

**Abstract**

- Per a CDC survey in 2016, 6.1 million children (9.4%) were diagnosed with ADHD.
- In New York, the prevalence of ADHD increased from 5.6% in 2003 to 8.8% in 2011.
- The prevalence of autism, according to the CDC has increased from 1 in 59 in 2014 to 1 in 54 in 2016.
- Developmental disability is diagnosed in rural areas more than urban, with fewer services offered in the rural setting.

**Objectives**

- To identify the psychological side effect of COVID-19 in the vulnerable sector of children and adolescents who have ADHD or autism.
- Also, in terms of lockdown and remote learning which affected a huge sector of children and their families, what was the impact on this special sector with learning difficulties?

**Methods**

- Resources: PubMed and Google scholar.
- MESH words 'COVID-19', 'ADHD', 'neurodevelopmental diseases' and Boolean operators like AND/OR.
- Around 35 papers in this area were published during 2020 and 2021.
- studies were limited to those that addressed the impact of COVID-19 on children and adolescents with neurodevelopmental diseases.

Author	sample size	Type of study	Purpose of the study	Results
<b>Nearchou. F et al 2020</b>	n=12,262 children (age 3 to 18 y/o).	Meta-analysis	Study the psychosocial effect of COVID on children and adolescents with no psychiatric co-morbidities.	<ul style="list-style-type: none"> <li>• Depression prevalence ranged from 22.6% to 43.7%</li> <li>• Anxiety reported by 18.9% to 37.4% of respondents.</li> </ul>
<b>Saurabh. K et al 2020</b>	N=252 (9-18 y/o with a mean age of 15.4y; 85.12% males and 14.88% females).	Cross-sectional	Study the effect of COVID on children.	<ul style="list-style-type: none"> <li>• Feelings of worry were reported in 68.5% among those in quarantine compared to 51.9% who are not in quarantine with a p-value=0.0069.</li> <li>• Feeling of fear reported in 61.9% of those in quarantine; 32.8% of those not quarantined (p&lt;.0001).</li> </ul>
<b>Non-Weiler et al 2020</b>	453 children aged 4-15 years including neurotypical controls.	Cross-sectional	Study the effect of COVID on children with neuro-developmental diseases.	<ul style="list-style-type: none"> <li>• higher emotional symptoms prevalence compared to neurotypical controls (42% vs. 15%; p&lt;0.001.</li> <li>• higher conduct problems compared to neurotypical controls (28% vs. 9%; p&lt;0.001).</li> </ul>
<b>Jefsen. O et al 2020</b>	61,467 clinical notes for patients below 18 years from the psychiatric services in the central Denmark region.	Traditional review	Study the effect of COVID on children with mental illness	<ul style="list-style-type: none"> <li>• 113 notes reported pandemic-related psychopathology in 94 children and adolescents (55% female, median age 14 years).</li> <li>• 38 notes mentioned anxiety-related symptoms as obsessive-compulsive symptoms.</li> <li>• 8 notes reported autism-related symptoms.</li> <li>• 16 notes reported ADHD related symptoms.</li> <li>• 8 notes mentioned self-harm and suicidality.</li> </ul>
<b>Li. D et al 2020</b>	3613 Chinese students already diagnosed with ADHD (50% male and 50% female)	Cross-sectional	Study the effect of COVID on the mental health of ADHD children	<p>Clinical depressive symptoms significantly associated with:</p> <ul style="list-style-type: none"> <li>• smartphone addiction OR=1.41</li> <li>• internet addiction OR=1.84</li> <li>• urban residence OR=1.32</li> <li>• family member/friend COVID+ OR= 3.74</li> <li>• graduation delay by pandemic OR= 1.31</li> <li>• separation anxiety levels OR= 2.07</li> <li>• physical injury fear OR= 2.126</li> <li>• emotion-focused coping style OR= 1.09</li> </ul>
<b>Melegari et al 2021</b>	992 children and adolescents (528 children, 464 adolescents and their parents.	Cross-sectional	Study the impact of lockdown on mood and behavior in ADHD children	<ul style="list-style-type: none"> <li>• 55% of patients discontinued their medications.</li> <li>• Anxiety level after the pandemic increased (X2 = 8.9, p-value&lt;0.003).</li> <li>• ADHD reported increased boredom(15.3% before the pandemic to 28.6% during the pandemic).</li> </ul>

**Discussion/Conclusion**

- In most of the studies, children with NDDs demonstrated a worsening of behavioral and mental health symptoms, such as new symptoms of anxiety, depression, obsessive-compulsive, post-traumatic stress disorder, boredom, temper tantrum, and worsening of oppositional/defiant and hyperactive impulsive symptoms.

**Strengths and Limitations:**

- Cross-sectional studies drawbacks: association not causation, limited generalization, online questionnaires, self-report and measurement error, inability to work with participants in person.
- Other confounders were not considered such as previous addiction history or previous mental or psychiatric illnesses.
- validated psychological tests were needed.
- Measurement error, the studies relied on personal opinions and parents' gradings.
- the generalizability of findings is limited due to different nationalities, the discrepancy in health services, and to different racial distributions.

**policy implications:**

- simplified explanation of the Covid-19 protective measures.
- New learning methods.
- Telemedicine reform and evaluation (closer follow-ups, medication modification and refills).
- Allocating resources and funds for research.
- Affordable insurance and special health care programs for children and their families.