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Review

Autism Spectrum Disorder and COVID-19: Vulnerabilities, Infections and Outcomes - A Systematic Review

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ABSTRACT

Background: Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder characterized by social communication challenges, repetitive behaviors and sensory sensitivities.Due to pandemic limitations and service delays, people with ASD were highlighted as a vulnerable population during the COVID-19 pandemic, with greater risks of infection, comorbid health difficulties and considerable mental health challenges.

Objective: This systematic review, following PRISMA guidelines, aims to consolidate research on the impact of COVID-19 on individuals with ASD, examining infection rates, clinical outcomes and mental health impacts to inform future support strategies.

Methods: A systematic search was conducted across databases (PubMed, Scopus and PsycINFO) for studies published between January 2020 and May 2022 using search terms including "Autism Spectrum Disorder," "COVID-19," "vulnerabilities," "infection outcomes," and "mental health." Articles assessing physical and mental health impacts of COVID-19 on individuals with ASD were selected.

Results: ASD individuals were found to have a 1.5x higher COVID-19 infection rate and twice the hospitalization rate compared to the general population, likely due to respiratory and immune-related comorbidities. Additionally, interruptions to routine and support systems had a significant influence on mental health, with heightened levels of anxiety, depression and behavioural difficulties noted; sensory sensitivity made it difficult to follow preventive measures.

Conclusion: The COVID-19 pandemic disproportionately affected individuals with ASD. Tailored interventions, such as sensory-friendly preventive measures, enhanced mental health support and healthcare provider training, are recommended to mitigate future health disparities.

Keywords: Autism Spectrum Disorder, COVID-19, comorbidities, mental health, systematic review, PRISMA

1. Introduction

Autism Spectrum Disorder (ASD) affects approximately 1 in 54 children in the United States and presents significant social, communication and behavioral challenges (CDC, 2020). Individuals with ASD also experience higher rates of respiratory, gastrointestinal and immune system comorbidities, which can complicate responses to infections like COVID-19. Disparities in healthcare outcomes have been brought to light by the epidemic, particularly for vulnerable groups like those with ASD, who have extra difficulties because of their tight routines, sensory sensitivity and greater levels of anxiety and sadness.

The COVID-19 pandemic introduced unique risks for ASD individuals, including challenges with adhering to preventive measures, an increased susceptibility to infections

due to pre-existing health conditions and significant mental health impacts caused by isolation and disrupted services. Understanding these vulnerabilities provides insight into how tailored support measures can mitigate such impacts. This systematic review follows PRISMA guidelines to examine the intersection of ASD with COVID-19, focusing on infection rates, outcomes and mental health impacts.

2. Methods

Search Strategy: Using PRISMA guidelines, we conducted a systematic search of PubMed, Scopus and PsycINFO databases to find studies examining the effects of COVID-19 on individuals with ASD. The search terms included "Autism Spectrum Disorder," "COVID-19," "infection rates," "vulnerabilities," "mental health," and "pandemic impact." Publications from January 2020 to May 2022 were included in the search, which concentrated on peer-reviewed papers that provided empirical information on hospitalisation, infection and mental health outcomes in populations with ASD.

3. Eligibility Criteria

Inclusion Criteria: Research on hospitalisation rates, COVID-19 infection rates and the effects on mental health in communities with ASD.

Articles with empirical data on pandemic-related behavioural responses and adherence to preventive measures**.** Published between 2020-2022.

Exclusion Criteria: Studies that only look at populations that are not ASD.

Non-human research and studies pertaining to COVID-19 or ASD that lack definitive empirical results.

Study Selection and Data Extraction: Two independent reviewers conducted the selection process by first screening article titles and abstracts for relevance. Studies meeting inclusion criteria underwent full-text review, with data extracted on study population, outcome measures, comorbidities, infection and hospitalization rates and mental health impacts. Any discrepancies in study selection were resolved by a third reviewer.

Prisma Flow Diagram: The PRISMA flow diagram **(Figure 1)** details the stages of the study selection process, from initial identification through final inclusion.

Stage	Number of Studies
Identified through database searches	1250
After removing duplicates	980
Screened (title & abstract)	980
Full-text articles reviewed	350
Included in final analysis	25

Figure 1: Prisma Flow Diagram

Characteristics of Included Studies: (Table 1) provides an overview of the included studies, detailing sample sizes, assessed outcomes and key findings related to infection rates, hospitalization, preventive measure adherence and mental health impacts.

Infection and Hospitalization Rates: Individuals with ASD were found to have a 1.5x higher rate of COVID-19 infections and were twice as likely to be hospitalized compared to the general population. This increase in infection and hospitalization rates is likely due to respiratory issues and immune system dysregulation, which are common in the ASD population[1].

Table 1: Study Characteristics and Key Findings.

Author (Year)	Sample Size	Outcomes Assessed	Key Findings
Leader et al. (2021)	500	Infection rates, hospitalization	Higher infection and hospitalization rates in ASD populations
Spain et al. (2021)	400	Mental health, behavioral outcomes	Increased anxiety, depression and behavioral disruptions
Zhu et al. (2020)	250	Immune response, respiratory issues	Elevated pro-inflammatory markers in ASD individuals

Challenges in Preventive Measures: The review highlighted sensory sensitivities and behavioral rigidity as significant barriers to adherence to COVID-19 preventive measures among individuals with ASD. **(Table 2)** provides a summary of the main barriers to preventive measures and potential solutions.

Table 2: Preventive Measures Adherence in ASD Populations.

Preventive Measure	Adherence Barrier	Suggested Solution
Mask Wearing	Sensory discomfort	Sensory-friendly mask materials
Hand-Washing	Tactile sensitivity	Use of sensory-adjusted hand sanitizers
Social Distancing	Difficulty understanding spatial boundaries	Visual cues and social stories

Mental Health Impacts: Mental health outcomes among ASD populations were significantly impacted during the pandemic, of note there was increases in anxiety and social redundancy, due to routine changes and social isolation. Family members and caregivers reported notable high levels of stress due to limited support services, adding on to the mental health challenges faced by individuals with ASD.

4. Discussion

Health Vulnerabilities and COVID-19 Severity: People with ASD were 1.5 times as likely to get COVID-19 and were twice as likely to be admitted to the hospital as people without ASD. Immune dysregulation and respiratory disorders are two prevalent comorbidities in ASD populations that are thought to be responsible for this increased vulnerability.Respiratory complications are already common in individuals with ASD and the presence of immune system abnormalities can exacerbate the severity of COVID-19 infections[1]. Preventive health screenings and early interventions for respiratory issues in ASD individuals could be a vital measure in reducing severe outcomes.

Behavioral Challenges in Preventive Measure Adherence: Adherence to preventive measures was difficult due to behavioural and sensory sensitivity. For example, tactile dislike to hand sanitiser or sensory pain from mask wearing frequently hindered complete adherence to advised safety procedures. Potential remedies for enhancing compliance with public health recommendations in ASD populations include visual aids, social narratives and sensory-friendly personal protective equipment. By making it easier for people with ASD to follow preventive guidelines, these accommodations can lower their risk of contracting COVID-19[2].

Mental Health Impacts and Long-Term Implications: The pandemic's disruption of routines and support services had a severe impact on the mental health of individuals with ASD. Increased anxiety, depression and behavioral disturbances were frequently reported, driven by isolation and a lack of structured environments. By enabling remote access to the mental health services that people with ASD depend on, telehealth alternatives were a crucial tool throughout the pandemic. ASD populations may benefit from virtual behavioural therapy and telehealth expansion as a means of receiving mental health help during future medical emergencies[3].

Recommendations for Public Health Preparedness: The review's conclusions emphasise how public health preparedness measures must take ASD into account. The following tactics are advised in order to assist people with ASD during upcoming pandemics:

Sensory-Friendly Preventive Options: Creating non-irritating hand sanitisers and soft-textured masks as alternative personal protective equipment (PPE) for people with sensory sensitivity.

Access to Mental Health Resources: increasing the availability of telehealth services to offer ongoing mental health assistance, especially for social skills training, behavioural therapy and anxiety control.

Training for Healthcare Providers: Improving healthcare workers' training on ASD will enhance hospital care experiences, particularly when it comes to handling communication needs and sensory sensitivity in medical environments.

Caregiver Support Programs: lessening the strain on families during public health emergencies by offering assistance to carers who frequently oversee the complicated needs of people with ASD.

5. Conclusion

The COVID-19 pandemic exposed the vulnerabilities of individuals with ASD, highlighting the need for public health strategies that are inclusive of ASD-specific needs. This review identified higher infection and hospitalization rates among ASD individuals due to respiratory and immune-related comorbidities, challenges in preventive measure adherence due to sensory sensitivities and severe mental health impacts resulting from disrupted routines and limited support.By putting in place ASD-specific accommodations, such as sensory-friendly preventive gear, more telemedicine choices and specialised training for medical professionals, these vulnerabilities may be reduced in the event of future health emergencies, enhancing the emotional and physical health of ASD communities.

6. References

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