

## References

- Achenbach, T.M., & Rescorla, L.A. (2001). *Manual for the ASEBA Adult Forms & Profiles*. Burlington: University of Vermont, Research Center for Children, Youth, and Families.
- Amso, D., & Lynn, A. (2017). Distinctive mechanisms of adversity and socioeconomic inequality in child development: A review and recommendations for evidence-based policy. *Policy Insights from the Behavioral and Brain Sciences*, 4, 139–146.
- Avery, E.E., Hermesen, J.M., & Kuhl, D.C. (2021). Toward a better understanding of perceptions of neighborhood social cohesion in rural and urban places. *Social Indicators Research*, 157, 523–541.
- Beyer, L., Keen, R., Ertel, K.A., Okuzono, S.S., Pintro, K., Delaney, S., & Slopen, N. (2024). Comparing two measures of neighborhood quality and internalizing and externalizing behaviors in the adolescent brain cognitive development study. *Social Psychiatry and Psychiatric Epidemiology*, 59, 1321–1334.
- Brand, A.H., & Johnson, J.H. (1982). Note on reliability of the Life Events Checklist. *Psychological Reports*, 50, 1274.
- Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist*, 32, 513.
- Casey, B.J., Cannonier, T., Cannonier, T., Conley, M.I., Cohen, A.O., Barch, D.M., ... & Dale, A.M. (2018). The Adolescent Brain Cognitive Development (ABCD) study: Imaging acquisition across 21 sites. *Developmental Cognitive Neuroscience*, 32, 43–54.
- Clark, D.B., Fisher, C.B., Bookheimer, S., Brown, S.A., Evans, J.H., Hopfer, C., ... & Yurgelun-Todd, D. (2018). Biomedical ethics and clinical oversight in multisite observational neuroimaging studies with children and adolescents: The ABCD experience. *Developmental Cognitive Neuroscience*, 32, 143–154.
- Crouch, E., Radcliff, E., Merrell, M.A., & Bennett, K.J. (2021). Rural-urban differences in positive childhood experiences across a national sample. *The Journal of Rural Health*, 37, 495–503.
- Didkowsky, N., & Ungar, M. (2016). A social ecological approach to understanding resilience among rural youth. In *The Routledge international handbook of psychosocial resilience*. Abingdon: Routledge.
- Donnelly, L., McLanahan, S., Brooks-Gunn, J., Garfinkel, I., Wagner, B.G., Jacobsen, W.C., ... & Gaydos, L. (2016). Cohesive neighborhoods where social expectations are shared may have positive impact on adolescent mental health. *Health Affairs*, 35, 2083–2091.
- Fan, C.C., Marshall, A., Smolker, H., Gonzalez, M.R., Tapert, S.F., Barch, D.M., ... & Herting, M.M. (2021). Adolescent Brain Cognitive Development (ABCD) study linked external data (LED): Protocol and practices for geocoding and

- assignment of environmental data. *Developmental Cognitive Neuroscience*, 52, 101030.
- Fontanella, C.A., Hiance-Steelesmith, D.L., Phillips, G.S., Bridge, J.A., Lester, N., Sweeney, H.A., & Campo, J.V. (2015). Widening rural-urban disparities in youth suicides, United States, 1996–2010. *JAMA Pediatrics*, 169, 466–473.
- Garavan, H., Bartsch, H., Conway, K., Decastro, A., Goldstein, R.Z., Heeringa, S., ... & Zahs, D. (2018). Recruiting the ABCD sample: Design considerations and procedures. *Developmental Cognitive Neuroscience*, 32, 16–22.
- Gary, T.L., Stark, S.A., & LaVeist, T.A. (2007). Neighborhood characteristics and mental health among African Americans and whites living in a racially integrated urban community. *Health & Place*, 13, 569–575.
- Gonzalez, R., Thompson, E.L., Sanchez, M., Morris, A., Gonzalez, M.R., Feldstein Ewing, S.W., ... & Zucker, R.A. (2021). An update on the assessment of culture and environment in the ABCD study®: Emerging literature and protocol updates over three measurement waves. *Developmental Cognitive Neuroscience*, 52, 101021.
- Grant, K.E., Compas, B.E., Thurm, A.E., McMahon, S.D., & Gipson, P.Y. (2004). Stressors and child and adolescent psychopathology: Measurement issues and prospective effects. *Journal of Clinical Child & Adolescent Psychology*, 33, 412–425.
- Hoffman, E.A., Clark, D.B., Orendain, N., Hudziak, J., Squeglia, L.M., & Dowling, G.J. (2019). Stress exposures, neurodevelopment and health measures in the ABCD study. *Neurobiology of Stress*, 10, 100157.
- Jaffee, S., Caspi, A., Moffitt, T.E., Polo-Tomás, M., & Taylor, A. (2007). Individual, family, and neighborhood factors distinguish resilient from non-resilient maltreated children: A cumulative stressors model. *Child Abuse & Neglect*, 31, 231–253.
- Kingsbury, M., Clayborne, Z., Colman, I., & Kirkbride, J.B. (2020). The protective effect of neighbourhood social cohesion on adolescent mental health following stressful life events. *Psychological Medicine*, 50(8), 1292–1299.
- Kingsbury, M., Kirkbride, J.B., McMartin, S.E., Wickham, M.E., Weeks, M., & Colman, I. (2015). Trajectories of childhood neighbourhood cohesion and adolescent mental health: Evidence from a national Canadian cohort. *Psychological Medicine*, 45, 3239–3248.
- Kurani, S., Webb, L., Cadet, K., Ma, M., Gibson, M., Jallah, N., ... & Johnson, R.M. (2022). Area-level deprivation and adverse childhood experiences among high school students in Maryland. *BMC Public Health*, 22, 811.
- Lacey, R.E., & Minnis, H. (2019). Practitioner review: Twenty years of research with adverse childhood experience scores – Advantages, disadvantages and applications to practice. *Journal of Child Psychology and Psychiatry*, 61, 116–130.
- Lipari, R., Hedden, S., Blau, G., & Rubenstein, L. (2016). Adolescent mental health service use and reasons for using services in specialty, educational, and general medical settings. Available from: <https://www.samhsa.gov/data/sites/default/files/report-1973/ShortReport-1973.html> [last accessed May 2024].
- Luthar, S.S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development*, 71, 543–562.
- Marçal, K.E., & Maguire-Jack, K. (2022). Informal supports, housing insecurity, and adolescent outcomes: Implications for promoting resilience. *American Journal of Community Psychology*, 70, 178–196.
- Maxwell, M.Y., Taylor, R.L., & Barch, D.M. (2023). Relationship between neighborhood poverty and externalizing symptoms in children: Mediation and moderation by environmental factors and brain structure. *Child Psychiatry & Human Development*, 54, 1710–1722.
- McLaughlin, K.A., Green, J.G., Gruber, M.J., Sampson, N.A., Zaslavsky, A.M., & Kessler, R.C. (2012). Childhood adversities and first onset of psychiatric disorders in a national sample of US adolescents. *Archives of General Psychiatry*, 69, 1151–1160.
- Muthén, L.K., & Muthén, B. (2017). *Mplus user's guide: Statistical analysis with latent variables, user's guide*. Los Angeles, CA: Muthén & Muthén.
- Nolan, L.B., Waldfogel, J., & Wimer, C. (2017). Long-term trends in rural and urban poverty: New insights using a historical supplemental poverty measure. *The Annals of the American Academy of Political and Social Science*, 672, 123–142.
- Orazani, S.N., Reynolds, K.J., & Osborne, H. (2023). What works and why in interventions to strengthen social cohesion: A systematic review. *Journal of Applied Social Psychology*, 53, 938–995.
- Pei, F., Wang, Y., Wu, Q., Shockley McCarthy, K., & Wu, S. (2020). The roles of neighborhood social cohesion, peer substance use, and adolescent depression in adolescent substance use. *Children and Youth Services Review*, 112, 104931.
- R Core Team. (2021). *R: A language and environment for statistical computing [computer software]*. Vienna: R Foundation for Statistical Computing. Available from: <https://www.r-project.org/>
- Riina, E.M., Martin, A., & Brooks-Gunn, J. (2014). Parent-to-child physical aggression, neighborhood cohesion, and development of children's internalizing and externalizing. *Journal of Applied Developmental Psychology*, 35, 468–477.
- Rivera, K.M., & Doom, J.R. (2023). The role of neighborhood collective efficacy in moderating associations between adversity and internalizing and externalizing problems in adolescents. *Journal of Community Psychology*, 51, 1736–1755.
- Sampson, R.J. (2008). Collective efficacy theory: Lessons learned and directions for future inquiry. In *Taking stock*. New Brunswick, NJ: Routledge.
- Shen, C., Wan, A., Kwok, L.T., Pang, S., Wang, X., Stewart, S.M., ... & Chan, S.S. (2017). A community based intervention program to enhance neighborhood cohesion: The learning families project in Hong Kong. *PLoS One*, 12, e0182722.
- Silk, J.S., Sessa, F.M., Sheffield Morris, A., Steinberg, L., & Avenevoli, S. (2004). Neighborhood cohesion as a buffer against hostile maternal parenting. *Journal of Family Psychology*, 18, 135–146.
- Smith, M.L., Rossetto, K., Campbell, M.D., Mann, M.J., & Griffin, K. (2025). Rural community perceptions on youth mental health: Developing the case for a community-engaged approach. *Journal of Rural Mental Health*, 49, 43–51.
- Solmi, F., Colman, I., Weeks, M., Lewis, G., & Kirkbride, J.B. (2017). Trajectories of neighborhood cohesion in childhood, and psychotic and depressive symptoms at age 13 and 18 years. *Journal of the American Academy of Child & Adolescent Psychiatry*, 56, 570–577.
- Stewart, L.C., Asadi, S., Rodriguez-Seijas, C., Wilson, S., Michelini, G., Kotov, R., ... & Olino, T.M. (2024). Measurement invariance of the Child Behavior Checklist (CBCL) across race/ethnicity and sex in the Adolescent Brain and Cognitive Development (ABCD) study. *Psychological Assessment*, 36(8), 441–451.
- Stride, C.B., Gardner, S., Catley, N., & Thomas, F. (2015). Mplus code for the mediation, moderation, and moderated mediation model templates from Andrew Hayes' PROCESS analysis examples. Available from: <http://www.offbeat.group.shef.ac.uk/FIO/mplusmedmod.htm>
- Tiet, Q.Q., Bird, H.R., Davies, M., Hoven, C., Cohen, P., Jensen, P.S., & Goodman, S. (1998). Adverse life events and resilience. *Journal of the American Academy of Child & Adolescent Psychiatry*, 37, 1191–1200.
- US Census Bureau. (2023). *Urban and rural*. Census.Gov. Available from: <https://www.census.gov/programs-surveys/geography/guidance/geo-areas/urban-rural.html> [last accessed May 2024].
- US Department of Health and Human Services. (2024). *Social Determinants of Health Literature Summaries—Healthy People 2030*. Available from: <https://health.gov/healthypeople/priority-areas/social-determinants-health/literature-summaries> [last accessed May 2024].



- USDA Economic Research Service. (2024). *State Fact Sheets: United States*. Available from: <https://data.ers.usda.gov/reports.aspx?ID=17854> [last accessed May 2024].
- Van Gundy, K.T., Stracuzzi, N.F., Rebellon, C.J., Tucker, C.J., & Cohn, E.S. (2011). Perceived community cohesion and the stress Process in youth. *Rural Sociology*, 76, 293–318.
- Wade, M., Wright, L., & Finegold, K.E. (2022). The effects of early life adversity on children's mental health and cognitive functioning. *Translational Psychiatry*, 12, 244.
- Warren, J.C., Smalley, K.B., & Barefoot, K.N. (2017). Recent alcohol, tobacco, and substance use variations between rural and urban middle and high school students. *Journal of Child & Adolescent Substance Abuse*, 26, 60–65.
- Webb, E.K., Cardenas-Iniguez, C., & Douglas, R. (2022). Radically reframing studies on neurobiology and socioeconomic circumstances: A call for social justice-oriented neuroscience. *Frontiers in Integrative Neuroscience*, 16, 958545.
- White, R.M.B., Witherspoon, D.P., Wei, W., Zhao, C., Pasco, M.C., Maereg, T.M., & Group, P. D. W. (2021). Adolescent development in context: A decade review of neighborhood and activity space research. *Journal of Research on Adolescence*, 31, 944–965.

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