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Investigating the educational experiences of students with disabilities during the COVID-19 school disruption: an international perspective

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Abstract

Students with disabilities generally experience educational inequities around the world. The coronavirus 2019 (COVID-19) pandemic likely exacerbated these inequities in access, resources, and support as schools shut down to mitigate the spread of the disease. Although some research has explored disparities between students with and without disabilities during the pandemic, limited research has explored this issue from the perspective of students across multiple countries. Therefore, we conducted a secondary analysis of the UNESCO Responses to Educational Disruption Survey student questionnaire administered to eighth graders in five countries to investigate changes in the educational experiences of students with disabilities during COVID-19 school disruptions and differences between these experiences and the experiences of students without disabilities during these disruptions. Specifically, we aimed to understand how students with disabilities' perceptions of their educational experiences changed during disruptions and varied from those of students without disabilities. Contrary to previous research, our findings revealed that students with disabilities generally reported positive experiences to a greater extent than students without disabilities. We discuss the implications of these findings and areas for future research beyond the COVID-19 pandemic.

Keywords School closure, COVID-19 pandemic, Special education

15% of people in the world (i.e., 1 billion people) experience disability (World Health Organization, 2021), and approximately 240 million children with disabilities live in the world (UNICEF, 2021). Historically, children with disabilities have been denied an education due to having a disability. Today, access to education for children with disabilities is still limited (e.g., United Nations Educational, Scientific and Cultural Organization [UNESCO], 2018; UNICEF, 2021). In fact, children with disabilities are 49% more likely than children without disabilities to have never attended school (UNICEF, 2021). Additionally, children with disabilities in developing countries are likely to face greater barriers

to education. Census data from 19 developing countries have revealed that the number of 11-year-olds with disabilities who have ever enrolled in school is 13 percentage points lower than the number of their peers without disabilities who have ever enrolled (Male & Wodon, 2017). In these same countries, people with disabilities are less likely than people without disabilities to complete both primary schooling (15.4-point gap among women and 17.6-point gap among men) and secondary schooling (10.4-point gap among women and 14.5-point gap among men; Male & Wodon, 2017). Thus, there is a clear need to improve educational opportunities for children with disabilities around the world.

Based on the premise that education is a right to all, efforts have been made to ensure that children with disabilities have access to education. For example, in 2006, the United Nations (UN) adopted the Convention on the Rights of Persons with Disabilities to "promote, protect and ensure the full and equal enjoyment of all human rights and fundamental freedoms by all persons with disabilities" (UN General Assembly, 2006, p. 4). The treaty recognizes that countries should ensure that "persons with disabilities are not excluded from the general education system on the basis of disability, and that children with disabilities are not excluded from free and compulsory primary education, or from secondary education, on the basis of disability" (UN General Assembly, 2006, p. 17). As of June 2022, the Convention on the Rights of Persons with Disabilities has 164 signatories, including the five countries represented in the current article. Although there seems to be a global commitment to making education more accessible for children with disabilities, even among those who are enrolled in school, students with disabilities (SWDs) typically experience poorer educational outcomes than students without disabilities around the world (e.g., Gilmour et al., 2019).

Education of students with disabilities during the COVID-19 pandemic

The coronavirus 2019 disease (COVID-19) has had a major impact on education today. In March 2020, the World Health Organization declared COVID-19 a pandemic (World Health Organization, 2020). Therefore, most countries closed their school buildings for at least some period to mitigate the spread of the disease (UNESCO, 2020), and many replaced in-person learning with remote learning. Several studies have suggested that these school closures—despite emergency remote learning—negatively affected the education of children worldwide. For example, Di Pietro et al. (2020) predicted that students in select countries in the European Union would experience learning loss. Further, researchers have reported that school closures and social lockdowns in response to COVID-19 were associated with negative mental health outcomes, such as anxiety and depression (Viner et al., 2022).

The pandemic has also exacerbated educational inequalities that existed before the pandemic (Human Rights Watch, 2021). In fact, SWDs have had worse educational experiences since the pandemic, due to COVID-19 school disruptions (Human Rights Watch, 2021). For example, 61% of parents of SWDs in Germany rated their children's learning during COVID-19 disruptions as significantly less than what it had been during regular schooling (Nusser, 2021). Parents of SWDs selected this rating more than parents of students without disabilities but with low achievement (44%) and parents of students without disabilities and without low achievement (28%).

Jesus et al. (2021) conducted a scoping review investigating the health and social impacts of COVID-19 lockdowns on individuals with disabilities. The authors reported that school disruptions caused disruptions to the professional support, educational equipment, and therapy SWDs received because access to these supports and services had been primarily provided in school settings until then. Many SWDs also lacked necessary social participation as well as structure and daily routines due to school disruptions. Additionally, although virtual options were available for SWDs in some countries, Jesus et al. reported that these solutions were not necessarily available to SWDs experiencing poverty and, even when available, did not consistently meet the needs of SWDs and their families. Therefore, many SWDs experienced more stress, greater challenging behaviors, and a regression of skills previously gained in school. These findings align with those of Shi et al. (2022), whose systematic review related to the COVID-19 pandemic revealed that students with learning difficulties or disabilities often had inadequate resources to support their learning, required more support from their parents to access learning, and experienced emotional difficulties as well.

Further, Rohwerder et al. (2022) conducted a scoping review exploring the experiences of adolescents with disabilities during COVID-19 and other large-scale humanitarian emergencies in low- and middle-income countries and concluded that SWDs experienced greater difficulties than students without disabilities during COVID-19 remote learning. For instance, Rohwerder et al. reported that adolescents' motivation for remote learning waned, and students engaged in little studying. Additionally, parents felt unable to support their SWDs' education during remote learning, were dissatisfied with teachers' engagement during remote learning, and worried about the negative effects of remote learning on their adolescents' future. Rohwerder et al. also reported that remote learning in response to COVID-19 school closures disrupted non-educational school benefits, such as therapies and rehabilitation, which is consistent with Jesus et al. (2021), and even school feeding programs that served SWDs.

Conceptual framework: potential factors influencing COVID-19 remote learning

Multiple factors may have influenced the experiences of SWDs engaging in emergency remote learning during COVID-19 school disruptions. Based on a review of 619 articles published between 2009 and 2018, Martin et al. (2020) identified several themes, organized by domain, related to research on the delivery of online learning, which presents a framework that delivers insight into factors that potentially contributed to the outcomes of SWDs participating in emergency remote learning during COVID-19 school disruptions.

Organization domain

The organization domain includes contextual factors that may influence remote learning experiences and outcomes (Martin et al., 2020). Within this domain is institutional support, which includes social, academic, and cognitive support for students. For example, well-resourced schools can support the experiences and outcomes of SWDs participating in remote learning. However, other schools, particularly those in high-poverty areas, may face greater challenges that hinder remote learning. Therefore, school

socioeconomic and demographic factors can influence the academic outcomes of students participating in virtual instruction.

Course and instructor domain

The course and instructor domain refers to the design of a course and the role of the instructor (Martin et al., 2020). This domain also influences SWDs' outcomes during remote learning. For example, during spring 2020 virtual instruction, synchronous virtual instruction was positively associated with time spent on schoolwork among students with neurodevelopmental disorders (McFayden et al., 2021). As such, Martin et al. (2020) explained that program design and development engage and assist students to achieve desired learning outcomes.

Learner domain

Finally, the learner domain relates to a learner's characteristics and outcomes and how the learner interacts with a course (Martin et al., 2020). This domain consists of themes such as engagement (e.g., interaction, participation, and collaboration), self-regulation (e.g., executive function), and readiness for online learning, which are all relevant to remote learning. For instance, emotional intelligence is positively associated with readiness for online learning (Buzdar et al., 2016), executive function and computational skill use (Robertson et al., 2020), and emotion regulation and engagement during virtual instruction among students with neurodevelopmental disorders (McFayden et al., 2021). Thus, learner factors may influence, or moderate, the relationships among organizational and course and instructor factors and the outcomes of SWDs participating in virtual instruction.

Research purpose

Because SWDs in different countries may have had varying experiences during COVID-19 school disruptions, a multinational analysis of these experiences is warranted. Additionally, it is important to explore these experiences from the perspectives of SWDs themselves. In fact, Rohwerder et al. (2022) argued that engaging adolescents as participants enables inclusive research focused on issues that are relevant to SWDs. Therefore, the purpose of this study was to determine the extent to which SWDs' perceptions of their educational experiences in five countries changed and varied from those of students without disabilities during school disruptions. Specifically, we aimed to answer the following research questions:

1. How did SWDs within each country perceive the amount of support they received specifically for a disability during the COVID-19 school disruption?
2. How did SWDs' perceptions of teacher support, schoolwork, learning experiences, and learning progress as well as their feelings during the COVID-19 school disruption vary from those of students without disabilities in each country?
3. To what extent is learning progress during the COVID-19 school disruption influenced by teacher support, schoolwork, learning experiences, and feelings, while controlling for gender, parental education, and disability status in each country?

Method

Data

This article presents results from a secondary data analysis of the Responses to Educational Disruption Survey (REDS; Meinck et al., 2022) student questionnaire. The REDS survey examined the effect of COVID-19 school disruptions on teaching and learning from an international perspective. REDS was a joint effort by the International Association for the Evaluation of Educational Achievement (IEA) and UNESCO as an initiative of the Global Education Coalition, which was founded in March 2020 by UNESCO. The study focuses on lower-secondary (or middle-level) education as eighth graders were administered the REDS student questionnaire. Data collection took place between December 2020 and July 2021.

Participating countries

Eight countries administered the REDS student questionnaire: Burkina Faso, Denmark, Ethiopia, Kenya, Russia, Slovenia, the United Arab Emirates (UAE), and Uzbekistan. However, three countries—Russia, Slovenia, and Uzbekistan—did not include any SWDs in their samples. Thus, for the purpose of our study, we analyzed student questionnaire data from the five countries with SWDs in their samples: Burkina Faso, Denmark, Ethiopia, Kenya, and the UAE—each of which has been a signatory of the UN Convention on the Rights of Persons with Disabilities for at least a decade.

Burkina Faso

According to UNESCO, the Constitution of Burkina Faso recognizes that SWDs have the right to education. As such, special education in Burkina Faso is dedicated to students with physical, sensory, and learning disabilities as well as students who have difficulties with "personal adaptation and social integration." SWDs can attend specialized centers, specialized schools, integrative schools, and inclusive schools.

According to the REDS International Report (Meinck et al., 2022), schools in Burkina Faso were physically closed in mid-March 2020 and reopened in October 2020, due to the COVID-19 pandemic. Students who responded to the REDS student questionnaire were asked to consider this 7.5-month closure (excluding the break between the 2019–2020 and 2020–2021 school years) as their reference period when completing the survey.

Denmark

According to the European Agency for Special Needs and Inclusive Education (n.d.), the *Folkeskole* (i.e., public school) Act in Denmark requires schools to differentiate education or, if needed, provide supplementary education, to ensure that all students receive a "relevant and efficient education" that is appropriate for their development and needs. If supplementary education is insufficient and inefficient for SWDs or if students need more than nine hours of support each week, the *Folkeskole* Act stipulates students can receive special needs education in mainstream schools, schools with special classes, or special schools.

The REDS International Report states that Danish schools shut down in mid-March 2020 and reopened in mid-May 2020. As COVID-19 rates increased, schools closed again in mid-December 2020 and reopened in mid-March 2021. REDS student respondents only considered the first school closure in Denmark as their reference period.

Ethiopia

According to UNESCO, special education in Ethiopia is designed for students who experience difficulties or barriers with learning and development and, thus, need additional support. While these difficulties can be attributed to disability, they can also be attributed to other factors, such as low socioeconomic status or isolation in rural communities. For SWDs, specifically, the Ethiopian Constitution recognizes that education is a human right and assures that all citizens, including individuals with disabilities, have access to education. However, UNESCO acknowledges that regulations enforcing education for all are absent in Ethiopia. Nonetheless, SWDs in Ethiopia can attend special day schools, special boarding schools, special classrooms in general education schools, as well as inclusive classrooms in general education schools.

According to the REDS International Report, Ethiopian schools shut down between mid-March 2020 and late November 2020, in response to the COVID-19 pandemic. Students who completed the REDS student questionnaire considered these 7.5 months of school disruption (excluding the break between school years) as their reference period.

Kenya

According to UNESCO, Kenya's 2012 Basic Education Act acknowledges education for students with intellectual and developmental disabilities (including specific learning disabilities), hearing and visual impairments, deaf-blindness, and physical impairments. Additionally, the Constitution recognizes SWDs' right to access educational institutions integrated into society, as appropriate for each student. As such, SWDs can attend special schools, integrated schools, and special classes within general education schools.

The REDS International Report (Meinck et al., 2022) indicates that schools in Kenya closed in mid-March 2020. However, the point at which schools reopened was not reported on Kenya's REDS survey. Therefore, the length of the reference period in Kenya is unknown.

United Arab Emirates

UNESCO indicates that a person with "special needs" in the UAE is considered to be someone whose abilities (e.g., physical, communication, psychological) limit their ability to perform what are considered "ordinary" requirements. As such, special education is reserved for students with a disability, difficulty, or other factor that impacts student learning or educational performance. Additionally, SWDs are guaranteed equal opportunities and reasonable accommodations to study in general education or special classes.

According to the REDS International Report, schools in the UAE closed in late March 2020. The school closure continued at least through July 2021. However, the reference period for student respondents to consider ended in December 2020.

Student respondents

To identify students to complete the REDS questionnaire, the REDS team used a two-stage stratified random sample design where schools were the first sampling stage and students were the second stage. Urbanization, type of funding, and region were used as stratification variables to facilitate both sampling and data analysis. The total sample size for the five countries in our sample was 12,229 students.

We used students' responses to Q26A (IS1G26AA) to distinguish SWDs (i.e., students who reported receiving support from their school and teachers for a disability) from students without disabilities (i.e., students who did not report receiving support from their school and teachers for a disability). Of the total sample, 26.1% (n=3,195) reported receiving support from their school and teachers for a disability and were thus identified as SWDs. Meanwhile, 54.1% (n=6,622) reported not receiving support for a disability and were thus identified as students without disabilities. Finally, some of the participants (19.7%, n=2,412) did not respond to the survey question regarding receiving disability support and were not included in our analysis. Thus, the final sample was 9,817 (32.5% SWDs; 67.5% students without disabilities).

Table 1 provides demographic characteristics of the students included in our final sample categorized by disability status. Nearly half of the sample was female among both students with and without disabilities. The average ages were 14 and 14.2 for SWDs and students without disabilities, respectively. Both SWDs (42.3%) and students without disabilities (46.8%) were most likely to indicate that they did not come to school and instead attended lessons from a place away from their school during the COVID-19 disruption. Meanwhile, 21.7% of SWDs and 13.9% of students without disabilities reported attending school for at least some lessons during the disruption. Finally, 18.5% of SWDs and 33.4% of students without disabilities stated that they did not do any schoolwork during

Table 1 Demographic description for students with and without disabilities

	Students with disabilities		**Students without disabilities**	
Variables	Frequency	%	Frequency	%
Gender				
Female	1536	48.1	3335	50.4
Male	1548	48.5	3154	47.6
Not reported	111	3.5	133	2.0
Parental Education				
High School Education or Less	2069	64.8%	4124	62.3%
Post-High School Education	882	27.6%	2186	33.0%
Not reported	244	7.7%	312	4.8%
Country				
Burkina Faso	110	3.4	1976	29.8
Denmark	176	5.5	1094	16.5
Ethiopia	1581	49.5	1259	19.0
Kenya	562	17.6	361	5.5
United Arab Emirates	766	24.0	1932	29.2
Where did you attend school lessons?				
I continued to come to school for all my lessons	276	8.6	355	5.4
I came to school for most lessons but attended some lessons in a place away from my school	100	3.1	138	2.1
I came to school for about half of my lessons and attended other lessons in a place away from my school	118	3.7	171	2.6
I came to school for some lessons but attended most lessons in a place away from my school	200	6.3	252	3.8
I did not come to school for any of my lessons and attended my lessons from a place away from my school	1353	42.3	3097	46.8
I did not do any schoolwork during the [COVID-19 disruption]	591	18.5	2213	33.4
Not reported	557	17.4	396	6.0
Total	3195	100.0	6622	100.0

Note. Sampling weights were not used in sample descriptions

the COVID-19 disruption. Please see Appendix A for demographic information for each country.

Measures

In this section, we describe the REDS student questionnaire measures we used to answer our research questions. Please see Appendix B for a full list of each measure used and the accompanying items.

School support before and during the COVID-19 disruption

School support for SWDs both before and during the COVID-19 school disruption was assessed in six areas. These areas were how students: (a) move around (lifting and carrying things, holding things, moving from place to place, getting around your community), (b) learn (seeing, hearing, learning to read, learning to write, learning math), (c) communicate (understanding what people say, communicating needs, speaking clearly, having conversations), (d) take care of themselves (personal grooming, using the bathroom, eating and drinking, and keeping safe), (e) relate to others (making friends, keeping friends, managing disagreements, understanding other points of view), and (f) solve problems (solving problems, persisting, staying on task, completing tasks independently, coping with setbacks).

SWDs were asked how much their school gave them support before the COVID-19 disruption in each of the aforementioned areas (IS1G26BA-IS1G26BF). These questions had three response categories: (a) *I do not need support in this area*, (b) *my school provided a little support in this area*, and (c) *my school provided a lot of support in this area*.

SWDs were also asked how the support from their school changed during the COVID-19 disruption in the same areas (IS1G26CA-IS1G26CF). These questions had four response categories: (a) *I do not need support in this area*, (b) *[support] increased during the COVID-19 disruption*, (c) *[support] stayed the same during the COVID-19 disruption*, and (d) *[support] decreased during the COVID-19 disruption.*

Confirmatory factor analysis

Using Mplus, we conducted a confirmatory factor analysis (CFA) for each of the following variables: teacher support, schoolwork, learning experiences, learning progress, and feelings. We conducted a Chi-square test and the following goodness-of-fit indices (Kline, 2016): root mean square error of approximation (RMSEA); standardized root mean squared residual (SRMR); and comparative fit index (CFI). For RMSEA, values greater than 0.10 may indicate a lack of fit (Browne & Cudeck, 1992). For SRMR, perfect model fit is indicated by SRMR = 0, while values greater than 0.10 may indicate poor fit (Kline, 2016). Finally, CFI values greater than 0.90 indicate that the proposed model fit is 90% greater than the baseline model fit, thus serving as an indicator of adequate fit (Kline, 2016).

Teacher support

Eight items required all students (i.e., students with and without disabilities) to rate the extent to which they agreed or disagreed with several statements about the support they received from their teachers during the COVID-19 disruption (IS1G21A-IS1G21H). For example, one item stated, "*My teachers adapted my schoolwork to meet my individual*

needs." Each item used the following four-point Likert scale: (1) *strongly agree*, (2) *agree*, (3) *disagree*, and (4) *strongly disagree* and was recoded so that higher values (i.e., ratings) indicated greater agreement. The CFA provides evidence that the data reasonably fit the teacher support construct. Although the Chi-square goodness-of-fit statistics are statistically significant, which suggests that the model fit is not perfect, the other goodness-of-fit statistics suggest a reasonable fit for the model (Chi-square=791.45 (df=20), $p<.001$; RMSEA=0.07 [90% CI: 0.065 to 0.074]; SRMR=0.033; CFI=0.958). The standardized factor loadings were between 0.69 and 0.8.

Schoolwork

Students with and without disabilities were asked if various aspects of their schoolwork changed during the COVID-19 disruption (IS1G18A- IS1G18J). Each of 10 aspects (e.g., quality of schoolwork) was rated on the following three-point scale: (1) *increased during the COVID-19 disruption*, (2) *did not change during the COVID-19 disruption*, and (3) *decreased during the COVID-19 disruption*. The responses were recoded as (1) *decreased*, (2) *did not change*, and (3) *increased*, so that higher values indicate positive schoolwork outcomes (IS1G18 A, B, C, D, E, G, H, I, J). Based on CFA results with eight items (IS1G18 A-D, G-J), the data reasonably fit the schoolwork construct. The Chi-square goodness-of-fit statistics are statistically significant, which suggests that the model fit is not perfect, but the other goodness-of-fit statistics suggest a reasonable fit for the model (Chi-square=291.4 (df=20), $p<.001$; RMSEA=0.041 [90% CI: 0.037 to 0.045]; SRMR=0.02; CFI=0.983). The standardized factor loadings were between 0.54 and 0.76.

Learning experiences

Nine statements assessed all students' perceptions of their learning experiences during the COVID-19 disruption (IS1G14A-IS1G14I). For instance, one statement read: "*I was unable to get help for my schoolwork from a teacher or school support staff.*" Students responded to each statement on the following four-point Likert scale: (1) *strongly agree*, (2) *agree*, (3) *disagree*, and (4) *strongly disagree*. We conducted a CFA with the items related to challenging learning experiences (IS1G14A, D-G), and the results presented a reasonable model fit for the learning experiences construct. The chi-square goodness-of-fit statistics are statistically significant, which suggests that the model fit is not perfect, but the other goodness-of-fit statistics suggest a reasonable fit for the model (Chi-square=253.8 (df=5), $p<.001$; RMSEA=0.078 [90% CI: 0.07 to 0.087]; SRMR=0.034; CFI=0.928). The standardized factor loadings were between 0.45 and 0.63. Considering the Likert scale used for this variable, the higher values indicated positive learning experiences.

Learning progress

The REDS student questionnaire included two statements about students' perceptions of their learning progress during the COVID-19 disruption (IS1G22A-B). These questions were "*I learned about as much as before the COVID-19 disruption*" and "*I made more progress in some subjects than before the COVID-19 disruption.*" Students rated each item on the same four-point scale: (1) *strongly agree*, (2) *agree*, (3) *disagree*, and (4) *strongly disagree*. These items were recoded so that higher values indicated learning

progress. Since there were only two indicators for learning progress, both factor loadings and error terms were set to be equal to create an overidentified model. The CFA results provide evidence that the data reasonably fit learning progress. The Chi-square goodness-of-fit statistics are statistically significant, which suggests that the model fit is not perfect. However, the other goodness-of-fit statistics suggest a reasonable fit for the model (Chi-square=10.53 (df=1), $p<.001$; RMSEA=0.035 [90% CI: 0.018 to 0.055]; SRMR=0.033; CFI=0.996). The standardized factor loading was 0.71 for both items.

Feelings

Thirteen items evaluated how students felt during the COVID-19 school disruption (IS1G24A- IS1G24M). An example item is "*I felt overwhelmed by what was happening in the world due to [the COVID-19 pandemic].*" Students responded to each item on a four-point scale: (1) *strongly agree*, (2) *agree*, (3) *disagree*, and (4) *strongly disagree*. Reflecting the Likert scale used for this variable, the higher values represented positive feelings. We conducted a CFA with the items related to worrying (IS1G24 A-F, K), and the results presented a reasonable model fit for the feelings construct. The Chi-square goodness-of-fit statistics are statistically significant, which suggests that the model fit is not perfect, while the other goodness-of-fit statistics suggest a reasonable fit for the model (Chi-square=380.1 (df=13), $p<.001$; RMSEA=0.049 [90% CI: 0.045 to 0.053]; SRMR=0.025; CFI=0.978). The standardized factor loadings were between 0.5 and 0.79.

Measurement invariance

Putnick and Bornstein (2016) emphasized that measurement invariance has a critical value and is a requirement when comparing group means. Thus, we tested measurement invariance between countries to maintain accurate comparisons among the countries in Mplus. There are four levels of measurement invariance: configural, metric (weak), scalar (strong) and strict models. In particular, scalar invariance is generally regarded as sufficient evidence for measurement invariance and requires both factor loadings and intercepts to be invariant across groups (Lubke & Muthén, 2005; Meredith, 1993). Thus, we tested configural, metric, and scalar measurement invariance. However, our results indicated that scalar measurement invariance was not attained among the teacher support, schoolwork, learning experiences, learning progress, and feelings variables among the five countries (Appendix C). Therefore, instead of comparing countries' learning progress (RQ3), we conducted separate multiple regression analyses to identify which variables significantly predicted learning progress in each country.

Reliability

We used the mean of the items within each category to create teacher support, schoolwork, learning experiences, learning progress, and feelings variables. We conducted a reliability analysis for each variable based on CFA results. Table 2 provides reliability (i.e., Cronbach's Alpha) and other information regarding these variables. A Cronbach's Alpha value above the 0.7 threshold indicates appropriate reliability (Nunnally, 1978). While Alpha values for teacher support, schoolwork, and feelings were above the cut score, the values for learning experience and learning progress were just below the cut score.

Table 2 Information regarding teacher support, schoolwork, learning experiences, learning progress, and feelings items

Variables	Item IDs	*n*	Cronbach's Alpha	Number of Items	Scale
Teacher Support	IS1G21A-H	7439	0.92	8	1–4
Schoolwork	IS1G18A-D, G-J	7389	0.87	8	1–3
Learning Experiences	IS1G14A, D-G	7615	0.67	5	1–4
Learning Progress	IS1G22A-B	7785	0.67	2	1–4
Feelings	IS1G24A-F, K	10,398	0.84	7	1–4

Data Analysis

The following data analysis procedures were conducted on SPSS 28 (IBM Corp., 2021) and IEA IDB Analyzer 5.0.11 (IEA, 2022) to answer our research questions. Additionally, we used sampling weight during data analysis when it was appropriate. In particular, we used the final student weight included in the REDS international database, which adjusted for varying selection probabilities for sampled schools and students and the varying patterns of non-participation among students in participating schools (UNESCO, 2022).

We conducted a separate analysis for each country for all three research questions. To answer our first research question, we used frequency counts to determine the amount of support SWDs reported receiving from their schools before the COVID-19 school disruption as well as SWDs' perceived change in the amount of school support during the COVID-19 disruption. For the second research question, we used descriptive statistics to determine students with and without disabilities' perceptions of teacher support, schoolwork, learning experiences, and learning progress as well as their feelings during the COVID-19 school disruption. We also conducted t-tests to examine if there was a statistically significant difference between students with disabilities and students without disabilities in each area. Since there were five t-tests for each country, we used Bonferroni correction and set the significance level to 0.01, which was determined by dividing 0.05 by 5 (i.e., the number of t-tests for each country).

To answer the third research question, we conducted a hierarchical (sequential) multiple regression to understand how learning progress during the COVID-19 school disruption was influenced by teacher support, schoolwork, learning experiences, and feelings, while controlling for gender and parental education, and disability status. We performed a hierarchical multiple regression for each country separately because measurement invariance was not achieved. Gender was coded as 1 (female) and 0 (male), and the male students were the reference group. Parental education was coded as 1 (parent has at least some postsecondary education) or 0 (parent has high school education or less), which was the reference group in the regression analysis. Disability status was coded as 1 (student with a disability) or 0 (student without a disability), which was the reference group.

The predictor variables were added in the regression model in the following order: (1) gender, parental education, and disability status; and (2) teacher support, schoolwork, learning experiences, and feelings. Additionally, sampling weights were not used in the regression analysis because sampling weights were not available for the REDS student questionnaires administered in Burkina Faso, Denmark, Ethiopia, and Kenya due to low student participation or missing sampling documentation.

Results

Research question #1: the amount of support SWDs received specifically for a disability by country

Our first research question investigated the amount of support SWDs received before the COVID-19 school disruption and the change in school support during the disruption within each country. Table 3 presents the weighted percentages of school support before and during the disruption in six areas (i.e., moving around, learning, communicating, taking care of myself, relating to others, and solving problems) for each county and the total sample. In general, the percentage of SWDs who reported not needing support in each area decreased during the COVID-19 disruption, indicating that more SWDs needed support during this time. For example, in Burkina Faso, while 65% of SWDs indicated that they did not need support in learning before the COVID-19 school disruption, only 40% claimed not needing support during the disruption. Additionally, 45% of SWDs among the total sample reported not needing support in how they take care of themselves before COVID-19, compared to only 35% who reported not needing it during the COVID-19 school disruption.

The proportion of students to report receiving decreased school support during the disruption (14–21%) was generally smaller than the proportion who reported having increased support (17–30%) in the total sample. Additionally, while about 14% of SWDs in the total sample indicated that school support for moving around stayed the same during the disruption, approximately 20% of SWDs stated that school support stayed the same in the other five areas. Additionally, nearly 30% of SWDs in the total sample reported that school support increased in both learning and taking care of themselves, while 21% and 15% of SWDs claimed that school support decreased during the disruption in these two areas, respectively. Similar results related to SWDs' taking care of themselves were observed in Ethiopia, Kenya, and the UAE as approximately 30% of SWDs in these countries indicated that school support for taking care of themselves increased.

Research question #2: comparing students with and without disabilities during the COVID-19 school disruption by country

We conducted t-tests to examine the differences between students with and without disabilities in each country. Table 4 presents country-level and total sample descriptive statistics and t-test results for students' perceptions of teacher support, schoolwork, learning experiences, and learning progress, as well as their feelings. The overall trend is that SWDs had significantly higher ratings than students without disabilities. In Denmark, Ethiopia, Kenya, and the UAE, SWDs reported statistically significantly higher ratings of teacher support and learning progress than students without disabilities, indicating generally better perceptions among SWDs. SWDs in Burkina Faso, Denmark, Kenya, and the UAE also had higher ratings for schoolwork. Finally, it should be noted that, although the total sample descriptive statistics show that SWDs had higher ratings of their feelings than students without disabilities (indicating that SWDs worried less than students without disabilities during the COVID-19 school disruption), Kenya was the only country in which SWDs rated their feelings higher than students without disabilities ($d = 0.35$).

Table 3 School support students with disabilities received before and change during COVID-19 disruption in percentages by country

		Before COVID-19			Change during COVID-19			
		I do not need support	My school provided a little support	My school provided a lot of support	I do not need support	Decreased	Stayed the same	Increased
Burkina Faso	How I move around	63.51	33.78	2.70	60.98	21.95	12.20	4.88
	How I learn	43.55	22.58	33.87	25.00	22.50	27.50	25.00
	How I communicate	57.14	23.81	19.05	43.59	23.08	17.95	15.38
	How I take care of myself	50.00	22.50	27.50	28.95	15.79	26.32	28.95
	How I relate to others	51.22	29.27	19.51	33.33	17.95	28.21	20.51
	How I solve problems	65.85	17.07	17.07	40.00	25.00	17.50	17.50
Denmark	How I move around	66.07	27.38	6.55	66.67	5.03	11.32	16.98
	How I learn	26.63	53.85	19.53	31.01	11.39	21.52	36.08
	How I communicate	50.00	38.82	11.18	49.37	5.70	20.89	24.05
	How I take care of myself	60.71	29.17	10.12	54.09	8.18	17.61	20.13
	How I relate to others	57.14	36.31	6.55	48.72	7.05	20.51	23.72
	How I solve problems	44.64	39.88	15.48	47.47	8.86	20.89	22.78
Ethiopia	How I move around	50.08	32.75	17.17	36.65	27.56	11.95	23.84
	How I learn	28.40	35.23	36.37	25.61	36.41	16.38	21.60
	How I communicate	34.65	30.61	34.73	26.00	36.93	16.73	20.35
	How I take care of myself	30.59	32.21	37.20	26.11	21.04	17.33	35.52
	How I relate to others	33.33	32.64	34.03	24.96	34.46	18.13	22.45
	How I solve problems	29.43	34.44	36.13	24.47	31.45	17.07	27.01
Kenya	How I move around	53.10	32.83	14.07	44.31	16.27	17.06	22.35
	How I learn	31.37	31.37	37.27	27.08	27.08	18.18	27.67
	How I communicate	38.58	36.14	25.28	33.13	25.40	21.03	20.44
	How I take care of myself	38.36	32.22	29.42	28.51	22.18	18.42	30.89
	How I relate to others	40.79	30.45	28.76	29.82	26.44	19.68	24.06
	How I solve problems	36.98	31.32	31.70	34.52	25.40	17.86	22.22

Table 3 (continued)

		Before COVID-19			Change during COVID-19			
		I do not need support	My school provided a little support	My school provided a lot of support	I do not need support	Decreased	Stayed the same	Increased
United Arab Emirates	How I move around	57.47	22.11	20.42	50.61	11.67	19.77	17.95
	How I learn	24.19	29.60	46.21	24.73	10.03	27.61	37.63
	How I communicate	34.34	27.99	37.67	32.90	11.26	27.82	28.03
	How I take care of myself	43.83	24.16	32.01	35.73	6.48	22.37	35.42
	How I relate to others	35.69	29.47	34.85	31.93	12.04	28.76	27.27
	How I solve problems	26.50	30.75	42.75	25.67	11.82	29.65	32.86
Total	How I move around	58.05	29.77	12.18	51.84	16.5	14.46	17.2
	How I learn	30.83	34.52	34.65	26.68	21.48	22.24	29.6
	How I communicate	42.94	31.48	25.58	37	20.47	20.88	21.65
	How I take care of myself	44.7	28.05	27.25	34.68	14.73	20.41	30.18
	How I relate to others	43.63	31.63	24.74	33.75	19.59	23.06	23.6
	How I solve problems	40.68	30.69	28.63	34.43	20.51	20.59	24.48

Note. Sampling weights were used in these analyses

Our t-test analyses revealed statistically significantly higher ratings of teacher support, learning progress, and feelings among SWDs in the total sample, indicating that they were more likely to have positive perceptions of teacher support and learning progress and less likely to experience feelings of worry during the COVID-19 school disruption. Additionally, SWDs reported statistically significantly lower ratings of learning experiences than students without disabilities in the total sample, indicating negative perceptions of SWDs' learning experiences. It is necessary to highlight these significant differences (in teacher support, learning experiences, learning progress, and feelings) between SWDs and students without disabilities had small effect sizes ranging between 0.09 and 0.26.

Research question #3: analyzing the influence of disability status, teacher support, schoolwork, learning experiences, feelings, on learning progress during the COVID-19 school disruption for each country

A hierarchical regression analysis was conducted to determine significant predictors of learning progress during COVID-19 for each country (due to lack of measurement invariance). Table 5 presents the hierarchical regression analysis results. In step 1, gender, parental education, and disability status explained between 1% and 4% of the variance in learning progress. In step 2, teacher support, schoolwork, learning experiences, and feelings explained between 12% and 44% of the variance in learning progress, after controlling for gender, parental education, and disability status. In particular, teacher support and schoolwork (i.e., an indication of students' perceptions of the schoolwork they completed) were the most influential variables on learning progress in all five

Table 4 t-test Results comparing students with and without disabilities in teacher support, schoolwork and feeling by country

		Students with disabilities			Students without disabilities				
		N	Mean	SD	N	Mean	SD	t-test	Effect Size
Burkina Faso	Teacher Support	30	2.52	0.72	299	2.22	0.74	2.12	
	Schoolwork	31	1.96	0.43	299	1.53	0.49	4.62	0.87***
	Learning Experiences	31	2.34	0.54	299	2.20	0.60	1.27	
	Learning Progress	31	2.74	0.74	299	2.01	0.87	4.49	0.85***
	Feelings	110	1.53	0.51	1968	1.50	0.55	0.42	
Denmark	Teacher Support	169	3.04	0.55	1071	2.80	0.52	5.41	0.45***
	Schoolwork	173	1.97	0.43	1075	1.87	0.45	2.79	0.23**
	Learning Experiences	174	2.64	0.49	1085	2.73	0.48	-2.50	
	Learning Progress	174	2.56	0.71	1083	2.42	0.71	2.47	0.20**
	Feelings	171	2.32	0.59	1071	2.40	0.57	-1.72	
Ethiopia	Teacher Support	1042	2.84	0.75	688	2.62	0.82	5.77	0.28***
	Schoolwork	1037	1.77	0.62	694	1.76	0.64	0.19	
	Learning Experiences	1037	2.24	0.62	689	2.28	0.65	-1.29	
	Learning Progress	1022	2.81	0.87	681	2.54	0.94	6.19	0.31***
	Feelings	1568	1.89	0.70	1252	1.91	0.73	-0.74	
Kenya	Teacher Support	515	2.52	0.70	259	2.15	0.78	6.67	0.51***
	Schoolwork	514	1.77	0.56	254	1.58	0.54	4.40	0.34***
	Learning Experiences	512	2.33	0.56	268	2.27	0.62	1.31	
	Learning Progress	511	2.41	0.81	254	2.09	0.84	5.09	0.39***
	Feelings	561	2.11	0.62	343	1.89	0.63	5.05	0.35***
United Arab Emirates	Teacher Support	748	3.29	0.56	1913	3.17	0.57	5.15	0.22***
	Schoolwork	748	2.31	0.47	1908	2.21	0.50	4.67	0.20***
	Learning Experiences	742	2.70	0.61	1907	2.72	0.57	-0.62	
	Learning Progress	742	2.93	0.73	1908	2.72	0.78	6.12	0.27***
	Feelings	752	1.98	0.60	1914	2.02	0.63	-1.67	
Total	Teacher Support	2504	2.92	0.73	4230	2.86	0.72	3.38	0.09***
	Schoolwork	2503	1.95	0.60	4230	1.96	0.57	-1.16	
	Learning Experiences	2496	2.42	0.63	4248	2.59	0.61	-10.35	-0.26***
	Learning Progress	2480	2.75	0.83	4225	2.53	0.83	10.44	0.26***
	Feelings	3162	1.96	0.67	6548	1.90	0.69	4.08	0.09***

Note. Sampling weights were not used in these analyses. UAE = United Arab Emirates

* $p < .05$; ** $p < .01$; *** $p < .001$

countries. There were mixed results of disability status when controlling for all other variables. In Burkina Faso, SWDs reported slightly higher learning progress than students without disabilities, while SWDs in Ethiopia, Kenya, and the UAE reported slightly lower learning progress. Denmark was the only country in which disability status was not a significant predictor of learning progress.

The regression model for Burkina Faso explained 44% of the variance in learning progress. In this model, parental education, disability status, teacher support, and schoolwork were significant predictors of learning progress. In particular, learning progress increased 0.35 and 0.43 standard deviation units when teacher support and schoolwork, respectively, increased one standard deviation unit. Additionally, SWDs rated learning progress 0.11 standard deviation units higher than students without disabilities when all other variables are constant.

The regression model for Ethiopia explained 12% of the variance in learning progress. In this model, parental education, disability status, teacher support, and schoolwork were also significant predictors. However, learning progress increased 0.22 and 0.15

Table 5 Hierarchical regression analysis of predictors of learning progress by country

Country	Model		Unstandardized Coefficients		Standardized Coefficients		R Square Change
			B	SE	Beta	R Square	
Burkina Faso	Step 1	(Constant)	2.00	0.06		0.039**	
		Gender	0.07	0.05	0.08		
		Parental Education	0.09	0.03	0.16**		
		SWD	0.02	0.01	0.07		
	Step 2	(Constant)	-0.28	0.18		0.44***	0.401
		Gender	-0.01	0.04	-0.01		
		Parental Education	0.05	0.02	0.08*		
		SWD	0.03	0.01	0.11**		
		Teacher Support	0.42	0.05	0.35***		
		Schoolwork	0.76	0.08	0.43***		
		Learning Experience	0.11	0.07	0.07		
		Feelings	-0.01	0.07	-0.01		
Denmark	Step 1	(Constant)	2.43	0.02		0.001	
		Gender	0.00	0.01	-0.01		
		Parental Education	0.01	0.01	0.04		
		SWD	0.00	0.01	-0.01		
	Step 2	(Constant)	0.59	0.14		0.203***	0.202
		Gender	0.01	0.01	0.07		
		Parental Education	0.00	0.01	0.02		
		SWD	-0.01	0.01	-0.05		
		Teacher Support	0.19	0.04	0.14***		
		Schoolwork	0.58	0.04	0.37***		
		Learning Experience	-0.03	0.04	-0.02		
		Feelings	0.12	0.03	0.09***		
Ethiopia	Step 1	(Constant)	2.69	0.03		0.037***	
		Gender	0.00	0.01	0.01		
		Parental Education	0.03	0.01	0.09***		
		SWD	-0.05	0.01	-0.17***		
	Step 2	(Constant)	1.64	0.13		0.121***	0.085
		Gender	0.00	0.01	0.00		
		Parental Education	0.03	0.01	0.06**		
		SWD	-0.04	0.01	-0.15***		
		Teacher Support	0.26	0.03	0.22***		
		Schoolwork	0.23	0.03	0.15***		
		Learning Experience	0.00	0.03	0.00		
		Feelings	-0.04	0.03	-0.03		
Kenya	Step 1	(Constant)	2.30	0.04		0.032***	
		Gender	-0.02	0.01	-0.05		
		Parental Education	0.23	0.07	0.10***		
		SWD	-0.03	0.01	-0.13***		
	Step 2	(Constant)	0.60	0.13		0.256***	0.224
		Gender	-0.01	0.01	-0.02		
		Parental Education	0.03	0.06	0.01		
		SWD	-0.02	0.01	-0.09***		
		Teacher Support	0.33	0.03	0.30***		
		Schoolwork	0.41	0.04	0.27***		
		Learning Experience	-0.05	0.04	-0.03		
		Feelings	0.16	0.03	0.13***		

Table 5 (continued)

Country	Model		Unstandardized Coefficients		Standardized Coefficients		R Square Change
			B	SE	Beta	R Square	
United Arab Emirates	Step 1	(Constant)	2.81	0.02		0.002	
		Gender	-0.06	0.03*	-0.04		
		Parental Education	0.00	0.01	0.00		
		SWD	-0.01	0.01	-0.02		
	Step 2	(Constant)	0.27	0.10		0.248***	0.246
		Gender	-0.03	0.03	-0.02		
		Parental Education	0.02	0.01	0.04*		
		SWD	-0.01	0.01	-0.04*		
		Teacher Support	0.35	0.03	0.26***		
		Schoolwork	0.52	0.03	0.33***		
		Learning Experience	0.01	0.02	0.00		
		Feelings	0.10	0.02	0.08***		

Note. Gender (1, female; 0, male); Parental Education (1, postsecondary education; 0, high school education or less); SWD (1, yes; 0, no). Sampling weights were not used in these analyses. SE = Standard Error. SWD = student with a disability. * $p < .05$; ** $p < .01$; *** $p < .001$.

standard deviation units when teacher support and schoolwork, respectively, increased one standard deviation unit. Further, SWDs reported learning progress 0.17 standard deviation units lower than student without disabilities.

Discussion

The purpose of this study was to examine the experiences of secondary SWDs during the COVID-19 school disruption in several countries and to determine if their experiences varied from those of students without disabilities. This study is important because it directly explores SWDs' perceptions, thus addressing Rohwerder et al.'s (2022) call for research that engages adolescents as participants. In order to answer our research questions, we conducted a secondary analysis of data from the REDS student questionnaire. Specifically, we examined SWDs' perceptions of school support during the COVID-19 school disruption; the perceptions of students with and without disabilities regarding teacher support, schoolwork, learning experiences, and learning progress, as well as their feelings during the disruption within each country; and the influence of disability status, teacher support, schoolwork, learning experiences, and feelings on learning progress, while controlling for gender and parental education, in each country.

Perceived school support for SWDs

Our findings revealed that SWDs reported needing more school support during the COVID-19 school disruption than before the disruption. Although it is unknown why more SWDs believed they needed school support, it is encouraging that many students believed that there was an increase in the school support they received. In fact, in all categories (e.g., how students communicate), students most frequently reported receiving increased school support during the COVID-19 school disruption. It is important to note, however, that this finding is inconsistent with previous findings indicating that SWDs do not receive sufficient support during distance learning (Shi et al., 2022).

Comparisons between students with and without disabilities

Teacher support

Students with and without disabilities had seemingly common ratings on items within the teacher support category (i.e., the average rating for each item was between 2.0 and 3.0—agree and disagree). However, our t-test analysis revealed significant differences in this category for each country. In particular, SWDs generally reported higher ratings than students without disabilities in the category of teacher support. For example, SWDs more frequently agreed that their teachers encouraged them to learn and adapted their schoolwork to meet their individual needs. The country-level analyses revealed these same patterns—SWDs reported better perceptions of teacher support than students without disabilities, indicating that SWDs perceived greater teacher support.

Schoolwork

SWDs did not have significantly better perceptions of the schoolwork they completed than students without disabilities in total sample. However, the country-level analyses revealed SWDs had statistically significantly higher perceptions of schoolwork they completed than students without disabilities in four countries. In these countries, schoolwork differences favored SWDs, suggesting that SWDs had better perceptions of their completed schoolwork than students without disabilities. Further, the only country to have nonsignificant findings was Ethiopia. Ethiopia has the largest sample size, which might explain why the total sample had nonsignificant findings.

Learning experiences

Students without disabilities had significantly higher ratings of learning experiences than SWDs. This difference means that students without disabilities rated their learning experiences more positively than SWDs. For example, students without disabilities were more likely than SWDs to disagree that they found it hard to understand the schoolwork their teachers gave them. Country-level statistics revealed statistically significant differences in Denmark only, again favoring students without disabilities.

Learning progress

Although students without disabilities reported better learning experiences, SWDs had better ratings of their learning progress. Specifically, SWDs had higher ratings related to learning as much as they did before the COVID-19 school disruption and making more progress than before the disruption. Additionally, this finding was replicated for each responding country. It is important to note, however, that when considering additional factors (Research Question #3), SWDs did not in fact have higher ratings of their learning progress.

Feelings

SWDs had higher ratings on items pertaining to feelings than students without disabilities, indicating less worry among SWDs. For example, across the total sample, SWDs had higher ratings of feeling anxious about the changes in their schooling and worrying about catching COVID-19, again indicating less worry. However, this finding was not consistent across countries. In particular, our t-test analyses revealed only significant differences in feelings for Kenya, favoring SWDs.

Factors influencing learning progress

Our hierarchical regression revealed that several factors influenced students' perceived learning progress during the COVID-19 school disruption. The general pattern of regression results indicates the following factors were influential: (a) parental education; (b) disability status; perceptions of (c) teacher support and (d) completed schoolwork; and (e) feelings. In particular, students of parents with any postsecondary education were more likely to report learning progress in all countries except Denmark. Students were also more likely to report learning progress with positive ratings of teacher support and completed schoolwork. Additionally, the feelings variable was a significant predictor in Denmark, Kenya, and the UAE. Further, when controlling for all other factors, SWDs were less likely to report positive learning progress than students without disabilities in Ethiopia, Kenya and the UAE. This finding is consistent with Nusser's (2021) findings that parents of SWDs more frequently reported less learning during COVID-19 school disruptions than their typical (i.e., face-to-face) learning. Finally, Denmark was the only country in which disability status and parental education were not significant predictors of learning progress.

Practical and policy implications

The results of this study have important implications regarding the education of SWDs during the COVID-19 school disruption. For instance, our hierarchical regression revealed that parents' postsecondary education was associated with higher ratings of learning progress, suggesting that differences in socioeconomic status (for which parental education is often used as a proxy) help explain differences in perceived learning progress during the COVID-19 school disruption. In particular, students of parents without any postsecondary education may be prone to poorer learning outcomes during remote learning. As such, school leaders and policymakers can consider providing students from lower socioeconomic backgrounds additional resources during remote learning.

Additionally, our finding that having a disability is associated with lower ratings of learning progress, when controlling for all other factors, suggests that SWDs experienced greater difficulty maintaining or increasing their learning progress during the COVID-19 school disruption. Therefore, practitioners and policymakers should consider putting policies and structures in place that provide SWDs with ongoing support during remote learning. For both students from lower socioeconomic backgrounds and SWDs (and SWDs from lower socioeconomic backgrounds, in particular), these resources, policies, and structures should aim to (a) increase students' teacher support, while promoting (b) positive perceptions of their schoolwork and (c) positive feelings, which were all associated with higher ratings of learning progress.

Further, our findings may have implications for remote learning beyond the COVID-19 pandemic. For instance, crises and disasters that force school buildings to close may necessitate emergency online learning (Rush et al., 2016). Given that natural disasters, in particular, may be increasingly common due to climate change (Van Aalst, 2006), the need for effective remote learning is critical. Fortunately, researchers posit that fully functioning emergency online learning is possible but requires "thoughtful planning and development" (Rush et al., 2016, p. 188). Thus, we argue that the findings of our study

can help ensure that the experiences and outcomes of SWDs during emergency online learning are considered during the planning and development of such learning.

Limitations

The current study has limitations that are important to consider when interpreting the results. As a secondary analysis, our study is limited by the same limitations of the original study. For instance, like with any survey, the data from the REDS student questionnaire is based on self-report, which is susceptible to bias. Additionally, the results of this study should be interpreted with caution as the results cannot be generalized to the population due to limited availability of sampling weights. The results for our first research question should also be interpreted with caution because a sensitivity analysis could not be conducted with the IEA IDB Analyzer. Further, meaningful differences regarding SWDs exist among the countries included in our analysis. For example, countries define *student with a disability* differently and had varying proportions of SWDs in their samples (range: 3.4–49.5%); therefore, we recommend making cross-country comparisons with caution and consideration of these differences. Finally, because the data collection period varied across countries (range: December 2020–July 2021), students could have been in different stages of the COVID-19 school disruption when they completed the survey. Nevertheless, our study provides an international snapshot of education during COVID-19 school disruptions.

Areas of future research

Future research should address the limitations of the current study. Additionally, it may be worth investigating the relationship between parents' perspectives of student experiences during COVID-19 school disruptions and the perspectives of the students themselves (i.e., their children). Such a study would reveal whether students who report positive experiences have parents who also report positive experiences (and vice versa). If student and parent perspectives do not correlate, then it is possible that parents of SWDs have stricter criteria for what counts as learning than students do.

Because many students with and without disabilities have likely returned to in-person learning, future research could also compare students' experiences (e.g., support, schoolwork, learning progress) during the COVID-19 school disruption to after the disruption. A follow-up study such as this could reveal if SWDs generally perceive that their school support for having a disability increased, stayed the same, or decreased upon returning to in-person schooling. This study could also reveal if patterns such as SWDs reporting better experiences than students without disabilities are sustained.

While we tested measurement invariance among the countries for teacher support, schoolwork, learning experiences, learning progress, and feelings, the partial measurement invariance was not included in our analysis. Partial measurement invariance may provide interesting insights into specific differences between countries. Thus, future research should examine the partial measurement invariance in the REDS dataset. Finally, it is important to acknowledge the nested structure of the data (e.g., students nested within schools). While beyond the scope of the present study, future research should analyze SWDs' education during the COVID-19 school disruption while including school-level variables using hierarchical linear modeling.

Conclusion

Our study revealed the increased need for school support among SWDs during the COVID-19 school disruption. Additionally, our study revealed that SWDs generally had better perceptions of schooling than students without disabilities during the disruption. However, having a disability generally predicted lower ratings of learning progress. Given that SWDs reported needing more support during the disruption and may also experience less learning progress, education leaders and policymakers should explore how to provide SWDs the support they need to maximize their learning, as remote instruction remains an option for SWDs beyond the COVID-19 school disruption.

Appendix A

Demographic description for students with and without disabilities by country

		Students with disabilities		Students without disabilities	
Country	**Variables**	**Frequency**	**%**	**Frequency**	**%**
Burkina Faso	Gender				
	Female	60	54.50%	1066	53.90%
	Male	48	43.60%	893	45.20%
	Not reported	2	1.80%	17	0.90%
	Parental Education				
	High School Education or Less	83	75.50%	1742	88.20%
	Post-high School Education	21	19.10%	178	9.00%
	Not reported	6	5.50%	56	2.80%
	Where did you attend school lessons?				
	I did not do any schoolwork during the [COVID-19 disruption]	77	70.00%	1612	81.60%
	I continued to come to school for all my lessons	5	4.50%	26	1.30%
	I did not come to school for any of my lessons and attended my lessons from a place away from my school	15	13.60%	199	10.10%
	I came to school for some lessons but attended most lessons in a place away from my school	2	1.80%	40	2.00%
	I came to school for most lessons but attended some lessons in a place away from my school	3	2.70%	10	0.50%
	I came to school for about half of my lessons and attended other lessons in a place away from my school	2	1.80%	31	1.60%
	Not reported	6	5.50%	58	2.90%

Demographic description for students with and without disabilities by country

		Students with disabilities		Students without disabilities	
Country	**Variables**	**Frequency**	**%**	**Frequency**	**%**
Denmark	Gender				
	Female	85	48.30%	566	51.70%
	Male	78	44.30%	464	42.40%
	Not reported	13	7.40%	64	5.90%
	Parental Education				
	High School Education or Less	87	49.40%	505	46.20%
	Post-high School Education	61	34.70%	500	45.70%
	Not reported	28	15.90%	89	8.10%
	Where did you attend school lessons?				
	I did not do any schoolwork during the [COVID-19 disruption]				
	I continued to come to school for all my lessons	14	8.00%	52	4.80%
	I did not come to school for any of my lessons and attended my lessons from a place away from my school	134	76.10%	954	87.20%
	I came to school for some lessons but attended most lessons in a place away from my school	16	9.10%	57	5.20%
	I came to school for most lessons but attended some lessons in a place away from my school	5	2.80%	8	0.70%
	I came to school for about half of my lessons and attended other lessons in a place away from my school	3	1.70%	11	1.00%
	Not reported	4	2.30%	12	1.10%
Ethiopia	Gender				
	Female	698	44.10%	531	42.20%
	Male	803	50.80%	686	54.50%
	Not reported	80	5.10%	42	3.30%
	Parental Education				
	High School Education or Less	1169	73.90%	978	77.70%
	Post-high School Education	257	16.30%	191	15.20%
	Not reported	155	9.80%	90	7.20%
	Where did you attend school lessons?				
	I did not do any schoolwork during the [COVID-19 disruption]	467	29.50%	519	41.20%
	I continued to come to school for all my lessons	144	9.10%	116	9.20%
	I did not come to school for any of my lessons and attended my lessons from a place away from my school	347	21.90%	270	21.40%
	I came to school for some lessons but attended most lessons in a place away from my school	121	7.70%	51	4.10%
	I came to school for most lessons but attended some lessons in a place away from my school	65	4.10%	47	3.70%
	I came to school for about half of my lessons and attended other lessons in a place away from my school	91	5.80%	48	3.80%
	Not reported	346	21.90%	208	16.50%

Demographic description for students with and without disabilities by country

		Students with disabilities		Students without disabilities	
Country	**Variables**	**Frequency**	**%**	**Frequency**	**%**
Kenya	Gender				
	Female	288	51.20%	165	45.70%
	Male	258	45.90%	186	51.50%
	Not reported	16	2.80%	10	2.80%
	Parental Education				
	High School Education or Less	442	78.60%	297	82.30%
	Post-high School Education	96	17.10%	48	13.30%
	Not reported	24	4.30%	16	4.40%
	Where did you attend school lessons?				
	I did not do any schoolwork during the [COVID-19 disruption]	47	8.40%	82	22.70%
	I continued to come to school for all my lessons	11	2.00%	8	2.20%
	I did not come to school for any of my lessons and attended my lessons from a place away from my school	291	51.80%	151	41.80%
	I came to school for some lessons but attended most lessons in a place away from my school	23	4.10%	17	4.70%
	I came to school for most lessons but attended some lessons in a place away from my school	9	1.60%	1	0.30%
	I came to school for about half of my lessons and attended other lessons in a place away from my school	5	0.90%	3	0.80%
	Not reported	176	31.30%	99	27.40%
UAE	Gender				
	Female	405	52.90%	1007	52.10%
	Male	361	47.10%	925	47.90%
	Not reported	-	-	-	-
	Parental Education				
	High School Education or Less	288	37.60%	602	31.20%
	Post-high School Education	447	58.40%	1269	65.70%
	Not reported	31	4.00%	61	3.20%
	Where did you attend school lessons?				
	I did not do any schoolwork during the [COVID-19 disruption]				
	I continued to come to school for all my lessons	102	13.30%	153	7.90%
	I did not come to school for any of my lessons and attended my lessons from a place away from my school	566	73.90%	1523	78.80%
	I came to school for some lessons but attended most lessons in a place away from my school	38	5.00%	87	4.50%
	I came to school for most lessons but attended some lessons in a place away from my school	18	2.30%	72	3.70%
	I came to school for about half of my lessons and attended other lessons in a place away from my school	17	2.20%	78	4.00%
	Not reported	25	3.30%	19	1.00%

Note. Sampling weights were not used in sample descriptions.

Appendix B

The measures and their items

Item ID	Questions
Teacher Support	
IS1G21A	My teachers were available when I needed their help.
IS1G21B	My teachers made it clear how to best contact them.
IS1G21C	My teachers gave me feedback that I could understand
IS1G21D	My teachers made a special effort to keep in contact with me.
IS1G21E	My teachers showed interest in my learning.
IS1G21F	I had a good relationship with my teachers.
IS1G21G	My teachers encouraged me to learn.
IS1G21H	My teachers adapted my schoolwork to meet my individual needs.
Schoolwork	
IS1G18A	My motivation to complete my schoolwork.
IS1G18B	The variety of schoolwork I was given.
IS1G18C	My capacity to plan the completion of my schoolwork.
IS1G18D	The quality of my schoolwork.
IS1G18G	My ability to keep up with my schoolwork.
IS1G18H	My confidence in completing schoolwork.
IS1G18I	My contribution to class discussion.
IS1G18J	My skills in accessing online learning content.
Learning Experiences	
IS1G14A	I found it hard to understand the schoolwork my teachers gave me.
IS1G14D	I was unable to get help for my schoolwork from a teacher or [school support staff].
IS1G14E	I needed other people at home to help me complete my schoolwork.
IS1G14F	I needed to contact my classmates to help me complete my schoolwork.
IS1G14G	I found it difficult to get extra or different types of work from my teachers.
Learning Progress	
IS1G22A	I learned about as much as before the COVID-19 disruption
IS1G22B	I made more progress in some subjects than before the COVID-19 disruption
Feelings	
IS1G24A	I felt anxious about the changes in my schooling.
IS1G24B	I felt overwhelmed by what was happening in the world due to [the COVID-19 pandemic].
IS1G24C	I felt overwhelmed by what was happening in my [local area] due to the [COVID-19 pandemic].
IS1G24D	I was worried about how the disruption affected my learning.
IS1G24E	I was worried about how this disruption will affect my future education.
IS1G24F	I missed my usual contact with my classmates.
IS1G24K	I was worried about catching [COVID-19].

Appendix C

Measurement Invariance Results.

Table 1 Goodness-of-fit indices for tests of measurement invariance on teacher support

Model	Comparative model	$\chi 2$ (df)	$\Delta\chi 2$ (df)	RMSEA [90%CI]	SRMR	CFI	ΔCFI
1. Configural	-	798.261 (100)***	-	0.066 [0.062-0.071]	0.033	0.959	-
2. Metric	2 vs. 1	990.241 (128)***	191.98 (20)	0.065 [0.061-0.069]	0.053	0.949	0.01
3. Scalar	3 vs. 1	2560.229 (156)***	1761.968 (56)	0.098 [0.095-0.102]	0.105	0.859	0.1

Table 2 Goodness-of-fit indices for tests of measurement invariance on schoolwork

Model	Comparative model	*χ2* (df)	*Δχ2* (df)	RMSEA [90%CI]	SRMR	CFI	*ΔCFI*
1. Configural	-	473.515(100)***	-	0.048 [0.044-0.053]	0.027	0.974	-
2. Metric	2 vs. 1	714.561 (128)***	241.046 (20)	0.053 [0.050-0.057]	0.055	0.958	0.016
3. Scalar	3 vs. 1	2255.885 (156)***	1782.37 (56)	0.092 [0.088-0.095]	0.116	0.851	0.123

Table 3 Goodness-of-fit indices for tests of measurement invariance on learning experiences

Model	Comparative model	*χ2* (df)	*Δχ2* (df)	RMSEA [90%CI]	SRMR	CFI	*ΔCFI*
1. Configural	-	276.910(20)***	-	0.082 [0.073-0.090]	0.037	0.922	-
2. Metric	2 vs. 1	328.160 (32)***	51.25(12)	0.069 [0.063-0.076]	0.048	0.910	0.012
3. Scalar	3 vs. 1	696.115 (44)***	419.205(24)	0.088 [0.082-0.094]	0.079	0.802	0.12

Table 4 Goodness-of-fit indices for tests of measurement invariance on learning progress

Model	Comparative model	*χ2* (df)	*Δχ2* (df)	RMSEA [90%CI]	SRMR	CFI	*ΔCFI*
1. Configural	-	115.568(9)***	-	0.086 [0.073-0.101]	0.063	0.906	-
2. Metric	2 vs. 1	115.568(9)***	000.00(0)	0.086 [0.073-0.101]	0.063	0.906	0.00
3. Scalar	3 vs. 1	200.032 (13)***	84.464(4)	0.095 [0.084-0.107]	0.063	0.835	0.071

Table 5 Goodness-of-fit indices for tests of measurement invariance on feelings

Model	Comparative model	*χ2* (df)	*Δχ2* (df)	RMSEA [90%CI]	SRMR	CFI	*ΔCFI*
1. Configural	-	608.448(65)***	-	0.060 [0.055-0.064]	0.036	0.965	-
2. Metric	2 vs. 1	833.771 (89)***	225.323(24)	0.060 [0.056-0.063]	0.051	0.952	0.013
3. Scalar	3 vs. 1	2231.667 (113)***	1623.219(48)	0.089 [0.086-0.093]	0.095	0.864	0.101

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