Neurodevelopmental and Behavioral Correlates of Household Structure Independent of Socioeconomic Status

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Background

- Household structure is associated with parental socioeconomic status (SES) and has been identified as a risk factor for mental health symptoms in children (1-3)
- Few studies have examined the effects of household structure on children's brain and behavioral development, independent of SES.
- The current study aimed to examine whether children from single-parent and two-parent households differ in psychopathology symptoms and brain structure.

Methods

Participants: We utilized baseline data from the Adolescent Brain Cognitive Development (ABCD) Study (version 5.1). Participants were 8,724 children (ages 9-10) belonging to either single-parent or two-parent households. The ABCD Study is an on-going NIH-funded longitudinal study of children and adolescent's brain development and health.

Measures:

Household Structure: Single- vs two-parent household structure was determined based on responses from the caregiver demographics survey. We restricted the sample to caregivers who endorsed being "Married" (two-parent household) or "Never Married" (single-parent household).

Socioeconomic Status: Parental SES was assessed using data on family income and parental education level from the caregiver demographics survey.

Psychopathology Symptoms: The Child Behavioral Checklist (CBCL), a 113-item parent report measure, was used to assess children's behavioral and emotional problems over the last six months.

Brain Imaging Acquisition: Structural MRI data were collected across 21 ABCD data collection sites using multiple 3T scanner models. The ABCD Data Analysis and Informatics Center conducted basic preprocessing steps including reorientation, motion correction, intensity correction, skull stripping, and spatial normalization and quality control procedures. Images were parcellated into 68 cortical and 19 subcortical regions using well-established atlases (4-5).

Data analysis: Data analyses were performed using R Studio and Mplus. Associations between household structure and SES were tested. Using multiple regression models, household structure was tested as a predictor of the CBCL psychopathology scales with age, sex, site, family income, and parental education added as covariates. Structural equation modeling was used to assess group differences in gray matter volume while adjusting for the same covariates. Sensitivity analyses further controlled for parental monitoring, perceived caregiver warmth, and total psychopathology. False discovery rate (FDR) correction was applied for multiple comparisons.

Results

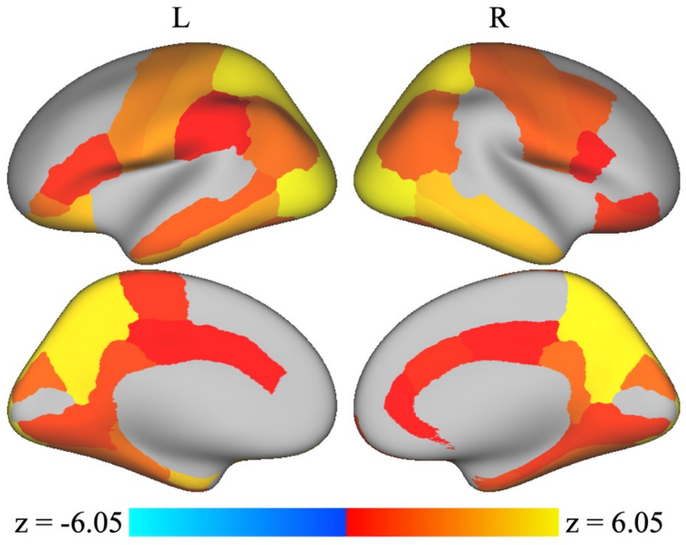
Table 1. Demographics of the sample (N=8,724)

	Sample Size (N)	Percent (%)
Race/Ethnicity		
White	5,018	57.52
Black/African American	1,116	12.79
Hispanic	1,486	17.03
Other	1,104	12.65
Parental Education		
No degree	269	3.08
Highschool/GED	860	9.86
Associate's degree	1,060	12.15
Bachelor's degree	2,699	30.94
Master's degree	1,900	21.78
Professional/Doctoral degree	618	7.08

	Sample Size (N)	Percent (%)
Sex		
Male	4,542	52.06
Female	4,182	46.47
Income		
$5,000 or less	277	3.17
$5,000-$11,999	273	3.13
$12,000-$15,999	174	1.99
$16,000-$24,499	316	3.62
$25,000-$34,999	429	4.92
$35,000-$49,999	604	6.92
$50,000-$74,999	1,102	12.63
$75,000-$99,999	1,331	15.26
$100,000-$199,999	3,042	34.87
$200,000 or more	1,176	13.48

	Sample Size (N)	Percent (%)
Household Structure		
Married	7,472	85.64
Never Married	1,252	14.35

Figure 1. Cortical regions with significant associations with household structure, controlling for socioeconomic status



Note. Children in two-parent households had significantly larger volumes in frontal, temporal, parietal, and occipital regions compared to children from single-parent households. Significant positive associations were also found for subcortical regions including the caudate, putamen, hippocampus, amygdala, and cerebellum.

Discussion

- Compared with children from single-parent households, children from two-parent households had significantly higher family income and parental education (p-values < .01).
- Children from two-parent households reported fewer symptoms of aggressive behavior, attention problems, rule-breaking behavior, social problems, total externalizing behavior, total psychopathology problems, ADHD, and conduct problems (p-values < .01).
- Males endorsed greater conduct problems, oppositional defiant issues, aggressive behavior, externalizing symptoms, rule-breaking behavior, social problems, depressive symptoms, withdrawn-depressed symptoms, and total problems compared to females (p-values < .05).
  - These relationships were stronger in single-parent households
- Children from two-parent households showed significantly larger gray matter volumes in widespread cortical and subcortical regions compared to children from single-parent households, independent of socioeconomic status ($p_{fdr} \leq .049$).
- These results remained significant after controlling for parental monitoring, perceived caregiver warmth, and total psychopathology scores.

Conclusions

- The results of this study suggest that household structure is associated with differences in psychopathology symptoms and structural brain development beyond the effects of SES.
- Future studies would benefit from clarifying whether these associations are driven by causal processes or shared familial factors and identifying pathways that mitigate these associations.

References

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