Previous research has reported that developmental psychopathology (DP) and developmental disabilities (DD) are often on the causal pathway to psychiatric disorders. At the same time, studies with a cross-sectional design have reported the comorbidity of DP, DD, and childhood psychiatric disorders (CPD). Numerous studies have found that these comorbidities during childhood are, in fact, significant predictors for developing mental and physical diseases later in life (adolescence and adulthood). However, previous research often focused only on diagnosed childhood disabilities or psychiatric disorders and overlooked the individual role and contribution of developmental psychopathology. This can, in part, be because DP is not well-suited or may not meet clinical diagnostic criteria. Developmental psychopathology, which is recognizable at early ages, may be an important predictor of significant psychiatric disorders as well as physical morbidities occurring later in life.

**Research Question**

To investigate the extent to which developmental psychopathology, independent of childhood psychiatric disorders and developmental disabilities, is associated with physical health conditions in childhood and adolescence.

### Figure 1. Conceptual model

![Conceptual model](image)

### Methods

#### Study Design and Participants:

This study analyzed cross-sectional parent-reported data on children aged 6-17 years from the National Survey of Children’s Health (NSCH), 2003-2004. Although NSCH provided data for children aged 0-17 years, variables used to construct developmental psychopathology were only available for children aged 6-17 years.

A total of 69,031 children were aged 6-17 in NSCH. In order to limit analyses to children without CPD or DD, children with the following conditions were excluded: autism, ADD/ADHD, learning disabilities, hearing or vision problems, and speech problems. This exclusion allows us to examine the effect of DP in the absence of CPD and DD (see figure 1). As a result, 56,286 children were included in the report.

#### Exposure Measure:

Two developmental psychopathology measures were included in this study - externalizing emotional problems (EEP) and internalizing emotional problems (IEP).

1. **Externalizing emotional problems (EEP)** - mean of the total score of the following six questions (coding: 1=never, 2=sometimes, 3=usually, 4=always):
   - [He/She] argues too much.
   - [He/She] bullies, or is cruel to mean to others.
   - [He/She] shows disrespect for teachers and neighbors. (reversely coded)
   - [He/She] is disobedient.
   - [He/She] is stubborn, sullen, or irritable.
   - The mean value 0-<1 is coded as ‘never’, 1–<2 ‘sometimes’, 2–4 ‘usually/always’.

2. **Internalizing emotional problems (IEP)** - mean of the total score of the following three questions (coding: 1=never, 2=sometimes, 3=usually, 4=always):
   - [He/She] gets along well with other children. (reversely coded)
   - [He/She] feels worthless or inferior.
   - [He/She] is unhappy, sad, or depressed.
   - The mean value 0-<1 is coded as ‘never’, 1–<2 ‘sometimes’, 2–4 ‘usually/always’.

#### Outcome Measures:

Each of the physical health conditions was dichotomously coded as Yes/No by asking parents: “Have you been told by a doctor or other health care professional that [He/She] had [condition]?”.

- **Asthma** ever had
- **Hay fever or any kind of respiratory allergy** during the past 12 months
- **Eczema** or any kind of skin allergies during the past 12 months
- **Frequent or severe headaches, including migraines** during the past 12 months
- **Three or more ear infections** during the past 12 months

A summary outcome variable was created:

- **Combined health conditions**: at least one of the listed six conditions

### Statistical Analysis:

- **Methods of variance estimation accounting for the complex sample design (multi-stage sampling with weighting) were applied. Specifically, standard errors were obtained using the Taylor-series approximation method.**
- **Weighted data and survey commands were used in bivariate and multivariate logistic regression.**
- **Multivariate logistic regression was used to estimate the effect of developmental psychopathology (i.e. EEP and IEP) on odds of each of the physical health conditions.**
- **Child age (in years), child sex, child race, child birth order, and household poverty level were controlled for in each multivariate model.**

### Results

**Unadjusted prevalence** (using 56,286 as the denominator) for each condition is: asthma 12.8% (n=7183), respiratory allergy 17.0% (n=9537), digestive allergy 3.0% (n=1663), skin allergy 8.3% (n=4677), severe/migraine headaches 5.7% (n=3212), three or more ear infections 2.4% (n=1333), and at least one of the above condition 34.3% (n=19296).

- **Results from multivariate analyses indicated that elevated EEP and IEP were both independently associated with each physical health condition. The associations appeared stronger when EEP and IEP were more severe – an indication of a dose-response relationship.**

### Table 1. Unadjusted associations between developmental psychopathology and physical health conditions

<table>
<thead>
<tr>
<th>Condition</th>
<th>EEP</th>
<th>IEP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asthma</td>
<td>31%</td>
<td>24%</td>
</tr>
<tr>
<td>Respiratory Allergies</td>
<td>10%</td>
<td>8%</td>
</tr>
<tr>
<td>Digestive Allergies</td>
<td>4%</td>
<td>3%</td>
</tr>
<tr>
<td>Skin Allergies</td>
<td>5%</td>
<td>4%</td>
</tr>
<tr>
<td>Severe Headaches</td>
<td>6%</td>
<td>5%</td>
</tr>
</tbody>
</table>

### Table 2. Adjusted associations between developmental psychopathology and physical health conditions

<table>
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### Discussion

Developmental psychopathology, independent of psychiatric disorders and developmental disabilities, is a correlate for various physical medical conditions during childhood and adolescence. Developmental psychopathology can be an early indicator or antecedent of health problems even when children do not have a clinical diagnosis of either psychiatric disorders or developmental disabilities at the time. An early identification of high risk children makes early intervention possible and potentially maximizes treatment effect. Therefore, treatment and intervention targeted to protect against future physical morbidities in children and adolescents should consider including a psychopathology component.