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The Problem

- There was a paucity of national data on developmental disabilities (DDs) in US children.
- Recent data with focused samples suggest higher and growing prevalence for some DDs:
  - Autism and attention-deficit/hyperactivity disorder.
- National data on trends in the prevalence of other DDs were lacking.
Factors Influencing Trends

- Improved survival  ➤
  - Preterm, birth defects, and genetic disorders
- Medical practice and prevention changes  ➤
  - Improved prenatal diagnosis, new infant vaccines, expansion of newborn screening
- Shifts in population risk factors
  - Increases in maternal age  ➤
- Increases in awareness, improved diagnosis  ➤
  ➤
Objectives

- To examine the overall prevalence of DD and specific DDs in US children, ages 3-17 years
- To examine trends in prevalence over a 12-year period (1997-2008)
- To examine how the prevalence and trends vary by key demographic characteristics
National Health Interview Survey

- Fielded continuously since 1957 to:
  - Collect data on the health status of the US population
  - Address specific issues of current public health concern
  - Provide estimates for monitoring trends
- Target is the US noninstitutionalized civilian population
- In-person interviews conducted by Census Bureau
- Oversample of black and Hispanic households
- High response rates
  - Average 88.3% for household interview
  - Average 91.2% for sample child interview
NHIS Structure

- **Household Core**
  - Demographic info on all household members

- **Family Core**
  - General info on all family members

- **Sample Adult Core**
  - One randomly selected adult

- **Sample Child Core**
  - One randomly selected child
  - Respondent is parent or other knowledgeable person

Sources for demographics, general health status, and insurance coverage

Source for health conditions, limitations, health care access and utilization, and mental health
Specific Developmental Disabilities

- Attention-deficit/hyperactivity disorder
- Autism
- Blind, unable to see at all
- Cerebral palsy
- Mental retardation (intellectual disability)
- Learning disability
- Moderate to profound hearing loss (without aids)
- Seizures
- Stammering/stuttering
- Other developmental delay
Developmental Disability Definitions and Time Frames

- For most disabilities, affirmative response to:
  - “Has a doctor or other health care provider ever told you that [child’s name] has [specific DD]?”

- For seizures and stammering/stuttering:
  - “During the past 12 months, has [child’s name] had [specific DD]?”

- For blindness and hearing loss:
  - “Is [child’s name] blind or unable to see at all?”
  - “Which statement best describes [child’s name]'s hearing without a hearing aid? Excellent, good, a little trouble hearing, moderate trouble, a lot of trouble, or deaf?”
Analysis Plan

● Estimates produced for children aged 3-17 years
  - Total sample size for 1997-2008: 119,367
  - Approximately 11,000 children per year
  - Weighted to represent the US population of children
  - Standard errors adjusted to account for sample design

● Examined prevalence for 12-year time period

● Temporal trends evaluated by considering four time periods:
## Overall Prevalence
for Noninstitutionalized US Children 3-17 Years

<table>
<thead>
<tr>
<th>Disability</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any developmental disability</td>
<td>13.9</td>
</tr>
<tr>
<td>ADHD</td>
<td>6.7</td>
</tr>
<tr>
<td>Autism</td>
<td>0.5</td>
</tr>
<tr>
<td>Blind, unable to see</td>
<td>0.1</td>
</tr>
<tr>
<td>Cerebral palsy</td>
<td>0.4</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>0.7</td>
</tr>
<tr>
<td>Learning disability</td>
<td>7.0</td>
</tr>
<tr>
<td>Moderate to profound hearing loss</td>
<td>0.5</td>
</tr>
<tr>
<td>Seizures</td>
<td>0.7</td>
</tr>
<tr>
<td>Stammering/stuttering</td>
<td>1.6</td>
</tr>
<tr>
<td>Other developmental delay</td>
<td>3.7</td>
</tr>
</tbody>
</table>
### Male/Female Ratio

<table>
<thead>
<tr>
<th>Disability</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any developmental disability</td>
<td><em>1.9</em></td>
</tr>
<tr>
<td>ADHD</td>
<td><em>2.5</em></td>
</tr>
<tr>
<td>Autism</td>
<td><em>3.9</em></td>
</tr>
<tr>
<td>Blind, unable to see</td>
<td>1.6</td>
</tr>
<tr>
<td>Cerebral palsy</td>
<td>1.0</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>1.2</td>
</tr>
<tr>
<td>Learning disability</td>
<td><em>1.8</em></td>
</tr>
<tr>
<td>M-p hearing loss</td>
<td>1.5</td>
</tr>
<tr>
<td>Seizures</td>
<td>1.2</td>
</tr>
<tr>
<td>Stammering/stuttering</td>
<td><em>2.5</em></td>
</tr>
<tr>
<td>Other developmental delay</td>
<td><em>1.8</em></td>
</tr>
</tbody>
</table>

**May Be Due To:**

- Biologic/genetic cause: X-linked
- Cultural incentive for greater case findings in boys vs. girls
- Sex-specific presentation: ADHD
## Race/Ethnicity Ratios
### Relative to Non-Hispanic White Children

<table>
<thead>
<tr>
<th>Disability</th>
<th>NH Black</th>
<th>Hispanic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any disability</td>
<td>1.0</td>
<td>* 0.7 *</td>
</tr>
<tr>
<td>ADHD</td>
<td>0.8</td>
<td>* 0.5 *</td>
</tr>
<tr>
<td>Autism</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Blind, unable to see</td>
<td>1.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Cerebral palsy</td>
<td>0.9</td>
<td>0.8</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>1.7</td>
<td>1.1</td>
</tr>
<tr>
<td>Learning disability</td>
<td>1.0</td>
<td>* 0.7 *</td>
</tr>
<tr>
<td>M-p hearing loss</td>
<td>0.8</td>
<td>0.6</td>
</tr>
<tr>
<td>Seizures</td>
<td>1.4</td>
<td>0.9</td>
</tr>
<tr>
<td>Stammering/stuttering</td>
<td>* 2.1 *</td>
<td>1.5</td>
</tr>
<tr>
<td>Other delay</td>
<td>0.9</td>
<td>* 0.7 *</td>
</tr>
</tbody>
</table>

May Be Due To:
- Access to care
- Insurance coverage
- Language barriers
# Maternal Education and Income Ratios
## Relative to College Graduates and Higher Incomes

<table>
<thead>
<tr>
<th>Disability</th>
<th>Less than HS</th>
<th>Poor or Near Poor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any disability</td>
<td><em>1.3</em></td>
<td><em>1.3</em></td>
</tr>
<tr>
<td>ADHD</td>
<td>1.0</td>
<td>1.1</td>
</tr>
<tr>
<td>Autism</td>
<td>0.4</td>
<td>0.9</td>
</tr>
<tr>
<td>Blind, unable to see</td>
<td>2.3</td>
<td>1.5</td>
</tr>
<tr>
<td>Cerebral palsy</td>
<td>0.8</td>
<td>1.2</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>1.9</td>
<td><em>2.1</em></td>
</tr>
<tr>
<td>Learning disability</td>
<td><em>1.7</em></td>
<td><em>1.4</em></td>
</tr>
<tr>
<td>M-p hearing loss</td>
<td>2.0</td>
<td>2.0</td>
</tr>
<tr>
<td>Seizures</td>
<td>1.6</td>
<td>1.8</td>
</tr>
<tr>
<td>Stammering/stuttering</td>
<td><em>2.7</em></td>
<td><em>2.2</em></td>
</tr>
<tr>
<td>Other delay</td>
<td>1.0</td>
<td><em>1.4</em></td>
</tr>
</tbody>
</table>

May Be Due To:

- Access to care
- Insurance coverage
# Health Insurance Ratios

Relative to Privately Insured Children

<table>
<thead>
<tr>
<th>Disability</th>
<th>Medicaid or CHIP</th>
<th>Not Insured</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any disability</td>
<td>* 1.7 *</td>
<td>1.0</td>
</tr>
<tr>
<td>ADHD</td>
<td>* 1.6 *</td>
<td>0.8</td>
</tr>
<tr>
<td>Autism</td>
<td>1.5</td>
<td>0.4</td>
</tr>
<tr>
<td>Blind, unable to see</td>
<td>1.7</td>
<td>1.7</td>
</tr>
<tr>
<td>Cerebral palsy</td>
<td>1.0</td>
<td>0.5</td>
</tr>
<tr>
<td>Intellectual disability</td>
<td>* 3.8 *</td>
<td>0.9</td>
</tr>
<tr>
<td>Learning disability</td>
<td>* 1.8 *</td>
<td>1.0</td>
</tr>
<tr>
<td>M-p hearing loss</td>
<td>2.3</td>
<td>1.3</td>
</tr>
<tr>
<td>Seizures</td>
<td>* 2.7 *</td>
<td>0.9</td>
</tr>
<tr>
<td>Stammering/stuttering</td>
<td>* 2.9 *</td>
<td>1.5</td>
</tr>
<tr>
<td>Other delay</td>
<td>* 2.0 *</td>
<td>0.8</td>
</tr>
</tbody>
</table>

May Be Due To:
Eligibility for Medicaid for children with disabilities
Trends in Prevalence of Any Developmental Disability
Trends in Prevalence of Specific Developmental Disabilities

- ADHD
- Learning disability
- Other delay
- Stutter/stammer
- Autism
- Seizures
- Intellectual disability
- Hearing loss
- Blind
Statistically Significant Trends

- ADHD
- Other delay
- Autism
- Hearing loss

Graph showing trends from 1997-99 to 2006-08.
Major Conclusions

- Nearly 10 million children in US were reported to have a DD in 2006-2008
- 17% increase over the 12-year time period
  - 1.8 million more children with DDs relative to a decade earlier
  - Due largely to changes in autism, ADHD, and other developmental delays
Why Increases in ADHD and Autism?

- Corroborated trends in other systems
  - Autism: ADDM, NSCH
  - ADHD: Office-based visits and education data

- Known efficacy of interventions
  - Early identification and intervention for autism
  - Medications and behavioral interventions for ADHD

- Increase in prevalence of prenatal and other risk factors

- Societal shift in acceptance and de-stigmatization
Why Changes in Hearing Loss and Other Developmental Delay?

- Hearing loss – no previous data
  - Slight modification to hearing loss categories

- Other developmental delay
  - Education change in 1997 allowed use of the delay category for children up to age 9 years
Strengths and Challenges

**Strengths**
- National picture
- Same questions over time
- High response rate

**Challenges**
- Errors due to parent reporting of conditions
- Chronicity of the disabilities
Implications

- Increases in developmental disabilities can impact:
  - Need for health, education, and social services
  - Need for specialized mental health services
  - Burden on families and caregivers

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