2023, Vol. 22, No. 64

OPEN ACCESS

Srishti Goel
https://orcid.org/0009-0004-6999-3167
One Health Trust, Bengaluru, Karnataka, India
One Health Trust, Bengaluru, Karnataka, Indie
goel@onehealthtrust.org

Jyoti Joshi
https://orcid.org/0000-0002-0971-7257
The International Centre for Antimicrobial Resistance Solutions, Copenhagen, Denmark
Międzynarodowe Centrum Rozwiązań w Zakresie Oporności na Środki Przeciwdrobnoustrojowe, Kopenhaga, Dania
jyoti@icars-global.org

Dominick Panarello
https://orcid.org/0009-0002-9216-5939
Merck Research Laboratories, Pennsylvania, USA
Merck Research Laboratories, Pensylwania, Stany Zjednoczone
dominick.panarello@merck.com

Vaishali Parab
https://orcid.org/0009-0007-2119-9345
Pharmacokinetics Pharmacodynamics and Drug Metabolism (PPDM) Bioanalytics (BA), Merck Research Laboratories, California, USA
Farmakokinetyka, farmakodynamika i metabolizm leków (PPDM) Bioanalityka (BA), Merck Research Laboratories, Kalifornia, USA
vaishali.parab@merck.com

Phu Duong
https://orcid.org/0009-0004-7257-8650
US Medical Affairs, Merck Research Laboratories, Pennsylvania, USA
Amerykański Dział Medyczny, Merck Research Laboratories, Pensylwania, Stany Zjednoczone
phu.duong@merck.com

Deepshikha Batheja
https://orcid.org/0000-0002-4991-2938
One Health Trust, Bengaluru, Karnataka, India
One Health Trust, Bengaluru, Karnataka, Indie
deepshikha@onehealthtrust.org

https://doi.org/10.35765/hw.2023.2264.03
Data zgłoszenia: 30.08.2023
Data akceptacji: 26.10.2023
Data publikacji: 29.12.2023

The Educational and Health Impact of COVID-19 on Children With Special Needs: A Systematic Review
Edukacyjny i zdrowotny wpływ COVID-19 na dzieci ze specjalnymi potrzebami: przegląd systematyczny

ABSTRACT

RESEARCH OBJECTIVE: Governments across the world were forced to impose social distancing and lockdown measures to prevent the spread of COVID-19, caused by coronavirus SARS-CoV-2

Suggested citation: Goel, S., Joshi, J., Panarello, D., Parab, Duong, P., & Batheja., D. (2023). The Educational and Health Impact of COVID-19 on Children With Special Needs: A Systematic Review. *Horizons of Educations*, *22*(64), 11-30. https://doi.org/10.35765/hw.2023.2264.03

that emerged in December 2019. Following the declaration of COVID-19 as a pandemic, the disruptions, including restrictive measures such as school closures had severe impacts on the physical, emotional and mental health of all people, especially children with special needs. There was also scant data, particularly in low-to-middle-income countries. Existing literature stems mostly from western countries, thus the need to perform a comprehensive review on this topic.

THE RESEARCH PROBLEM AND METHODS: The primary objective of the systematic review is to understand the impact of COVID-19 and restrictive measures such as school closures on the educational outcomes and physical and mental health of school-going children with special needs.

THE PROCESS OF ARGUMENTATION: This systematic review used the PRISMA 2020 checklist where four databases (Google scholar, ERIC, EBSCO and PubMed database) and grey literature were searched for full text articles, peer reviewed publications in the English language that were published during January 2019–December 2021.

RESEARCH RESULTS: The literature search identified 1294 publications, of which 25 key papers were selected. These studies investigate the impact on children with special needs across the globe, with a majority of papers from Europe. The ongoing pandemic affected the education and learning outcomes for children with special needs as online schooling methods did not cater to their particular needs. We found that COVID-19 and the digitalization of schooling had severe impacts on the physical and mental health of children with special needs and their parents/caregivers.

CONCLUSIONS, RECOMMENDATIONS AND APPLICABLE VALUE OF RESEARCH: These studies highlight the need for an inclusive school environment to ensure that the learning outcomes for children everywhere are achieved. Further, a hybrid model that includes classroom learning with novel inventive methods would be beneficial for children with special needs.

→ **KEYWORDS:** COVID-19, CHILDREN WITH SPECIAL NEEDS, EDUCATION, MENTAL HEALTH, PHYSICAL HEALTH

STRESZCZENIE

CEL NAUKOWY: Rządy na całym świecie zostały zmuszone do nałożenia środków dystansowania społecznego i izolacji, aby zapobiec rozprzestrzenianiu się choroby COVID-19 wywołanej przez koronawirusa SARS-CoV-2, który pojawił się w grudniu 2019 r. Po wydaniu oświadczenia uznającego COVID-19 za pandemię wprowadzono wiele środków ograniczających, takich jak zamykanie szkół, które miały poważny wpływ na zdrowie fizyczne, emocjonalne i psychiczne wszystkich ludzi, zwłaszcza dzieci ze specjalnymi potrzebami. Dane obrazujące sytuację były nieliczne, zwłaszcza w krajach o niskich i średnich dochodach. Istniejąca literatura wywodzi się głównie z krajów zachodnich, stąd potrzeba dokonania kompleksowego przeglądu tego zagadnienia.

PROBLEM I METODY BADAWCZE: Głównym celem przeglądu systematycznego literatury jest zrozumienie wpływu pandemii COVID-19 i wprowadzonych w związku z nią środków ograniczających, takich jak zamykanie szkół, na wyniki w nauce oraz zdrowie fizyczne i psychiczne dzieci ze specjalnymi potrzebami szkolnymi.

PROCES WYWODU: W przeglądzie systematycznym wykorzystano listę kontrolną PRISMA 2020, w ramach której przeanalizowano cztery bazy danych (Google Scholar, ERIC, EBSCO i PubMed) oraz tzw. szarą literaturę pod kątem artykułów pełnotekstowych i recenzowanych publikacji w języku angielskim, które ukazały się w okresie od stycznia 2019 r. do grudnia 2021 r.

WYNIKI ANALIZY NAUKOWEJ: W rezultacie badań wyłoniono 1294 publikacje, spośród których wybrano 25 kluczowych. Badania podejmowane w analizowanych publikacjach dotyczą wpływu restrykcji pandemicznych na dzieci ze specjalnymi potrzebami na całym świecie, przy czym większość artykułów pochodzi z Europy. Trwająca pandemia wpłynęła na edukację i wyniki w nauce dzieci ze specjalnymi potrzebami, ponieważ metody nauczania online nie zaspokajały ich szczególnych potrzeb. Ustaliliśmy, że pandemia COVID-19 i cyfryzacja szkolnictwa miały poważny wpływ na zdrowie fizyczne i psychiczne dzieci ze specjalnymi potrzebami oraz ich rodziców/opiekunów.

WNIOSKI, REKOMENDACJE I APLIKACYJNE ZNACZENIE WPŁYWU BADAŃ: Przeprowadzone badania podkreślają potrzebę stworzenia włączającego środowiska szkolnego, które zapewni dzieciom na całym świecie osiągnięcie efektów uczenia się. Co więcej, model hybrydowy obejmujący naukę w klasie z wykorzystaniem nowatorskich, wynalazczych metod byłby korzystny dla dzieci ze specjalnymi potrzebami.

→ **SŁOWA KLUCZOWE:** **COVID-19, DZIECI ZE SPECJALNYMI POTRZEBAMI, EDUKACJA, ZDROWIE PSYCHICZNE, ZDROWIE FIZYCZNE**

Introduction

The recent global COVID-19 pandemic initiated by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) strain, named in December 2019, and since then has infected approximately 618 million individuals across the globe (Johns Hopkins University, 2021). To contain the spread of the virus, many countries around the globe adopted new policies to enforce physical and social distancing and isolation measures. This was done through suspension of usual economic activities and human mobility lockdowns which include travel restrictions, workplace closure and remote work, school closures and online teaching, and cancellation of public events. Although the impact of the virus has been considered mild for children, the pandemic had unwarranted effects on their mental, physical and emotional health (Aishworiya & Kang, 2021). The shift to online education did not only impact their learning outcomes but also reduced their social and physical movement (Xiang et al., 2020).

India had one of the strictest lockdowns for long periods of time. The "Oxford COVID-19 Government Response Tracker (OxCGRT)," created by The Blavatnik School of Government collects global information about the government policy responses to the epidemic and scores the strictness of these measures (Ray & Sreenivasan, 2020). According to this index, India had the highest score from April 2020 to May 2020 and has had consistent high scores during every surge in COVID-19 cases. The high scores are indicators of the severity of the lockdown and restrictions that were imposed by the government of

India. The impact of these lockdowns has been severe on people's physical, social and emotional health; however, it has been harshest on vulnerable populations, especially people with disabilities or with special needs (PSN).

Persons with special needs include all people that have any long-term mental, physical, intellectual or sensory impairments, which hinders their regular interaction and participation in society. This distortion in interaction and participation in the society is not only limited to people with special needs but also impacts their families. Families of children with special needs often face various conflicts and challenges related to decision making related to the child's well-being, finances, emotional issues, social interactions, etc that can significantly impact their daily lives and well-being. These challenges arise from decisions related to finding appropriate treatment and therapy and the related costs. Further, they also have to cope with the emotional needs of caregiving, social isolation, and maintaining a supportive environment for the child. Making decisions related to appropriate education avenues is another financial and time-consuming challenge (Davis & Gavidia-Payne, 2009; Di Marino et al., 2018; Karst & Van Hecke, 2012; Resch et al., 2010).

In India, 18,237,600 people are estimated to have disabilities, of which 28% are congenital. India's People with Disabilities Act promote inclusive education; however, the reality is starkly different. Only 50% of people with disabilities above the age of seven were literate in 2018 and 19.3% PWD above the age of 15 had the highest level of education at secondary school or above (MOSPI, 2018). At present, 9% of the population with any disability belongs to the school-going age group (5–14 years) (MOSPI, 2018). According to the UDISE 2020–2021 report, the existing provisions made for children with special needs (CWSN) were already limited in schools, only 24.5% of schools with functional CWSN friendly toilets and 48.3% of schools had ramps with handrails for CWSN.

With every surge of the pandemic in India, there was a decrease in the enrolment rate of students with special needs, approximately 22.49 lakh students had enrolled in 2019–2020; however, this number dipped by 3.55% in 2020–2021 (UDISE, 2021). Further, the lockdowns have required students to shift to online classes and these classes did not accommodate the needs of CWSN and their parents. For example, autistic children faced the difficulty of changes including the transformation of their safe place at homes into a workplace due to work from home norms as well as the home transformation into a school setting for online classes (Canning & Robinson, 2021). The pandemic has affected their mental health resulting in an increase in anxiety, stress, fear, sleep disorders, in addition to other mental health conditions (Asbury et al., 2021). Additionally, as CWSN require regular health and rehabilitative care in order to function normally, the impact of restrictions in movement and social distancing caused by this crisis was greater in CWSN and their families than in children without any disability (Jesus et al., 2021).

CWSN have not only been at a disadvantage with physical and mental health trauma due to COVID-19, but they have also faced the challenge of adapting to the change from in-person classes to online classes which could have impacted learning and educational outcomes. The purpose of this paper is to develop a succinct qualitative systematic review of current literature regarding the impact of lockdown-related policies on

the learning and health outcomes for school-going children with special needs and to recommend measures to mitigate these impacts in low- and middle-income countries (LMIC). Through this paper, we aim:

1. To understand the education and health (mental and physical) outcomes of children with special needs and their parents/ caregivers.
2. To understand the advantages and disadvantages of the pandemic induced school closures across the globe in the context of children with special needs.

This is a preliminary study to comprehend the impact of COVID-19 on the health and education outcomes of children with special needs. In pursuant of this review, we have also conducted a primary study using quantitative and qualitative research techniques to assess the effects of COVID-19 on the learning and health outcomes of CWSN in India.

Methods

Using the PRISMA 2020 checklist we searched four global databases PubMed, Education Resources Information Center (ERIC), EBSCO and Google Scholar to collate and synthesize available data on the educational and health outcomes of school-going children with disabilities during the COVID-19 pandemic across the globe from January 2019 to August 2021. We included studies that were conducted in countries outside of India, as there was limited data that focused on the impact of COVID-19 on CWSN in India.

Eligibility Criteria

In this systematic review we included peer-reviewed publications as well as editorial correspondences between January 2019 through August 25, 2021, that summarized the effect of school closures or digital teaching on CWSN. Studies published in English were included, as well as data on children and adolescents (primary and secondary schools).

Table 1. Eligibility criteria

No	Inclusion	Exclusion
1	English language	Non-English publications
2	Peer-reviewed	Media reports
3	Time period: 2019 – August 2021	Studies dated prior to 2019
4	Primary research	Non-primary-research data-based articles
5	Related to school closure effects	Unrelated to school closures

Own source.

Information Sources / Search Strategy

A comprehensive, systematic search of four databases: PubMed, ERIC, EBSCO Information Services (EBSCO), and Google Scholar was conducted to identify publications on the educational and health impact of children with disabilities or special needs during COVID-19 using specific keywords. For health-related literature, we resorted to using PubMed and for education-specific data, we used ERIC. To ensure comprehensiveness, EBSCO and Google Scholar were used to detect articles that may not have been captured by PubMed or ERIC.

The following search terms were used: coronavirus, COVID-19, children with disabilities, children with special needs, education, learning, learning outcomes, health, health outcomes, and India. Search terms were discussed and determined by all authors after a preliminary scan of titles and abstracts from the search engines.

Two separate searches were conducted using EBSCO database using the following terms with and without "India": coronavirus, COVID-19, children with disabilities, children with special needs. These searches were limited to include full text articles, scholarly peer reviewed journals in English language that were published during the time Jan 2019–Aug 2021. EBSCO automatically removed the exact duplicates from the results and presented available literature without any redundancy.

Search criteria#1:

("Coronavirus" OR "COVID-19") AND ("Children with disabilities" OR "Children with special needs") AND ("Education" OR "Learning") AND "impact"

("Coronavirus" OR "COVID-19") AND ("Children with disabilities" OR "Children with special needs") AND "health" AND "impact"

Search criteria#2:

("Coronavirus" OR "COVID-19") AND ("Children with disabilities" OR "Children with special needs") AND ("Education" OR "Learning") AND "impact" "India"

("Coronavirus" OR "COVID-19") AND ("Children with disabilities" OR "Children with special needs") AND ("Health") AND "impact" "India"

Two separate searches were conducted using Google Scholar. The first search utilized the keywords:

"COVID-19" AND "education" AND "india" AND "english" AND ("children with disabilities" OR "children with special needs").

The second search utilized the keywords:

"COVID-19" AND "health" AND "india" AND "english" AND ("children with disabilities" OR "children with special needs").

Both searches were narrowed to a custom time range of 2019–2021 and citations were not included. Results were sorted by relevance.

Selection Process/Data Collection Process/Data Synthesis

All search results were entered in an Excel spreadsheet and publications were screened by their title and abstract by an independent reviewer and checked by another reviewer. Discrepancies were discussed in consultation and resolved via a third reviewer. The Google Scholar results were populated using an automation tool called Publish or Perish (Harzing, 2007). Duplicates were removed and relevance of articles were determined by reviewers for inclusion in systematic review. Pertinent articles were retrieved and downloaded on to Microsoft Teams for review and data extraction. Data was categorized as health (physical, mental, social) or educational (school closure, digitalization, lack of resources) impact on children with disabilities.

Methodological Quality Assessment

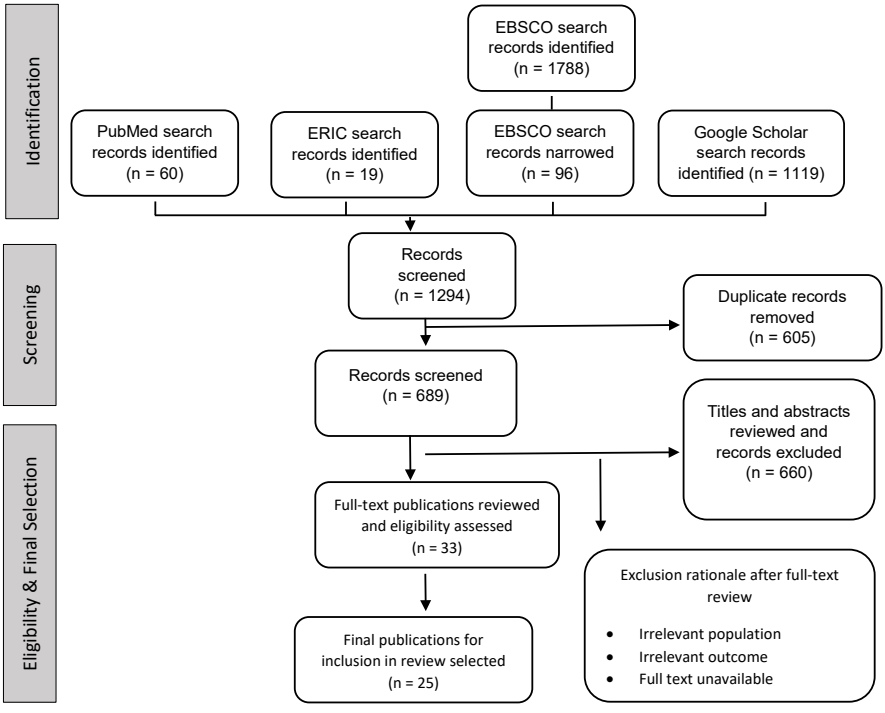
We used the Grading of Recommendations, Assessment, Development, and Evaluations (GRADE) approach to assess the examine the type of evidence. We considered randomized controlled trials as high certainty evidence (level 1), observational data including cohort data as low certainty evidence (level 2) and any other data as very-low certainty evidence (level 3).

Results

Screening Articles

We identified 1294 publications for this review, of those 689 were screened for titles and abstracts after duplicates were removed. There were 33 primary studies that were reviewed with full text and eligibility was assessed. A final selection of 25 key papers were included reporting health and/or educational impact on CWSN (Figure 1).

Figure 1. PRISMA 2020 flowchart of the systematic review inclusion and exclusion process



Own source.

Study Characteristics

A summary of the objective and findings of the key identified 25 papers is shared in Table 1. Of the 25 studies, 23 (92%) studies involved children with special needs, one (4%) paper studied individuals with disabilities and one (4%) paper focused on the impact of COVID-19 on school going children. Most studies were conducted in populations outside India with nine (36%) in Europe, four (16%) each in Middle East and South Asia excluding India, three (12%) in the United States, two (8%) in South Africa, two (8%) studies explored the Indian population one (8%) study was based in Mexico.

The studies employed both qualitative and quantitative research methods. Among the 25 studies: 10 (40%) studies were quantitative, 11 (44%) studies used qualitative research techniques and four (16%) studies employed a mixed methods approach. In these twenty-five studies, qualitative or quantitative surveys were conducted among a total of 10,765 participants, of which, 7543 (70.07%) were parents/caregivers of CWSN, 2149

(6.21%) were parents of middle and high school children (including parents of CWSN), 661 (6.21%) CWSN, 373 (3.46%) teachers of CWSNs, and 31 (0.29%) PSN.

Effect of School Closures and Digitalization of Virtual School

The themes explored in these studies are CWSN's attitudes, behavioural change, mood changes, social determinants of health, symptoms of anxiety, unusual repetitive movements and increase in sleep disorders. These impacts were due to school disruptions from multiple surges of COVID-19. These papers also aimed to understand the educational outcomes of CWSNs, and the support provided by schools during online classes. Some studies explored the challenges that parents' of CWSNs faced with home-schooling and the measures taken to overcome these challenges. They aimed to identify parents' experiences, concerns, challenges, coping strategies, and perceived needs during the lockdown. Further some of these studies also discussed the difficulties that teachers faced in adapting to the virtual setting the inclusive methodologies adopted to ease the learning process of CWSNs. These studies also highlighted some outcomes that positively impacted the wellbeing of CWSNs and their families.

Quality Assessment

All the studies in this literature review were observational and thus can be characterized as low certainty evidence.

Table 2. Summary of primary literature on the health and educational impact of children with special needs during COVID-19

Study	Country	Methods	Respondents	Key findings
Health				
Asbury et al., 2021	United Kingdom	Qualitative study	241 parents or caregivers of school aged CWSN	COVID-19 affected mental health, leading to a significant rise in anxiety and fear. A small percentage of the sample reported that their mental health improved during the pandemic.
Dondi et al., 2021	Italy	Quantitative study – online Survey	6210 parents including families of CWSN	Mothers of 80.2% CWSN reported that their children had become more nervous, sad or worried since the pandemic. Major factors contributing to the increase in sleep disorders included socioeconomic status, food insecurity, parent's job loss, children's mood swing, family attitude the pandemic, and feelings of loneliness, or missing outdoor activities were major risk factors for sleep disorders.
Murphy et al., 2021	United States	Quantitative study – online survey	207 parents of children with special needs	44% of the parents were not satisfied with the therapy provided to their child in the pandemic. Telehealth seems to be a promising option for continuing high quality services during the COVID-19 pandemic and for families who face barriers in accessing services in general.
Castro-Kemp & Mahmud, 2021	United Kingdom	Quantitative study – online Survey	83 parents of children and young people with various types of special need	54.2% parents reported the lockdown had a negative impact on their child's mental health. 67% parents reported that the pandemic also affected their mental health negatively. COVID-19 had an unfavourable effect on their own and their children's mental health (particularly those from the most disadvantaged neighbourhoods). 73% of the parents reported that reopening of schools had a positive impact on their child's mental and physical health.
Habib Alshamri, 2021	Saudi Arabia	Qualitative study – qualitative survey	Literature review and interviews with 15 teachers	Shutdown period was more challenging for students due to the physical needs of special education. The education infrastructure in Saudi Arabia did not adequately support teachers for this mode of teaching. Teacher input is required for students and online learning cannot satisfy those needs for children with disabilities.
Sakiz, 2021.	Turkey	Qualitative study – thematic analysis	31 individuals with disabilities (IWD)	The delay in education along with pressures resulting from the preventative measures used for COVID-19 had a deteriorating effect on the mental health of individuals with disabilities. Difficulties were realized in emotional well-being, structured routines, learning, and socialization.

Sutter et al., 2021	United States	Mixed methods	102 caregivers of children with childhood-onset motor impairment	Access to rehabilitation programs was disrupted during the pandemic. Only 52% CWSN were receiving therapy. Disruption to rehabilitation programs impacted physical and mental health. As telehealth expands, child feedback as well as caregiver feedback should be incorporated to optimize outcomes.
Wanigasinghe et al., 2021	Sri Lanka	Mixed methods	Caregivers of 140 children with epilepsy from seven pediatric neurology centers	Lockdown strategies in Sri Lanka did not alter the ability to control epilepsy for 87.3% of the children in the sample. Self-management strategies for the caregivers (87.1%) helped to mitigate stress, adapt to the new normal situation, and prepare for future outbreaks.
Education				
Greenway & Eaton-Thomas, 2020	United Kingdom	Mixed methods	238 parents of CWSN	Parents and caregivers were not satisfied by the tools and support that their children were provided to enhance their learning and psychological needs and the negative impacts of home-schooling.
Canning & Robinson, 2021	United Kingdom	Qualitative study- Ethnographic study	8 families and children with SEND (Autism) age 5–13	The movement restrictions and quarantine policies imposed by the government had invaded safe home spaces with external stimuli. School and work meetings once separate, became part of the home and blurs the boundaries.
Ng et al., 2021	Across Europe – France, Ireland, Latvia, Lithuania, Portugal and the United Kingdom	Quantitative study – online survey	125 adapted physical education (APE) teachers	Teachers faced challenges during online education for students with special needs because of a lack of structured learning environment at home as well as interactions with peers. Proper remote teaching delivery with daily communication through different modes (e.g. email, phone, SMS, WhatsApp, etc.) is needed along with teacher preparation to use the right technologies.
Supratiwi et al., 2021	Indonesia	Quantitative study – online survey	226 special education teachers (SETs)	66 % teachers SETs (66%) confirmed that they faced difficulties from distance learning from students (boredom and their lack of abilities), parents (lack of coordination and communication, limited use of mobile phones, and limited time for parents to accompany the students), and other teachers (difficulties in monitoring and evaluating student progress, adapting material to online learning, and the lack of direction and coordination from schools), as well as technical barriers (frequent blackouts and insufficient internet signal).

Schuck & Lambert, 2020	United States	Qualitative study – qualitative analysis	2 elementary special education teachers	Teachers reported three distinct stages of emergency remote teaching (ERT): making contact, establishing routines, and transitioning to academics. They also discussed the challenges they faced during this period (i.e. inequity in resources amongst students, needing to rely on at-home support in order to meaningfully teach students, and online teaching). While clearly not in favor of online learning, the teachers shared there was increased communication between teachers and parents.
Ressa, 2021	Kenya	Qualitative study – Key Informant Interviews (KIIs) and Focus Group Discussions (FGDs)	Children with special needs	Children with special needs with disabilities fell behind academically after school closure and COVID-19.
Khanna & Kareem, 2021	India	Qualitative KIIs – thematic analysis	5 primary school teachers	There were various reasons for teachers' dissatisfaction, including salary cuts, and forced removal of students due to missing fees. Creative methodologies need to be rethought and planned for the future. Standardized online education policy is required for India, including plans to address marginalized families with limited resources. Education is more than taking exams, and the social and inclusive aspects need to be protected as well.
Jones et al., 2021	Bangladesh, Ethiopia, and Jordan	Mixed methods – GAGE data, phone surveys, qualitative interviews	549 CWSN	Gender, poverty, and disability are all contributing to deepening the social inequalities. Gender differentials in access to distance learning were uneven across different contexts. Adolescents with disabilities face greater barriers to distance learning. Measures are required to tackle social inequalities.
Health and education				
Scarpellini et al., 2021	Italy	Quantitative study – online survey	2149 mothers of primary and middle school children including CWSN	14.7% of the children with special needs did not receive any assistance. The main teaching mode was via video classes (77.4%).

Tokatly Latzer et al., 2021	Israel	Qualitative study – interviews	31 parents of 25 children with autism	The main difficulties encountered by the autistic children were related to the change in routine, lack of special education services, limited physical space, and food- and sleep-related issues leading to worsening of behavioral, social, and developmental domains in some of the children.
Daulay, 2021	Indonesia	Qualitative interviews – thematic analysis	5 mothers of children with autism spectrum disorder	Adaptability of mothers to teaching while still assuming the burden of caregiving. There are constraints to home education implementation when factoring maladaptive behaviors of ASD and emerging negative emotions. Coping strategies were required for mothers to help alleviate the constraints to education and to deal with the stress.
Srinivasan et al., 2021	India	Qualitative study – cognitive interviews	15 caregivers of children with disabilities aged 5–17 years	Significant differences in all PEM-CY scores were found between children with and without disabilities. CWSN had lower scores across the board. Caregivers of CWSN desired greater change in their children's participation and also described environmental barriers to their child's participation.
Swanwick et al., 2020	Ghana	Qualitative study – interviews	Interviews of deaf adults, children, and their families	Removal of social interaction in schools has had a negative effect on the health of deaf children. Inclusivity is required for deaf children to improve health and educational outcomes.
Unexpected outcomes/ Positive Outcomes				
Dovigo et al., 2021	Italy	Mixed-method design	39 girls (ages 3–24) with Rett Syndrome	Teleconference platforms can be used both in daily living and typical clinical settings and these platforms have a positive impact on many levels of functioning, from cognitive to social.
Levstek et al., 2021	United Kingdom	Mixed-method design	13 virtual music groups including mainstream and special education/ disabled young people.	The music groups offered a source of social interaction that allowed for self-expression, emotion management, and a sense of belonging. This aspect had been lacking in distance learning. Direct connection was not observed in virtual music groups like it was observed in in-person groups.
Cardona-Reyes et al., 2021	Mexico	Quantitative study – questionnaires	Elementary school children with attention deficit hyperactivity disorder	The virtual reality environment was engaging with the students with ADHD. The students expressed pleasure with using the system. The multidisciplinary team was able to rapidly adjust each iteration for the individual needs of the students to achieve the best outcomes.
Dursun et al., 2021	Turkey	Quantitative study – Online survey	347 individuals	Establishing an integrative multistep multidisciplinary telehealth-based approach in a short timeframe may be possible. 66.3% of parents reported improvement in their child.

Own source.

Discussion

Closure of schools due to COVID-19 affected the learning outcomes for children with all backgrounds; however, the impact has been greater on children with socially and economically disadvantaged backgrounds and CWSN. Online classes have not only disrupted the education outcomes for CWSN but have also severely affected their physical and mental health. The articles used in this study focused on primary data collection methods. The following section will discuss the themes that were uncovered in the systematic literature search.

The sudden closure of schools across the globe due to the on-going pandemic resulted in many schools opting for a digital home-schooling model. The shift from in-person classes to online classes had been difficult for all students across the world; however, it was particularly more challenging for CWSN. CWSN are often schooled in set routines that provides them with stability in everyday life. Schools have been regarded as learning and interactive spaces, while homes are considered safe and autonomous spaces for CWSNs. The sudden shift to the online schooling model has breached the boundaries of safe home spaces with schooling and remote work interactions (Canning & Robinson, 2021). Further, online class models often do not accommodate the special needs for CWSN. Parents of CWSNs reported that they were dissatisfied with the material and resources provided to address their child's educational and psychological needs.

Educational Impact

Online teaching models that were introduced to address the challenges posed by the ongoing pandemic did not cater to the needs of CWSN. The curricula ordinarily focused on the requirements of children without any disabilities and did not incorporate the resources and support for CWSNs education and psychological needs. Children with autism had difficulty in adapting and adjusting to home schooling where their private home space was transformed to become shared spaces for both school and work (Canning & Robinson, 2021). Online classes also increased screen time for CWSNs and decreased in-person interactions (Canning & Robinson, 2021). Physical education of CWSNs was another concern caused by online schooling. Physical education teachers required appropriate information and communications technology that were lacking in many circumstances in order to incorporate physical education in the online home-schooling format (Ng et al., 2021). A majority of European educators (66%) faced difficulty in teaching CWSNs because students lacked a structured learning environment and interactions with their peers that was provided in normal in-person classes (Ng et al., 2021). From a metric standpoint, CWSN scored lower in all measures of the Participation and Environment Measure-Children and Youth (PEM-CY) scores when compared with children without disabilities in India (Srinivasan et al., 2021).

Effect on the Mental Health of CWSN

The sudden change in the world caused by COVID-19 has disrupted the routines of CWSNs and affected their mental health by increasing anxiety, fear, distress, low mood and stress. Schools do not only provide students with an academic atmosphere, but they also hone their social, emotional, physical development (Larsen et al., 2021). They played a pivotal role in encouraging physical, mental and emotional well-being. The lockdown periods increased the number of schools providing a specialized on-line curriculum to accommodate for the needs of CWSN and to promote their mental health (Sakız, 2021). However, this did not particularly improve the mental health of CWSN as well as their parents/caregivers. The pooled prevalence of deteriorating mental health in CWSN in three studies was 55.5%.

Effect on Parents/Caregivers of CWSN

Online school models had negative impacts on parents and caregivers as well. They had to adapt to the new online teaching methods while also managing caregiving responsibilities, especially mothers (Daulay, 2021). These online methods introduced challenges such as a lack of coordination and communication, limited use of mobile phones, and limited time to support their children's education (Supratiwi et al., 2021). These double responsibilities of managing the education and managing households had serious implications on the mental health of parents/ caregivers (Castro-Kemp & Mahmud, 2021).

Impact on Physical Health and Other Health Aspects

COVID-19 pandemic has also affected the physical health of children by confining them to their houses[8]. The change in routine due to the lockdown restrictions across the globe has affected the mental health of CWSN. Disturbance of set routines has also impacted the sleeping patterns of children and adolescents. The multiple lockdown periods of isolation and uncertainty has led to an increase in sleeping disorders which include problems with staying asleep, falling asleep, nightmares and other sleep disturbances. As a positive outcome, lockdown strategies did not have a major impact on children with epilepsy. Self-management strategies for caregivers helped to mitigate stress, adapt to the new normal situation, and prepare for future outbreaks (Wanigasinghe et al., 2021).

Closure of schools has altered the learning outcomes for children across the globe; however, it has also significantly impacted access to various therapies for CWSN. This decrease in access to traditional care has not only affected the CWSN but also had a negative impact on the parents and caregivers of the CWSN. It was reported that this reduced availability of in-person therapy sessions resulted in an increase in the demand for virtual therapies. Virtual therapies received a mixed response to the impact they had

on the mental health of CWSN and caregivers (Sutter et al., 2021). School closures and absence of social interactions have deteriorated the health of children; however, it had a larger impact on students with hearing disabilities as inclusivity is required for deaf children to improve health and educational outcomes (Swanwick et al., 2020).

Social and Gender Inequalities Were Evident During Distance Learning

The impact of this closure has been even greater on children with disabilities from economically disadvantaged sections of society. There has been a compounding effect of school closures on the intersection of gender, poverty and disability that deepens the existing inequalities in education. The existing strong patriarchal and gender norms in low-to-middle income countries dictate roles for girls and women in the household includes their time occupied with household chores and domestic care. This subsequently has led to a decrease in time for potential studying. Furthermore, the support provided by schools for learning via online platforms may not be accessible to those from lower income backgrounds. Even if the online platforms are accessible, the support provided is not adequate and the responsibility is often transferred to the parents who might not be equipped to effectively administer learning (Jones et al., 2021).

Unexpected Outcomes/Positive Outcomes

Home-schooling due to the lockdowns also had positive impacts on CWSNs. Increased time spent with parents and reduced levels of stress of competing with other students led to an increase in confidence levels in CWSNs (Canning & Robinson, 2021). Online classes adopted various innovative methods to promote cognitive and social interactions. Some of these innovative modules included the use of stories, cartoons and music that showed better recall and learning (Dovigo et al., 2021). Virtual group music-making activities was a helpful tool for children including CWSN for self-expression and emotion management, restored lost musical identities and confidence, and preserved treasured social connections (Levstek et al., 2021). The use of virtual reality environments is an alternative to support the learning process in children with special educational needs such as Attention Deficit Hyperactivity Disorder (ADHD) and other associated disorders that occur in basic education (Cardona-Reyes et al., 2021).

Limitation of the Current Review

We relied on multi-database search strategy for review of literature, with the inclusion of grey literature to broaden the possibility of capturing all articles of relevance. However,

we only focused on papers with full texts so may have missed some papers. It is also possible that we may have excluded studies especially those not available in English language or published in local non-peer reviewed journals. Nevertheless, our search strategy was exhaustive in exploring four large databases to study the research question from carefully assessed peer-reviewed journals.

Conclusion

The recent pandemic and its lockdown restrictions disrupted the lives of millions across the globe. Social distancing restrictions forced schools to shut down and incorporate online home-schooling. In this paper, we examine the impact of this crisis on education, health, and well-being of children with special needs and their families. From our results, it can be concluded that online schooling did not cater for the needs of children with special needs. This not only impacted the learning and education outcomes for CWSN, but also altered their physical and mental health negatively. The occurrence of a child's disability marks a period of conflict within the family, commencing from the moment the disability is diagnosed, regardless of whether it happens before or after birth. Families experience internal conflicts on various levels, including social, economic, and psychological dimensions. The COVID-19 crisis compounded the conflicts and challenges even further for their parents and caregivers. Social and gender inequalities were clearly evident during distance learning. However, there were some unexpected positive outcomes arising from innovative online teaching methods that increased the confidence of these children. CWSN and their families would benefit from a hybrid model that continues traditional learning methods while incorporating innovative learning strategies that were discovered in the pandemic.

References

Aishworiya, R., & Kang, Y.Q. (2021). Including children with developmental disabilities in the equation during this COVID-19 pandemic. *Journal of Autism and Developmental Disorders*, *51*(6), 2155–2158. https://doi.org/10.1007/s10803-020-04670-6

Asbury, K., Fox, L., Deniz, E., Code, A., & Toseeb, U. (2021). How is COVID-19 affecting the mental health of children with special educational needs and disabilities and their families? *Journal of Autism and Developmental Disorders*, *51*(5), 1772–1780. https://doi.org/10.1007/s10803-020-04577-2

Canning, N., & Robinson, B. (2021). Blurring boundaries: The invasion of home as a safe space for families and children with SEND during COVID-19 lockdown in England. *European Journal of Special Needs Education*, *36*(1), 65–79. https://doi.org/10.1080/08856257.2021.1872846

Cardona-Reyes, H., Muñoz-Arteaga, J., Villalba-Condori, K., & Barba-González, M.L. (2021). A lean UX process model for virtual reality environments considering ADHD in pupils at elementary school in COVID-19 contingency. *Sensors*, *21*(11), Article 11. https://doi.org/10.3390/s21113787

Castro-Kemp, S., & Mahmud, A. (2021). School closures and returning to school: Views of parents of children with disabilities in England during the COVID-19 pandemic. *Frontiers in Education*, *6*. https://www.frontiersin.org/article/10.3389/feduc.2021.666574

Daulay, N. (2021). Home education for children with autism spectrum disorder during the COVID-19 pandemic: Indonesian mothers experience. *Research in Developmental Disabilities*, *114*, 103954. https://doi.org/10.1016/j.ridd.2021.103954

Davis, K., & Gavidia-Payne, S. (2009). The impact of child, family, and professional support characteristics on the quality of life in families of young children with disabilities. *Journal of Intellectual & Developmental Disability*, *34*(2), 153–162. https://doi.org/10.1080/13668250902874608

Di Marino, E., Tremblay, S., Khetani, M., & Anaby, D. (2018). The effect of child, family and environmental factors on the participation of young children with disabilities. *Disability and Health Journal*, *11*(1), 36–42. https://doi.org/10.1016/j.dhjo.2017.05.005

Dondi, A., Fetta, A., Lenzi, J., Morigi, F., Candela, E., Rocca, A., Cordelli, D.M., & Lanari, M. (2021). Sleep disorders reveal distress among children and adolescents during the COVID-19 first wave: Results of a large web-based Italian survey. *Italian Journal of Pediatrics*, *47*(1), 130. https://doi.org/10.1186/s13052-021-01083-8

Dovigo, L., Caprì, T., Iannizzotto, G., Nucita, A., Semino, M., Giannatiempo, S., Zocca, L., & Fabio, R.A. (2021). Social and cognitive interactions through an interactive school service for RTT patients at the COVID-19 time. *Frontiers in Psychology*, *12*. https://www.frontiersin.org/article/10.3389/fpsyg.2021.676238

Dursun, O.B., Turan, B., Gulsen, M., Karayagmurlu, A., Tugce Mustan, A., Kutlu, A., Rodopman Arman, A., Gokcen, C., Dogru, H., Esin, I.S., Kaya, I., Coskun, M., Soylu, N., Erbilgin, S., & Tanır, Y. (2021). Caring for the most vulnerable: A model for managing maladaptive behavior in children with mental special needs during the COVID-19 pandemic. *Telemedicine and E-Health*, *27*(9), 1068–1073. https://doi.org/10.1089/tmj.2020.0380

Greenway, C.W., & Eaton-Thomas, K. (2020). Parent experiences of home-schooling children with special educational needs or disabilities during the coronavirus pandemic. *British Journal of Special Education*, *47*(4), 510–535. https://doi.org/10.1111/1467-8578.12341

Habib Alshamri, K. (2021). The challenges of online learning for teachers of children with intellectual disability in the COVID-19 pandemic: Qualitative method. *Journal of Education*, 85, 77–94. https://doi.org/10.21608/edusohag.2021.164347

Harzing, A.-W. (2007). *Publish or Perish*. Harzing.Com. https://harzing.com/resources/publish-or-perish

Jesus, T., Bhattacharjya, S., Papadimitriou, C., Bogdanova, Y., Bentley, J., Arango-Lasprilla, J., Kamalakannan, S., & The Refugee Empowerment Task Force, International Networking Group of the American Congress of Rehabilitation Medicine. (2021). Lockdown-related disparities experienced by people with disabilities during the first wave of the COVID-19 pandemic: Scoping review with thematic analysis. *International Journal of Environmental Research and Public Health*, *18*(12), 6178. https://doi.org/10.3390/ijerph18126178

Johns Hopkins University. (2021). *Ongoing Johns Hopkins COVID-19 resources*. Johns Hopkins Coronavirus Resource Center. https://coronavirus.jhu.edu/

Jones, N., Sanchez Tapia, I., Baird, S., Guglielmi, S., Oakley, E., Yadete, W.A., Sultan, M., & Pincock, K. (2021). Intersecting barriers to adolescents' educational access during COVID-19: Exploring the role of gender, disability and poverty. *International Journal of Educational Development*, *85*, 102428. https://doi.org/10.1016/j.ijedudev.2021.102428

Karst, J.S., & Van Hecke, A.V. (2012). Parent and family impact of autism spectrum disorders: A review and proposed model for intervention evaluation. *Clinical Child and Family Psychology Review*, *15*(3), 247–277. https://doi.org/10.1007/s10567-012-0119-6

Khanna, R., & Kareem, J. (2021). Creating inclusive spaces in virtual classroom sessions during the COVID pandemic: An exploratory study of primary class teachers in India. *International Journal of Educational Research Open*, *2*, 100038. https://doi.org/10.1016/j.ijedro.2021.100038

Larsen, L., Helland, M.S., & Holt, T. (2022). The impact of school closure and social isolation on children in vulnerable families during COVID-19: A focus on children's reactions. *European Child & Adolescent Psychiatry*, *31*, 1–11. https://doi.org/10.1007/s00787-021-01758-x

Levstek, M., Barnby, R.M., Pocock, K.L., & Banerjee, R. (2021). "It all makes us feel together": Young people's experiences of virtual group music-making during the COVID-19 pandemic. *Frontiers in Psychology*, *12*. https://www.frontiersin.org/article/10.3389/fpsyg.2021.703892

MOSPI. (2018). *Persons with disabilities in India, NSS 76th round (2017–2018)*. Ministry of Statistics and Programme Implementation. https://www.mospi.gov.in/documents/213904/301563//Report_583_Finalm1653997477655.pdf/2a1b5dde-2fb8-841e-a0a5-6a07834d0d8c

Murphy, A., Pinkerton, L.M., Bruckner, E., & Risser, H.J. (2021). The impact of the novel coronavirus disease 2019 on therapy service delivery for children with disabilities. *The Journal of Pediatrics*, *231*, 168–177. https://doi.org/10.1016/j.jpeds.2020.12.060

Ng, K., Klavina, A., Ferreira, J.P., Barrett, U., Pozeriene, J., & Reina, R. (2021). Teachers' preparedness to deliver remote adapted physical education from different European perspectives: Updates to the European standards in adapted physical activity. *European Journal of Special Needs Education*, *36*(1), 98–113. https://doi.org/10.1080/08856257.2021.1872848

Ray, D., & Sreenivasan, S. (2020). India's lockdown: An interim report. *Indian Economic Review*. https://www.nber.org/system/files/working_papers/w27282/w27282.pdf

Resch, J.A., Mireles, G., Benz, M.R., Grenwelge, C., Peterson, R., & Zhang, D. (2010). Giving parents a voice: A qualitative study of the challenges experienced by parents of children with disabilities. *Rehabilitation Psychology*, *55*(2), 139–150. https://doi.org/10.1037/a0019473

Ressa, T.W. (2021). The COVID-19 pandemic, its consequences, and the recovery: Implementation of disaster education and management is key to the schooling of children with disabilities. *International Journal of Modern Education Studies*, *5*(1), 22–48. https://doi.org/10.51383/ijonmes.2021.62

Sakız, H. (2021). Delayed educational services during COVID-19 and their relationships with the mental health of individuals with disabilities. *Journal of Community Psychology*, *50*(6), 2562–2577. https://doi.org/10.1002/jcop.22676

Scarpellini, F., Segre, G., Cartabia, M., Zanetti, M., Campi, R., Clavenna, A., & Bonati, M. (2021). Distance learning in Italian primary and middle school children during the COVID-19 pandemic: A national survey. *BMC Public Health*, *21*(1), 1035. https://doi.org/10.1186/s12889-021-11026-x

Schuck, R.K., & Lambert, R. (2020). "Am I doing enough?" Special educators' experiences with emergency remote teaching in spring 2020. *Education Sciences*, *10*(11), Article 11. https://doi.org/10.3390/educsci10110320

Srinivasan, R., Kulkarni, V., Smriti, S., Teplicky, R., & Anaby, D. (2021). Cross-cultural adaptation and evaluation of the participation and environment measure for children and youth to the Indian context – a mixed-methods study. *International Journal of Environmental Research and Public Health*, *18*(4), Article 4. https://doi.org/10.3390/ijerph18041514

Supratiwi, M., Yusuf, M., & Anggarani, F.K. (2021). Mapping the challenges in distance learning for students with disabilities during COVID-19 pandemic: Survey of special education teachers. *International Journal of Pedagogy and Teacher Education*, *5*(1), Article 1. https://doi.org/10.20961/ijpte.v5i1.45970

Sutter, E.N., Francis, L.S., Francis, S.M., Lench, D.H., Nemanich, S.T., Krach, L.E., Sukal-Moulton, T., & Gillick, B.T. (2021). Disrupted access to therapies and impact on well-being during the COVID-19 pandemic for children with motor impairment and their caregivers. *American*

Journal of Physical Medicine & Rehabilitation, *100*(9), 821–830. https://doi.org/10.1097/PHM.0000000000001818

Swanwick, R., Oppong, A.M., Offei, Y.N., Fobi, D., Appau, O., Fobi, J., & Frempomaa Mantey, F. (2020). The impact of the COVID-19 pandemic on deaf adults, children and their families in Ghana. *Journal of the British Academy*, *8*, 141–165.

Tokatly Latzer, I., Leitner, Y., & Karnieli-Miller, O. (2021). Core experiences of parents of children with autism during the COVID-19 pandemic lockdown. *Autism*, *25*(4), 1047–1059. https://doi.org/10.1177/1362361320984317

UDISE. (2021). *UDISE report*. Department of School Education & Literacy Ministry of Education Government of India. https://udiseplus.gov.in/#/page/publications

Wanigasinghe, J., Jayawickrama, A., Hewawitharana, G., Munasinghe, J., Weeraratne, C.T., Ratnayake, P., Wijesekara, D.S., Fernando, S., & Rupasinghe, P. (2021). Experience during COVID-19 lockdown and self-managing strategies among caregivers of children with epilepsy: A study from low middle income country. *Seizure*, *84*, 112–115. https://doi.org/10.1016/j.seizure.2020.12.001

Xiang, M., Zhang, Z., & Kuwahara, K. (2020). Impact of COVID-19 pandemic on children and adolescents' lifestyle behavior larger than expected. *Progress in Cardiovascular Diseases*, *63*(4), 531–532. https://doi.org/10.1016/j.pcad.2020.04.013

Source of funding

This project was funded by MSD Fellowship for Global Health. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

Disclosure statement

No potential conflict of interest was reported by the author(s).