Review article

Experiences and consequences of remote schooling during the Covid-19 pandemic for children and youth in the Nordic countries: a scoping review

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Abstract
Between March 2020 and March 2022, the Covid-19 pandemic led to societal lockdowns and school closures worldwide. The length of school closures varied from a few weeks to many months. We summarise the experiences and consequences of remote schooling during the pandemic on children and youth in the Nordic countries. We conducted a systematic scoping review, including longitudinal, qualitative and mixed-methods studies. The methods involved predetermined selection criteria, an extensive literature search, independent screening of references and a narrative summary of findings. We included 20 studies (in 21 reports), from Denmark, Norway, Sweden and Finland. There were 7 longitudinal, 7 qualitative and 6 mixed-methods studies. The studies covered primary, lower and upper secondary education. The studies that collected data at

the beginning of the pandemic in spring 2020, when most schools in the Nordic countries had been closed for a few weeks, showed variations in how children and youth experienced remote schooling. Many students (and teachers) experienced subjective learning gaps. Lower well-being was reported among students on all educational levels during the period of remote schooling, although some students thrived in this period. Factors that might predispose children and youth for negative consequences of the pandemic are socio-economic background, immigrant background and learning difficulties. The extensive shift to remote schooling for children and youth during the pandemic yielded important consequences that should be considered in the preparation for future pandemics or similar crises.

Keywords Covid-19 pandemic; school closure; remote schooling; remote teaching; distance learning

Introduction

From the winter and spring of 2020, and during the next two years, the Covid-19 pandemic led to infection control measures, societal lockdowns and various other constraints influencing people and their everyday lives all over the world.

Closing of schools internationally

The widespread closure of and restrictions in preschools, schools and universities affected children and young people in most countries. Millions of schools offered only remote teaching in periods, mainly from March 2020 to March 2022 (UNESCO, 2022). The length of school closures varied greatly between and within countries, from a few weeks to many months. In addition to full-time physical closures of schools, long periods of hybrid teaching (a mixture of in-school and remote teaching) and extensive use of quarantines for teachers and students disrupted education for more than 90 per cent of students globally (UNESCO, 2022; UNICEF, 2022).

Previous research on the impacts of school closure derives from earlier pandemics and from homeschooling as a result of parents taking their children out of school to teach them at home. Studies from the SARS epidemic in 2002–3 focused primarily on the contamination and transmission of the virus, the economic costs, the parents' absence from work and hence the impact on the health services (Cauchemez et al., 2014; Jackson et al., 2013). There are no or few studies on the impacts of school closure on children's and youth's learning, social health, mental health and development issues, for example.

Regarding home schooling, existing research has focused on both academic and social impacts (for example, Ray, 2017). However, this form of voluntary school at home differs from enforced remote schooling in several aspects, for instance, that parents have chosen to take on the responsibility to teach their children themselves, and thus reserved time (years) off work. Studies on impacts of crises and catastrophes in general have indicated that the impact on families does not strike by chance. For example, climate catastrophes tend to unproportionally affect socially disadvantaged groups (Marshall et al., 2020) or vulnerable groups, such as children (Seddighi et al., 2021). Consequently, before 2020, few studies investigated the impacts of a pandemic leading to extensive closure of schools and the switch to remote schooling on children and youth.

Regarding the academic and social impacts of the Covid-19 pandemic on children and youth, several reviews have been published. Two systematic reviews from 2023 synthesised studies of learning loss during the pandemic, performing meta-analyses. Betthäuser et al. (2023) reviewed 42 studies from 15 countries, primarily from the US and the UK, mainly focusing on learning progress among school-age children. Their last literature search was conducted in August 2022. The meta-analysis across all 42 studies indicated an overall negative effect of the pandemic on learning (Cohen's $d = -0.14$, 95 per cent confidence interval: -0.17 to -0.10). This learning deficit appeared more pronounced among children from low socio-economic backgrounds. The review authors estimated that students experienced an approximate 35 per cent loss of a school years' worth of learning.

Di Pietro (2023) included 39 studies from 19 countries, investigating the impact of Covid-19 on student achievement across primary, secondary and tertiary education levels (last literature search in July 2022). The review revealed a reduction in student achievement (on average 0.19 standard deviations). Notably, there were no significant distinctions between different educational levels. A more substantial learning deficit was observed in mathematics and science compared to other subjects. Additionally, the extent of the learning deficit appeared less pronounced among European students compared to those in other regions. The results suggested that a year later, students had not fully recovered from the learning setbacks caused by the school closures in 2020.

In addition, several systematic reviews from 2021 and 2022 studied psychosocial outcomes for children and youth during the pandemic and closing of schools. School closure contributed to increased anxiety and loneliness in young people (Chaabane et al., 2021); emotional and behavioural problems among children (Lehmann et al., 2021); and adverse mental health symptoms and health behaviours among children and adolescents (Viner et al., 2022). For each of these reviews, associations between school closure and health outcomes and behaviours cannot be separated from other lockdown measures.

All the referred reviews include studies from all over the world, irrespective of differences between the countries regarding, for example, burden of disease, length of school closure or societal structures.

The Nordic countries

The Nordic countries share a similar welfare model, with relatively high living standards on average and comparable school systems, which makes it easier to compare the Nordic countries between themselves and with other non-Nordic countries. For example, the loss of services such as free school lunches as a consequence of school closures was not as relevant in the Nordic countries as it was in the US or the UK. Further, the Nordic countries have been relatively fortunate in facing the pandemic compared to many other nations globally, but Denmark, Finland, Iceland, Norway and Sweden still felt its impact significantly, dealing with infections, disease and varying degrees of lockdown measures. Each country executed preventive actions and lockdowns differently. Sweden, for instance, opted not to enforce societal lockdowns, border controls, quarantines or restrictions on people gathering, primarily relying on recommendations rather than legal measures (Irfan et al., 2022; Saunes et al., 2022). In contrast, Denmark, Finland and Norway implemented legal restrictions, including lockdowns, border controls and quarantines. Iceland also implemented legal restrictions, but instead of strict lockdowns it used extensive testing, contact tracing, quarantines and isolation.

Regarding school restrictions in 2020, Sweden used limited remote teaching for children and young people. Primary and lower secondary school teaching continued as normal throughout the pandemic, with upper secondary schools only closing for three months in spring 2020 (Skolverket, 2022; Svaleryd et al., 2022). Iceland also kept primary schools open, whereas Denmark, Finland and Norway intermittently closed both primary and secondary schools (Irfan et al., 2022, Saunes et al., 2022).

The term *closed schools* is understood here as remote learning, where students were not physically present in the classroom. However, in Norway, even during these closures, some exceptions allowed certain groups of students, such as children of parents who were critical workers or children with special needs, to attend school (Caspersen et al., 2021). Some regions adopted hybrid learning models, with only half of the students attending physically each day.

The most stringent school regulations, such as full closures, were more common during the early months of the pandemic. As the situation evolved, measures became less strict with the availability of vaccines and the introduction of other strategies, such as mass testing. However, new variants of the Covid-19 virus led to the reintroduction of restrictions for various durations, even in the Nordic countries (Hall et al., 2022). There were also notable local variations, with differences between regions within a country and between urban and rural areas (Utdanningsdirektoratet, 2021).

Research questions

Research interest in the Covid-19 pandemic as a natural experiment has been extensive. Studies on its impact on children and youth, encompassing their mental and physical health, family dynamics, social relationships and school activities, require more particular attention. The data from these studies are crucial if we want to shape future crisis response strategies, taking not only contamination and organisation of the health services into consideration, but also the lives and well-being of children and

youth. In view of the comprehensive closing of physical schools, outcomes related to remote schooling are important to study. Limiting the focus area to the Nordic countries may yield results more based on similar underlying assumptions, compared to including a larger geographical area. Our research questions were:

- What were the experiences and consequences of remote schooling during the Covid-19 pandemic for children and youth aged 6 to 18 years in the Nordic countries?
- What background factors are associated with the experiences and consequences?

Methods

The rather broad and open questions on experiences, consequences and associated factors were addressed in a scoping review. These results can later be a foundation for more specific and pointed questions and answers in a full systematic review. A systematic review is a literature review that entails explicit criteria for inclusion, a systematic literature search and a comprehensive synthesis of the results from the included studies. There exists a variety of types of systematic reviews, differing in purpose and extent, but principles of transparency and explicit methods are essential and common for all types (Aromataris et al., 2024; Higgins et al., 2023).

The main purpose of a scoping review is to map the existing literature on a broader topic or research area. A scoping review may take a systematic approach and tends to focus on presenting a narrative summary of study findings to provide an overview of the breadth of literature on a specific topic, rather than conducting comprehensive synthesis or statistical analyses of the results across included studies (Arksey and O'Malley, 2005; Campbell et al., 2023; Levac et al., 2010; Lockwood et al., 2019). Typically, full systematic reviews aim to provide a focused and in-depth analysis of a specific research question, while scoping reviews aim to map the literature landscape on a broader topic, identifying gaps and trends.

We followed the PRISMA-ScR reporting guidelines in the writing of this scoping review (Tricco et al., 2018). We did not publish a protocol.

Inclusion criteria

Our predetermined inclusion criteria are presented in Table 1. We included only longitudinal, qualitative and mixed-methods studies, as they can indicate, respectively, changes over time, experiences in depth and the understanding of a phenomenon from different angles. Cross-sectional studies such as surveys were not eligible, since they offer only a description of the situation at one specific time and give insufficient attention to complexity. The focus of this review has been on the general population of children and youth, and studies of specific subgroups of children and youth were excluded.

Table 1. Inclusion criteria

Aspect	Criteria for inclusion
Population	Students in primary, lower and upper secondary education (aged 6–18 years) Parents, teachers and others who could give information about the groups of students who could not easily speak for themselves
Exposure	Covid-19 pandemic
Outcome	Students' learning, experiences of remote schooling, well-being
Study design	Longitudinal studies (same cohort with outcomes measured on at least two timepoints, repeated cross-sectional studies or registry data), qualitative studies, mixed-methods studies
Country	Norway, Denmark, Sweden, Finland, Iceland (>50 per cent of participants from a Nordic country)
Language	English, Norwegian, Danish, Swedish
Publication year	1 January 2020 to 14 August 2023 (we included preprints)

We excluded the following:

- Studies of children in kindergarten and university students
- Studies that only looked at subgroups of children and youth (for example, children with somatic disorders)
- Studies of previous pandemics
- Studies that mainly focused on consequences for schools (for example, organisational).
- Studies that included only cross-sectional data, as this design does not allow for examinations of change in outcome over time.

Literature search

The present scoping review draws on a systematic literature search performed in September 2020, documented in Nøkleby et al. (2021a), with three updates: in April 2021 (Nøkleby et al., 2021b), July 2022 (Nøkleby et al., 2023) and August 2023 (present article; the authors can provide the documentation on request – see Figure 1). The searches were performed by an information specialist in databases covering the fields of welfare, social sciences, medicine, mental health and learning: MEDLINE, Embase, PsycINFO, Scopus, ERIC, Web of Science and Sociological Abstracts. We also searched special Covid-specific databases such as Coronavirus Research Database, CDC downloadable database and Epistemonikos L-OVE. The searches consisted of search terms describing Covid (for example, covid* OR corona OR coronavir*) and children or adolescents (for example, child* OR teen* OR adolesc*). In the largest databases, the searches were further limited with a range of search terms describing relevant outcomes such as mental health, well-being, learning or school performance. The searches were also limited to publications from 1 January 2020. There were no limitations to study designs. Search strategies from PsycINFO, Epistemonikos, ERIC and MEDLINE can be provided upon request. Additionally, we carried out limited searches for grey literature in Google, relevant institution's publication lists and several Nordic science archives, for example, Idunn (www.idunn.no), Cristin (www.cristin.no), DIVA (www.diva-portal.org) and Bibliotek.dk (www.bibliotek.dk). For complete search strategies from all databases, see Nøkleby et al. (2021a, 2021b, 2023).

In the last two search updates, we used OpenAlex as the main source for retrieving relevant papers. OpenAlex is an open-source dataset with more than 250 million scientific objects, such as journal publications, white papers and conference abstracts (Priem et al., 2022). The data sources for OpenAlex include Microsoft Academic Graph, CrossRef, ORCiD, PubMed, CENTRAL, Unpaywall, ISSN International Centre, preprint servers and institutional repositories. One of the authors (TCB) searched OpenAlex through EPPI-Reviewer, a reference management tool (Thomas et al., 2023), and used previously identified relevant studies as seed studies. OpenAlex uses machine-learning algorithms to analyse patterns in the seed studies, identifying related articles based on similarities and connections between documents, authors and topics. In the OpenAlex literature searches, we used the relevant studies from the previous searches as seed studies for the update searches.

Study selection

References were screened in EPPI-Reviewer. Priority screening, a machine-learning function, was used when screening titles and abstracts. Priority screening is a ranking algorithm in the EPPI-Reviewer software. It is a supervised machine-learning algorithm that is trained by the researchers' decisions on inclusion and exclusion of references at the title and abstract levels, which results in prediction of relevance of unscreened data, which is then presented in EPPI-Reviewer according to relevance. References that the algorithm considers more relevant based on the researchers' inclusion decisions are pushed forward in the 'reference queue'. Thus, we get a quicker overview of how many references possibly fulfil the inclusion criteria than if we were to read the references in random order.

References at the title and abstract level were screened by two researchers independently for all searches. Full texts were retrieved and screened by two researchers independently in the first search. In the later searches, due to the sheer number of included references at title and abstract level, one researcher screened each full text, while another researcher checked the evaluations. Disagreements in screening decisions, both at title and abstract level and at full-text level, were discussed in the project group until an agreement was reached.

Figure 1. Flow chart of references identified and records included
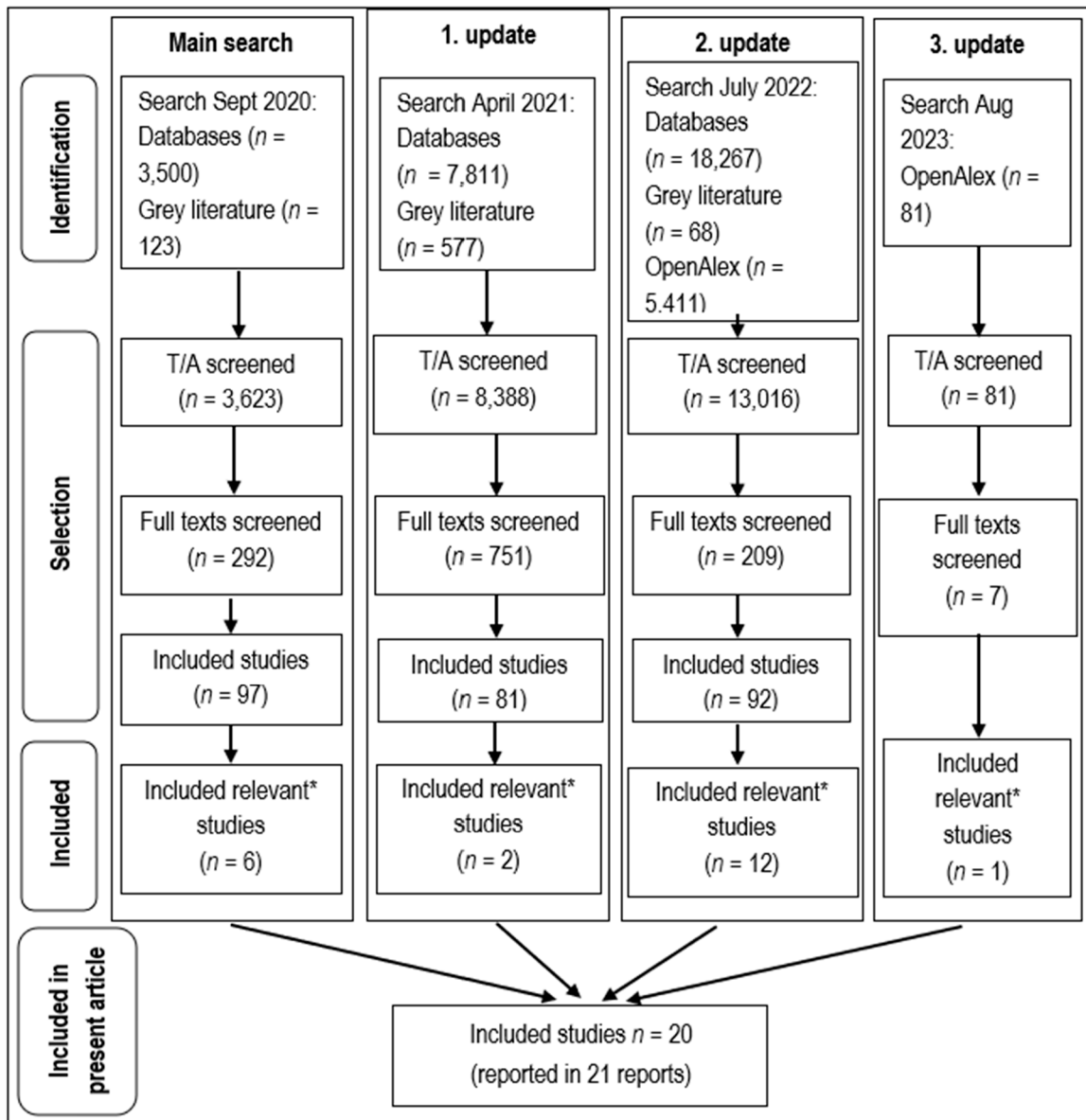
* Relevant studies = studies satisfying the inclusion criteria for the present article

Data extraction and summary

We extracted the following data: publication year, country, study design, aim of study, research question, number of participants, age group of participants, time of data collection measured outcomes, and results. Quantitative results from included studies were extracted as overall findings, not the statistical expressions. As this is a scoping review, we have not performed any quality appraisal of the studies, and the findings were summarised to provide an overview, not a precise answer. One researcher extracted the data while another researcher checked the data. We then summarised the information collected. The findings were described according to a theme, and then grouped into categories with similar subthemes. Six main themes were identified: three regarding experiences and consequences, and three regarding factors that seemed associated to the experiences and consequences.

Results

Figure 1 presents a flow chart with the number of references identified, full texts read and records included from each of the four literature searches. In total, we included 20 studies in 21 reports. (The study by Skar et al. is described in Skar et al. [2021, 2023].)

The 20 studies are 7 longitudinal studies (mostly repeated cross-sectional), 7 qualitative studies (mostly interviews) and 6 mixed-methods studies (mostly survey plus interviews). The studies were carried out in Denmark (*n* = 8), Norway (*n* = 6), Sweden (*n* = 4), Finland (*n* = 1), and one study included samples from four Nordic countries. Of the studies, 14 collected data in spring 2020, while 6 studies completed their data collection in 2021, which points to the first half of the pandemic. The populations covered the age group 6–18 years, that is, primary and lower and upper secondary education. Of the studies, 7 also included teachers and other school personnel (of which 1 study included only teachers); 4 studies included parents in addition to students. All the studies are presented in Table 2.

Main findings

Regarding the first research question – What are the experiences and consequences of remote schooling during the pandemic for children and youth aged 6 to 18 years in the Nordic countries? – three main themes were identified: experiences of digital learning (four studies), well-being outcomes (seven studies) and learning outcomes (six studies). The second research question – What background factors are associated with the experiences and consequences? – also yielded three main themes: socio-economic background (six studies), immigrant background (three studies) and learning difficulties or low-achieving students (five studies).

Experiences of digital learning

Four studies examined students' experiences of being taught on digital platforms and their learning experiences. A Norwegian study from upper secondary school showed how school closures made it difficult for students in vocational study programmes to receive relevant tasks in practical subjects (Andersen et al., 2021). It was deemed essential to prioritise the return of these students when schools reopened, not only for motivation and learning, but also for grading in vocational subjects. However, differences emerged among students in various vocational programmes, with the poorest learning outcomes observed in electrical engineering and the highest in the health programme. Many students were unable to engage in vocational training at external companies during spring 2020. Still, by autumn 2020, the number of students participating in such training was not much lower compared to the previous year.

Regarding primary schools, their use of digital resources varied widely, both before and during the pandemic. Some schools provided tablets or computers to students who lacked access to such equipment at home (Letnes et al., 2021). Communication with schools also varied significantly, with some students having minimal contact with teachers or peers, while others maintained daily interactions. Both students and their parents expressed a desire for frequent teacher contact, and parents felt that online cooperation and social interaction among students could have been more frequent and effective. Parental involvement in assisting children with schoolwork varied, with some dedicating several hours a day and others allowing independent work. Several parents noted their children's development of digital skills, although parents of younger children felt that the schoolwork was not adequately tailored to their needs.

In a Danish study from spring 2021, students in Grades 5–9 reflected on digital learning experiences (Lundtofte, 2021). The study highlighted the importance of striking a balance between clear boundaries and flexibility to ensure effective digital teaching. Challenges arose from a lack of personalised instruction and active engagement during classes. A Swedish study also noted substantial variation in the level of support that students received from teachers during the period of digital teaching (Loeb and Windsor, 2022). Many students reported feeling pressured, emotionally drained, lacking motivation and unable to influence the situation. The research underscored the strong connection between motivation for learning and the interaction between students and teachers in the classroom.

Table 2. Included studies (*N* = 20) (reported in 21 reports)

Study	Country	Aim of study	Study design	Participants	Data collection	Main findings
Andersen et al. (2021)	Norway	Investigate consequences and management of the pandemic in upper secondary schools	Mixed methods (surveys + interviews)	*N* = total c. 3,000 Students of 16–19 years of age, teachers, school leaders	October 2020–January 2021	Lockdown impacted on student well-being and motivation and learning varied. Teachers were especially concerned about students facing different challenges. The majority felt that the shift to remote teaching negatively affected students with low academic levels, vulnerability or frequent absences. Teachers noted that some students thrived in the remote learning environment, finding it less tiring or demanding than the classroom. While a few students were allowed to remain at school, many teachers believed more should have been given this option. Additionally, teachers expressed concerns that minority students with short periods of residence in Norway might face challenges with remote learning.
Cameron et al. (2022)	Norway	Investigate school closure experiences among teachers and students with/without learning disabilities	Mixed methods (surveys + interviews)	*N* = 208 Students Grade 9–10 with and without learning difficulties + teachers	Winter 2020/1	Most students viewed remote teaching as equal to or slightly better than in-person teaching, reflecting a generally positive perception. Students with learning difficulties had a notably more negative opinion. Teachers grappled with deciding which students should have in-person classes, raising concerns for those without this option and for potential emotional and social consequences. Approximately half of the teachers believed students with learning difficulties were not receiving the necessary support, noting their tendency to give up quickly when facing challenges. These students reported a more negative impact on their social relationships during the pandemic. Teachers stressed that students lacking support at home faced the greatest risk of negative consequences due to school closures.

Caspersen et al. (2021)	Norway	Investigate experiences with the school closure in primary school and subsequent opening	Mixed methods (surveys + interviews)	*N* = total c. 90,000 Students in primary, lower and upper secondary + parents, teachers, school leaders, psychologists, child welfare service	August 2020–January 2021	Perceived learning outcomes decreased during the period of remote teaching, while there were about the same number of students who liked remote teaching better as there were students who liked remote teaching less than regular school. There seemed to be a clear correlation between the time spent by parents following up schoolwork in a regular school situation and during remote teaching. There seemed to be a clear distinction between parents of children with special educational needs and other parents, with the former experiencing less guidance and follow-up at home than they felt they needed. Of teachers, 80 per cent reported having an overview of vulnerable students in their class, while only 27 per cent responded that they were able to follow up vulnerable students.
EVA Denmark's Evaluation Institute (2021)	Denmark	Investigate lessons learned from remote teaching (and reopening)	Mixed methods (survey, focus groups, interviews, registry data)	*N* = c. 1,900 Students in primary and lower secondary + teachers and leaders	Autumn 2020	The study revealed great differences during spring 2020, with younger students experiencing a high degree of independent work, while older students had more digital collaboration. Teachers noted poorer learning outcomes, especially for academically weaker students, and mixed motivation levels among students, including those with high academic abilities. Some students appreciated the remote format for its quieter environment and fewer distractions. Vulnerable groups, such as socially disadvantaged students and those with special needs, faced the most academic and well-being challenges during the lockdown. Some students with mental health issues appeared to benefit from remote teaching. As schools reopened, the youngest students saw benefits, such as outdoor teaching and smaller groups.
Hallin et al. (2022)	Sweden	Investigate learning outcomes in 248 municipalities	Longitudinal (repeated cross-sectional + registry data)	*N* = 97,073 Students Grade 1–3	Pre-pandemic Spring/summer 2021	The results showed no decline in reading skills during the pandemic, compared with the previous years, for students in Grades 1, 2 and 3. There was also no change in the proportion of students with weaker reading skills. Students from families with low socio-economic status (who the authors assume were negatively affected by the pandemic in other ways) did not show poorer results during the pandemic compared to before, and there were no clear gender differences. The authors concluded that Swedish students benefited from schools remaining open during the pandemic.

Hansen et al. (2020)	Denmark	Explore the experiences of older teenagers in their new everyday life due to the pandemic and lockdown	Qualitative (interviews + texts)	*N* = 239 Students of 15–19 years of age	June 2020	Many young people longed for the social life of the school, and many vulnerable and exposed young people were even worse off. However, there were young people who felt less stressed. Vulnerable young people also reported relief from the pressure that can be associated with the social performance scene in a school setting.
Jensen and Reimer (2021)	Denmark	Investigate the effect of school closure in March–May 2020 on students' reported well-being and possible variations regarding socio-economic backgrounds	Longitudinal (repeated cross-sectional)	*N* = 123,932 Students Grade 6–9	Pre-pandemic March–May 2020	Compared to previous years, during the spring 2020 lockdown, an increase in whether students reported liking school was reported, while no change was found in students' reported levels of loneliness. Students with lower socio-economic status in both the lockdown group and the control group generally reported lower well-being than students in the high socio-economic status group. Furthermore, the results indicated that the spring 2020 lockdown did not exacerbate social inequalities related to the measured outcomes. However, the authors observed a trend indicating that students with mothers with higher education reported a slightly weaker increase in well-being and increased loneliness, compared to students with mothers who did not have higher education.
Letnes et al. (2021)	Norway	Explore families' experiences with digital technology in school and leisure time during the pandemic	Qualitative (interviews)	*N* = 15 families (parents and students of 6–11 years of age)	June 2020	There was great variation in how schools used digital opportunities, both before and during the pandemic. Communication with the school varied greatly: some students barely spoke to teachers and fellow students, while others had daily contact. Both children and parents wanted frequent contact with the teacher. Some parents helped their children with their schoolwork for several hours a day, while others let their children work alone/independently. Some parents expressed concern about remote teaching, especially for younger children. For many families, remote teaching was a transition to a more digital everyday life for the whole family, including in the afternoon.

Lidegran et al. (2021)	Sweden	Investigate high school students' experience of remote teaching	Qualitative (survey with open questions)	*N* = 3,726 (qual. responses = 1,500) Students in upper secondary	Spring/summer 2020	Urban upper-middle-class students had mixed feelings about remote teaching during the pandemic. They worried about workload and understanding grading criteria. These students missed the boundaries between school and home, and social interactions with classmates. Immigrant students from working-class backgrounds were dissatisfied due to insufficient school support and unclear instructions. They often had limited home space and struggled with remote teaching, leading to grade drops and concerns about future studies. Rural working-class students felt detached from school during the pandemic. They experienced late mornings, boredom and distractions during remote teaching. They missed their friends the most.
Loeb and Windsor (2022)	Sweden	Explore how students in their final year of upper secondary school experienced their everyday school life, and everyday life in general	Qualitative survey with open questions + texts)	*N* = 87 Students in last year upper secondary	Spring/summer 2020	The results showed how the shared physical school building had now been replaced by different home situations for students, for example, related to overcrowding or internet coverage. There were also large variations in how much help students felt they received from teachers in the digital learning situation. Many students felt pressured, emotionally exhausted, unmotivated and unable to influence the situation. The students' stories showed how their conversations with friends had changed from initially being all about Covid, how bad everything was and remote teaching, to one year later having more depressed conversations, anxiety about the future and diminishing hope for change.
Lundtofte (2021)	Denmark	Explore experiences with remote teaching	Qualitative (interviews)	*N* = 22 Students Grade 5 and 9 + parents, teachers, school leaders and so on.	Spring 2021	The results showed that the balance between a clear framework and flexibility was essential to make remote teaching work for students. Furthermore, teachers were surprised by, and had not been able to predict, which students were most affected by school closures in terms of well-being and motivation. Students who were identified were invited to be physically present at school, but participate in lessons digitally in line with the other students. The teachers recommended that in a future similar situation, schools should try to better facilitate the needs of each individual student. Both teachers and students (especially the youngest) expressed frustration that the other students did not always have a webcam in class. The students generally wanted to return to the regular school, but they also recognised some benefits of remote teaching.

Mælan et al. (2021)	Norway	Investigate middle school students' experiences with remote teaching	Longitudinal (repeated cross-sectional)	*N* = 1,755 (93 schools) Students in lower secondary	Autumn 2018 + May 2020	All student groups (high, medium and low grade level) reported lower well-being during remote teaching compared to regular school pre-Covid. In regular school, students with low grades had lower self-efficacy compared to students with high grades, and this difference had increased during remote teaching. Students reported less teacher feedback during remote teaching than in regular school, and more written than verbal feedback during remote teaching. Students with high grades reported the greatest change in feedback.
Primdahl et al. (2021)	Denmark	Investigate experiences with remote teaching among teachers responsible for 'preparation classes' for newly arrived immigrants and refugees	Qualitative (interviews)	*N* = 8 teachers for new immigrant students in lower secondary and upper secondary	Spring/summer 2020	Teachers faced difficulties staying connected with students who lacked necessary equipment such as computers, relevant software or internet access. Language barriers further hindered communication, and the absence of physical presence posed significant teaching challenges. Social support, including building relationships and fostering a sense of school community, suffered as a result. Moreover, teachers expressed concerns about the closure or limited availability of crucial support services, such as psychologists. The study's findings underscore the importance of physical school spaces and proximity in aiding newly arrived immigrants and refugees, highlighting the vulnerability of this group during crises.
Qvortrup et al. (2022)	Denmark	Investigate students' and teachers' understanding and experience of the learning environment and activities in June 2020	Mixed methods (survey + interviews)	*N* = 1,222 Students of 9–15 years of age + 18 teachers and school leaders	Spring/summer 2020	During the pandemic, students reported a shift from project-based learning to guided discovery learning. In interviews, teachers and school leaders emphasised the benefits of this change, including increased student-centred teaching, smaller class sizes, enhanced individual support, greater participation from quieter students and more outdoor education opportunities allowing for differentiation. Teaching outdoors was positively experienced, with a variety of activities. Some teachers maintained a subject-based structure, while others appreciated the fluidity of continuous, teacher-led outdoor sessions.

Rambøll Management (2020)	Denmark	Investigate how the lockdown affected young people socially, personally and professionally	Mixed methods (surveys + interviews)	*N* = 1,140 in total Students Grade 8 + parents	June–August 2020	Twelve per cent of the respondents reported experiencing increased life satisfaction during the lockdown (more girls than boys). They also reported fewer academic and social demands, more time with family, more socially acceptable to be alone; 13 per cent experienced a decrease in life satisfaction. They reported less learning in remote teaching and missing everyday routines, friends and leisure activities.
Reimer et al. (2021)	Denmark	Investigate the impact of school closure on reading behaviour in different student groups	Longitudinal (repeated cross-sectional)	*N* = 5,485 Students Grade 4–5	February 2020 + March 2020 + May 2020	The study showed that students' online reading behaviour increased significantly after school closure. Both before and after closure, there were differences in reading behaviour between students from different socio-economic backgrounds. In the first period after the outbreak (until Easter), when schools were closed and students were only taught remotely, the differences in reading behaviour increased between students with parents with higher education and students with parents without. However, this increased difference did not continue in the second post-outbreak period (after Easter), although socio-economic differences remained (and everyone still read more than pre-Covid).
Ringer and Kreitz-Sandberg (2022)	Sweden	Investigate how students in upper secondary school experienced digital teaching	Qualitative (interviews)	*N* = 13 Students in upper secondary	Spring/summer 2020	Three key themes emerged: new daily routines and structure, relationships with teachers, and interactions with classmates. These themes revealed substantial variations among the interviewees: • New structure: some viewed the morning routines as time-saving and relaxing, while others found them demotivating. The flexibility of remote learning offered independence and freedom for some, but overwhelmed others due to the lack of structure. Work breaks and choice of workspace at home also varied. • Teachers: interviews highlighted challenges in communication with teachers during remote learning. Difficulties included interpreting teacher expectations, limited adaptation to students' pace, reduced influence on teachers' decisions as individual students, and greater difficulty seeking teacher assistance. • Classmates: all interviewees encountered difficulties learning from peers in the digital classroom, including comparing performance, engaging in meaningful discussions, offering support and organising group activities.

Salmela-Aro et al. (2021)	Finland	Investigate whether the pandemic led to increased burnout and reduced engagement at school	Longitudinal (cohort study)	*N* = 2,755 Students Grades 5–6 and 7–8	Pre-pandemic Autumn 2020	The results brought up five student profiles: a majority reporting a slight decline in academic well-being from 2019 to 2020, as expected according to age-related development. Two other groups of students reported moderate or strong declines in academic well-being, while two groups reported weak and moderate increases. The group of students who did not thrive at school (who reported exhaustion, cynicism and a sense of lack of mastery) increased more during the pandemic than normal age development would indicate. Socio-emotional skills appeared to be associated with school satisfaction: the largest group that reported no change in school satisfaction also reported no significant changes in socio-emotional skills (slightly increased loneliness and slightly decreased belonging), while increased school satisfaction correlated with increased curiosity, perseverance, academic buoyancy and social engagement. Reduced school satisfaction was associated with strongly increased loneliness and strongly reduced sense of belonging.
Skar et al. (2021)	Norway	Investigate whether lockdown and remote teaching led to changes in first graders' writing skills	Longitudinal (repeated cross-sectional)	*N* = 817 (2,453 in total) Students Grade 1	June 2019 + June 2020	The study showed that first graders performed worse on the three outcome measures: writing quality (small to medium effect size), handwriting (small to medium effect size) and attitude towards writing (small effect size), compared to first graders tested before the pandemic.
Skar et al. (2023)	Norway	Investigate the long-term impact of the Covid-19 pandemic on the writing skills of second-grade students	Longitudinal (repeated cross-sectional)	*N* = 641 (2,309 in total) Students Grade 2	June 2019 + June 2021	The results of the study showed that the negative impact on children's writing skills reported in Skar et al. (2021) was no longer evident one year later when the same students were in second grade. The initial study had found lower writing scores, handwriting fluency and attitude towards writing among first-grade students immediately after remote teaching started due to the pandemic, compared to the previous year's students. In the current study, there were no statistically significant differences in writing quality, handwriting fluency and attitude towards writing between the students who experienced remote teaching during the pandemic and the pre-Covid students.

| Szelei et al. (2022) | Norway, Sweden, Denmark, Finland, Belgium and UK | Investigate the impact of school closure, post-traumatic stress symptoms and social support on school belonging for first-generation immigrant students | Longitudinal (cohort study) | *N* = 751 Students of 11–18 years of age, immigrants | Pre-pandemic Spring/summer 2020 | The results showed that when comparing groups measured before and during the pandemic, there were no significant differences on school belonging across countries. However, a small negative effect on perceived school belonging was associated with increasing post-traumatic stress symptoms during the pandemic in three of the countries (Denmark, Finland and the UK). Furthermore, an association was also observed between increases in post-traumatic stress symptoms and reduced school connectedness for those assessed after school closure, but not for those assessed before the 2020 lockdown. |

Well-being outcomes

We identified seven studies that investigated various well-being outcomes among children and youth having school at home. A large Norwegian study from upper secondary school, where data were collected between October 2020 and January 2021, found that the school closure affected the students' well-being, motivation and learning to different degrees (Andersen et al., 2021). It brought challenges for many students, with assignments, theory-based teaching and limited teamwork contributing to a decline in motivation. Approximately half of the students reported no significant change in their well-being, and a similar proportion maintained their pre-lockdown levels of motivation. Differences in student experiences were not strongly linked to their educational programme, grade level or gender, but rather correlated somewhat with their ability to work undisturbed at home. Notably, at this point, one in three students thrived with remote learning from home, and this group encompassed a diverse range of students. Some teachers observed that students with mental challenges, such as social anxiety or reluctance to attend school, had an opportunity to shine during the lockdown period.

Another Norwegian study, running from autumn 2018 to May 2020, explored how lower secondary school students experienced remote schooling compared to regular schooling (Mælan et al., 2021). All students reported decreased well-being during remote schooling in comparison to their pre-pandemic experiences in regular school. In the regular school setting, students with lower grades had less confidence in their abilities compared to those with better grades, and this gap widened in remote learning. Students noted receiving less teacher feedback while learning remotely at home than in the traditional school setting, with remote teaching incorporating more written feedback. Notably, students with higher grades reported the most significant changes in their feedback experiences.

The studies we examined revealed group disparities among students. One Finnish study highlighted a potential polarisation in students' experiences as the pandemic unfolded, with one group (Grades 6–8) thriving and another not, although the majority reported no change in school satisfaction or socio-emotional skills (Salmela-Aro et al., 2021). This study also found that socio-emotional skills, including curiosity, grit, academic buoyancy, social engagement, loneliness and social connectedness, appeared to be linked to school satisfaction. A Danish study revealed that, in general, students (Grades 6–9) had a more favourable view of their school during the pandemic compared to the previous year (Jensen and Reimer, 2021). Additionally, some studies highlighted that remote learning was positively received by some students during spring 2020, including those facing mental health challenges.

Additionally, three studies conducted in upper secondary schools in Sweden investigated the experiences of remote schooling. Students held diverse opinions regarding the new routines, flexibility, choices and independence that remote learning provided. While some students appreciated these aspects, others encountered difficulties. However, a shared sentiment among all students was their yearning for the connections they had with their classmates (Lidegran et al., 2021; Loeb and Windsor, 2022; Ringer and Kreitz-Sandberg, 2022).

All seven studies suggest lower well-being among many students at all educational levels during the period of remote school, but there are also students that appreciated the solitude and quietness of school at home. Longing for school friends was widespread.

Learning outcomes

Six studies looked at objective learning outcomes (that is, observable differences before and after the pandemic), or subjective experiences of learning. Initial studies conducted in spring 2020 rarely delved explicitly into learning outcomes or learning loss. However, a Danish study revealed that one in three students in secondary and upper secondary school expressed concerns about whether they had acquired sufficient knowledge during the lockdown to perform well in the upcoming academic year (Rambøll Management, 2020). This concern was particularly pronounced among graduating students, with girls exhibiting more apprehension than boys.

We identified two longitudinal studies focusing on objective learning outcomes that assessed specific skills in one or more subjects. A Norwegian study examined writing skills in Grade 1 and compared the results between spring 2020 and spring 2019 (Skar et al., 2021). The findings indicated that Grade 1 students in 2020 demonstrated poorer performance across all three measures – writing quality, handwriting and attitude towards writing – in comparison to students assessed before the pandemic. In a follow-up of that study, Skar et al. (2023) investigated the writing skills of the same students one

year later, when they were in second grade. They found no statistically significant differences in writing skills between students who experienced remote teaching during the pandemic and students from the previous year. A study from Sweden, where primary schools were kept open throughout the pandemic, found no changes in reading skills among students in first and third grade between 2017 and 2021 (Hallin et al., 2022).

Several studies examined the subjective experiences of teachers and students regarding learning outcomes. A study across various grade levels in Norway, with a focus on Grades 5 and 10, revealed that both students and teachers perceived a decline in learning outcomes during the period of remote learning compared to regular in-person schooling (Caspersen et al., 2021). Notably, there were no large differences based on grades or gender. In a separate study involving Norwegian upper secondary schools, over 60 per cent of students expressed that they had learned less than before (Andersen et al., 2021). Other studies also reported that most teachers considered that learning outcomes were lower than usual, especially for those students who were struggling academically.

Results from the studies on students' learning outcomes suggest that many students experienced poorer learning during the pandemic compared to before. However, the two studies measuring objective outcomes did not find any changes; one found decreased learning after the first year (but not the second), while the second was conducted in Sweden, where primary schools remained open.

Socio-economic background

Six of the included studies investigated connections between student learning outcomes or experiences with remote learning and their socio-economic background. Hallin et al. (2022) examined learning outcomes in Grades 1–3 in Sweden. The results showed that students from families with low socio-economic status had no decline in reading skills during the pandemic.

A Danish longitudinal study analysed whether the reading habits of students in Grades 4–5 underwent changes during the period of remote learning (Reimer et al., 2021). Both prior to and following the school closures, variations in reading behaviour were observed among students, with those from less privileged socio-economic backgrounds reading less than their peers. During the initial phase after the pandemic outbreak, when schools were closed and students received exclusively online instruction, the disparities in reading habits between students with highly educated parents and those with parents without higher education widened. However, in the subsequent period, these differences remained stable.

Another Danish study investigated the effect of the temporary school closures in Denmark on students' reported well-being, and whether the effect varied between students in Grades 6–9 with different socio-economic backgrounds (Jensen and Reimer, 2021). Students with lower socio-economic status in both the lockdown group and the control group consistently reported lower well-being than students in the high socio-economic status group, compared to previous years. The results indicated that the lockdown in spring 2020 did not lead to an increase in social inequalities related to the measured outcomes.

The results of a mixed-methods study involving primary and secondary school students in Norway, primarily from Grades 5–10, suggest that the remote learning experience was influenced by students' social backgrounds (Caspersen et al., 2021). Additionally, the study revealed that students who had access to a quiet study space, a computer and parental assistance with their schoolwork reported a more conducive learning environment. A similar pattern was found in a mixed-methods study conducted in Denmark, which involved students, teachers and school principals at the primary school level (EVA Denmark's Evaluation Institute, 2021). The academic and well-being challenges during the lockdown were most pronounced for more vulnerable students, including those from socially disadvantaged backgrounds and students requiring educational support or having special needs.

In Sweden, a survey conducted in spring–early summer 2020 among upper secondary school students employed both qualitative and quantitative analysis (Lidegran et al., 2021). Through cluster analyses, three distinct social groups emerged: urban upper middle class, immigrant working class and rural working class. The findings indicated that students from the urban upper middle class displayed a greater level of dedication to their studies and expressed more concern about their academic achievements. Conversely, immigrant students from the working class were less satisfied with the school's support and motivation, often missing the guidance of teachers and clearer instructions. In a less structured educational environment, they encountered challenges in understanding their tasks. Students

from the rural working class felt more disconnected from the school situation. In contrast to their upper middle-class peers, who perceived school as encroaching on their home lives, working-class students appreciated later mornings and a sense of vacation, but also expressed feelings of boredom and missing their friends.

All six studies found that lower socio-economic status was connected to poorer learning outcomes. However, results were varied regarding whether the pandemic made an already observed gap between lower and higher socio-economic status on learning even larger, or if the difference was constant.

Immigrant background

We identified three studies focusing on students with immigrant backgrounds. The studies had various outcomes, but they found distinctive difficulties among both first- and second-generation immigrant students. In the Norwegian study, interviews with teachers revealed that students from minority-speaking families faced greater challenges as remote learners (Caspersen et al., 2021). Teachers and other school personnel reported their inability to provide adequate academic support to these students, leading to difficulties in their remote learning experiences. Some students lacked support at home from parents, and even more students needed to be present at the school in order to structure their school day and homework.

Similar findings were obtained when the second study investigated the experiences of schoolteachers responsible for 'preparation classes' for newly arrived immigrants and refugees in Denmark during the initial weeks of the pandemic (Primdahl et al., 2021). Teachers encountered obstacles in maintaining connections with their students, as many lacked access to a computer, necessary software or an internet connection. Additionally, language barriers posed a significant challenge in communication. The absence of physical presence in a classroom, which typically facilitates learning and interaction, contributed to reduced social interaction and the ability to connect with fellow students.

Szelei et al. (2022) examined the impact of school closures, post-traumatic stress symptoms and social support on school belonging among first-generation immigrant students in six northern European countries. These students had resided in their respective countries for an average of three years, with a range spanning from 0 to 16 years. When comparing the 'effect' between groups measured before and during the pandemic, a small yet significant negative effect of increasing post-traumatic stress symptoms on school belonging was observed during Covid-19 school closures in three countries (Denmark, Finland and the UK). However, no such differences were found in Norway, Sweden and Belgium. The sense of school belonging did not increase significantly.

Overall, there was agreement across studies that students with immigrant or minority-speaking background faced specific obstacles regarding language and home support, especially.

Learning difficulties or low-achieving students

Five studies conducted in Norway and Denmark focused on students with learning difficulties or those with weak academic performance. In a study led by Cameron et al. (2022), it was discovered that students in Grades 9–10 who faced learning difficulties expressed a more negative perception of remote learning. While some of these students were eventually offered in-person instruction at school, it was not initially provided to all of them. Approximately 50 per cent of teachers reported that students with learning difficulties did not receive the necessary support they were entitled to. Additionally, these students indicated a notably adverse impact on their social relationships, surpassing that reported by their peers.

Several other studies, surveys or interviews with students, teachers or parents underscored the adverse repercussions of school closures and restrictions, particularly for students with learning difficulties (Andersen et al., 2021; Caspersen et al., 2021; EVA Denmark's Evaluation Institute, 2021).

A study by Mælan et al. (2021) investigated the changes in well-being among lower secondary school students. They compared a group of students from 2018 to a group of students in May 2020. The findings revealed that all students reported experiencing lower well-being during remote schooling compared to regular school before the pandemic. Notably, while students with lower grades already had lower self-efficacy compared to students with higher grades in the regular school setting, this difference had increased further during remote schooling. In another study conducted by EVA Denmark's Evaluation Institute (2021), teachers also evaluated the learning outcomes of low-achieving students as

especially low during remote schooling, despite the fact that all students experienced lower learning outcomes compared to their usual levels.

Finally, several studies already mentioned indicated that students with some kind of learning difficulties suffered from the distance from teachers and classmates, missing both the special education services and the classroom learning environment.

Discussion

Student experiences with digital teaching and remote schooling varied. Factors such as school and teacher approaches to classroom organisation, teaching methods, individual support and feedback, student learning styles, motivation, study environment and parental assistance all played a role in determining how well students adapted to, and thrived in, the remote learning environment. The relative contribution of each factor's impact on the students' learning and well-being is not yet known. Over time, many students began to feel fatigued and impatient due to the absence of traditional in-person schooling. For a significant proportion of students, the physical presence of a classroom, classmates and teachers was closely tied to the learning experience. Nevertheless, it is important to note that some students found value in remote schooling, citing benefits such as reduced disruptions, exposure and bullying.

Systematic reviews, including studies from countries worldwide, have found objective learning losses during and after the pandemic. Learning losses seemed to be particularly prominent among children from lower socio-economic backgrounds, among students in countries outside Europe, and in the subjects of mathematics and science. In the present scoping review, only one study examined objective learning outcomes among students in a Nordic country. Their findings suggested a significant negative impact on writing skills during summer 2020, but this impact was not observed in summer 2021. In a separate Swedish study conducted in schools without any restrictions, no changes in learning outcomes were identified, indicating no learning losses. The learning loss might have been smaller in the Nordic countries compared to other countries which experienced longer periods of school closure or less social and economic equality. The extent of learning loss experienced by children and youth in Nordic countries due to the pandemic and school closures remains uncertain. Additional research is required to better understand this phenomenon.

The included studies in this scoping review underscore the significance of low socio-economic status as a vulnerability factor for negative consequences stemming from school closures. Poor socio-economic backgrounds appear to be linked to challenges with remote schooling, parental involvement and the well-being and academic outcomes of children and youth. However, it is important to note that this cannot be solely attributed to school closures; they may also be influenced by other pandemic-related factors, such as parents' employment loss, financial strain and prolonged periods of crowded households. In line with previous research, the family's socio-economic status appears to consistently be a factor that has negative consequences for children and young people in a crisis.

In addition to socio-economic status, immigrant background and various forms of learning difficulties appear to stand out as factors contributing to negative experiences with school closures. An immigrant background may have several implications, partly depending on the duration of time spent in the country (or being born there). Mastering the teaching language, and having parental academic support at home in addition to a quiet place to do schoolwork, seem to play significant roles for many children and youth in this context. Having physical or mental disabilities and/or learning disabilities can also increase vulnerability due to the need for additional support from teachers. Moreover, for the very few allowed to attend physical school during closures, this situation may carry a stigma. This stigma attached to being among the vulnerable children may also be valid for other groups of children who had the most negative experiences with having school at home.

Strengths and limitations

This scoping review has several strengths. We conducted extensive and systematic literature searches (last updated in July 2022), in addition to searches in OpenAlex. This review includes both qualitative and quantitative studies focusing on school and learning, which offer a more comprehensive understanding of the subject, examining both actual learning outcomes and children's well-being during remote schooling.

There are also some limitations to this scoping review. The analyses are somewhat limited compared to a full systematic review, meaning that we have not systematically synthesised quantitative results in a meta-analysis or systematically synthesised qualitative results as overarching findings. Instead, we conducted simpler summaries to provide an overview of the results. Since the last literature search was conducted in August 2023, it is possible that relevant studies that have been published since can give new insights into the consequences of, or experiences with, remote schooling for children during the pandemic. Studies that have examined learning and well-being outcomes in the last part of the pandemic and/or with a longer follow-up are needed. More studies from the different Nordic countries, Sweden in particular, are required to explore potential diversity. There is also a possibility that results from studies with a cross-sectional design could have given valuable contributions to the findings in this review.

A need for further research

Based on the studies we reviewed, there are several topics within remote schooling and children's learning where research, particularly in Nordic countries, is either limited or absent:

- Few studies covered the latter half of the pandemic (from spring 2021 to spring 2022), and there were no studies conducted with data collection after the pandemic had concluded.
- There was a scarcity of studies that objectively measured learning outcomes and any potential learning losses, such as longitudinal studies tracking test results over time.
- Research addressing school refusal, where students do not attend school regularly, during or after the pandemic, was lacking.
- The long-term consequences of the pandemic on children's education and well-being remain unclear. Further studies are needed to determine whether positive or negative changes observed during the pandemic persist, weaken or strengthen in the post-pandemic period.

Conclusion

This systematic scoping review identified 20 studies from the Nordic countries which looked at the experiences and consequences of remote schooling for children and young people during the Covid-19 pandemic (2020–1). The results suggest differences between students regarding learning, motivation and the home-school situation. Some factors seem to increase the risk for negative consequences. Background characteristics such as low socio-economic status, immigrant descent and learning difficulties are factors that could indicate a vulnerability for school closures and restrictions. Many students associate learning with the physical school environment, including classrooms, classmates and teachers. The physical school setting facilitates the learning process for children and youth, as well as providing a context for play, belonging and social development. The ongoing debate centres on whether the cost of school closures outweighs the benefits gained. Further research is needed, particularly on academic outcomes and specific student subgroups, to fully understand the long-term consequences.

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