Introduction

• Background: Early life stress can adversely affect the developing brain. While hierarchical modeling has established the existence of a general factor of psychopathology, no studies have modeled a general factor of environmental stress and related this to brain development

• Objective: Identify general and specific factors of environmental stress and test their associations with brain structures and psychopathology symptoms in children

• Hypotheses: General factor of environmental stress will be related to globally smaller brain volumes and thinner cortices as well as greater psychopathology

Materials and Methods

• Participants: 9-10 year old children from Wave 1 (release 3.0) of the Adolescent Brain and Cognitive DevelopmentSM Study (ABCD Study®; N = 11,878, 51% male, 53% White)

• Environment Measures: 117 items reflecting early life stress (e.g., family/community characteristics, physical environment, and interpersonal relationship)

• Psychopathology Measures: 66 Child Behavior Checklist items

• Brain Structures: Regional cortical and subcortical gray matter volume (GMV) and cortical thickness were examined

• Statistical Analyses
  - Exploratory Structural Equation Modeling followed by Bifactor Modeling identified general and specific factors of environmental stress and psychopathology
  - Structural Equation Modeling was performed with 1) environmental factors predicting regional cortical thickness and GMV, controlling for demographic factors and scanner models and 2) environmental factors predicting psychopathology symptoms

Results

Figure 1. A bifactor analysis identified general and specific factors of environmental stressors and psychopathology

Table 1. Regression coefficients (β) indicating the relationship between environmental stress factors and psychopathology dimensions (FDR; q < .05)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>General Environmental Stress</th>
<th>Family Dynamics</th>
<th>Interpersonal Support</th>
<th>Neighboring Deprivation</th>
<th>Urbanicity</th>
</tr>
</thead>
<tbody>
<tr>
<td>General Psychopathology</td>
<td>-0.03ba</td>
<td>0.84***</td>
<td>-0.15***</td>
<td>0.02sb</td>
<td>-0.02sb</td>
</tr>
<tr>
<td>Internalizing</td>
<td>0.08***</td>
<td>-0.00ns</td>
<td>0.08b</td>
<td>0.05bs</td>
<td>-0.02bs</td>
</tr>
<tr>
<td>ADHD</td>
<td>0.09***</td>
<td>0.84***</td>
<td>-0.25***</td>
<td>0.08b</td>
<td>-0.04</td>
</tr>
<tr>
<td>Conduct Problems</td>
<td>0.09***</td>
<td>0.92***</td>
<td>-0.23***</td>
<td>0.08b</td>
<td>-0.03s</td>
</tr>
</tbody>
</table>

Conclusions

• The current study found the hierarchical structure of environmental stress, which is consistent with prior theories of environmental influence on child development

• Bronfenbrenner's ecological systems theory suggests that child development is affected by multiple levels of child's environment from the immediate family/school characteristics to the broad influence of the society

• The general and specific factors of environmental stress may possess risk on brain-behavior outcomes

• On the other hand, the “unique” variance of urbanicity might be distinctive from other stress factors in terms of its influence on brain development

Support & Disclosures

All authors report no competing interests.

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References