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School burnout among students with and without disabilities before, during, and after the COVID-19 pandemic

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ABSTRACT

Background: Students' mental health problems increased during the COVID-19 pandemic and persisted afterward. Evidence regarding school burnout—particularly among disabled students—is limited.
Objective: We assessed school burnout and its changes among students with specific (only cognitive, only sensory, only mobility, or several) and any (at least one of the three domains) disabilities compared to those without disabilities before (2019), during (2021), and post-pandemic (2023).
Methods: We analyzed population-level cross-sectional data from the Finnish School Health Promotion study, including 467,186 lower secondary, upper secondary, and vocational students (mean age = 16.2; SD = 1.22) from 2019, 2021, and 2023 using logistic regression.
Results: At all school levels, students with any disabilities reported school burnout more often than those without disabilities. Those with several disabilities were the most vulnerable, particularly girls. At vocational level, burnout prevalence was about half that of other levels among girls and boys with and without any disabilities. In lower secondary school, burnout increased among girls with and without any disabilities from 2019 to 2021 and remained high post-pandemic. For lower secondary boys, burnout increased only among those without disabilities from 2019 to 2021 and persisted post-pandemic. For boys with any disabilities, burnout began to increase post-pandemic. In upper secondary and vocational schools, burnout increased among girls and boys with and without any disabilities from 2019 to 2021. Post-pandemic, these increases declined.
Conclusions: Schools require resources addressing school burnout inequalities, especially during crises and among disabled girls. Post-pandemic, addressing persistent school burnout among lower secondary students with disabilities is crucial.

1. Introduction

When demands exceed resources, subsequent stress can lead to burnout according to the demands–resources model.[1] School provides an important developmental context for students, and school burnout is a school-context-specific measure.[1,2] School burnout refers to exhaustion due to study demands, a cynical attitude toward schoolwork, and feelings of inadequacy.[1,2] Specifically, school-related exhaustion can be defined as feelings of strain resulting from excessive schoolwork.[2] School-related cynicism is associated with students' loss of interest and a lack of perceived meaning in their academic work.[2] Feelings of inadequacy refer to diminished feelings of competence regarding one's schoolwork.[2] Students experiencing school burnout are vulnerable to school dropout,[3] mental health problems,[4] delays in their studies,[5] and a diminished educational aspirations.[5] Investigating the occurrence and changes in school burnout enables us to better target resources and

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implement measures to reduce burnout and prevent its negative consequences. We assessed school burnout and its changes among disabled students compared to those without disabilities before, during, and after the pandemic in lower and upper secondary schools.[1]

Worldwide, including in Finland, measures were implemented to control the COVID-19 pandemic. Measures included school closures, event cancellations, social distancing, assembly restrictions, activity limitations, and mandatory quarantine for the infected. Like many countries, Finland experienced widespread school closures and a subsequent shift to distance learning due to the pandemic.[6] The pandemic and related measures—lockdowns, physical distancing, and distance education—caused stress, disrupted learning, and potentially increased school burnout.[7] Moreover, students may be more sensitive to school burnout due to the increased demands and pressures of modern schooling. Disabled students faced challenges, a lack of interest, and low confidence in their learning even before the pandemic.[8] According to the stress process theory and the demands-resources model, these vulnerabilities may have increased learning inequalities during the pandemic due to heightened stressors and adversity.[1,9]

Limited research exists on whether disabled students report more school burnout than those without disabilities. A study in Colorado found that caregivers of disabled children reported that their children aged 5 to 16 experienced stress during the school closures in 2020.[10] Although this study included lower secondary students, it did not investigate school burnout or compare disabled students to those without disabilities. Two other studies indicated that U.S. medical students with disabilities had higher burnout levels than their peers without disabilities.[11,12] These studies did not focus on younger students in secondary schools and did not focus on specific disabilities. Previous studies have indicated that school burnout increased during the pandemic among students in lower and upper secondary schools.[13,14] This increase may be attributed to isolation and distance learning challenges, including self-direction problems, lack of support, and decreased teacher–student interaction.[13,14] However, there is limited evidence on school burnout changes among disabled students.

Students with certain disabilities may have been at risk of increased school burnout during the pandemic. A previous study indicated that anxiety and depression increased between 2019 and 2021, especially among Finnish lower secondary students with cognitive and mobility disabilities,[15] but school burnout was not investigated. During the pandemic, online instruction was insufficiently accessible for students with cognitive disabilities.[16,17] Secondary students aged 11 to 18 with cognitive disabilities reported lower abilities to learn online compared to face-to-face.[17] Students of different ages with sensory disabilities, such as hearing impairments, experienced inaccessibility and faced challenges during distance education.[18] Students with mobility disabilities struggled to sit at a computer, follow lessons, and take notes during distance learning.[19] However, empirical evidence is lacking regarding whether school burnout prevalence changed between 2019 and 2021 among students with specific disabilities.

School burnout varies across school levels and genders, making it important to investigate these differences among disabled students. Academic track students experience higher school burnout than vocational track students.[20] Additionally, secondary school girls, aged 14 to 18, are more prone to school burnout than boys.[20,21] This may be because girls often tie their self-worth to academic success, feel pressure to meet high expectations, and experience lower motivation.[20,21] Although Read et al. found that school burnout increased only among girls between 2006 and 2009 in lower and upper secondary schools,[22] the gender differences in burnout during the pandemic are poorly understood. Magson et al. found that mental health problems increased more among girls aged 13–16 years than boys during the pandemic in Australia.[23] Another study indicated no gender differences in mental health changes during that time among British students aged 11–16 years.[24] However, these studies did not investigate school burnout. Secondary school girls with cognitive disabilities aged 11 to 19 reported more stress due to online lessons and device use than their male counterparts,[25] potentially increasing these girls' vulnerability to burnout during the pandemic.

When schools reopened and distance learning declined, vulnerability to school burnout may have decreased. Simoës-Perlant et al. found that French students in lower and upper secondary education experienced post-pandemic school burnout,[26] but they did not compare the pre-and post-pandemic periods. Another study revealed that mental health problems persisted or continue to worsen among Finnish lower and upper secondary students but did not investigate school burnout.[27] Disabled students may be vulnerable post-pandemic. Caregivers of students with disabilities aged 8 to 16 reported that the children's learning declined during the pandemic[28]; this may have persisted post-pandemic. The learning gap may be evident among individuals with mobility, cognitive, and sensory disabilities due to distance learning challenges during the pandemic.[16,18,19] However, there is a lack of evidence regarding changes in school burnout after the pandemic among disabled students.

We investigated whether students with any disabilities and specific disabilities (cognitive, sensory, mobility, or several) reported more school burnout than those without disabilities. Next, we investigated how burnout levels changed between 2019, 2021, and 2023 among students with and without disabilities. We analyzed the results separately for the school levels and genders. We hypothesized that school burnout increased during the pandemic but decreased afterward. Our results may help support disabled students' learning during and after crises, thereby reducing inequalities among vulnerable groups.

2. Methods

2.1. Data and design

We analyzed population-based datasets from the Finnish School Health Promotion (SHP) study for 2019, 2021, and 2023.[29] This nationwide survey is conducted by the Finnish Institute for Health and Welfare (THL) every other year between March and May and utilizes total population sampling. We included lower secondary (8th and 9th grades), general upper secondary (1st and 2nd grades), and vocational education (1st and 2nd grades) students between 2019 and 2023, a total of 467,186 participants (mean age = 16.2; SD = 1.22). The average sample sizes were 122,317 for lower secondary (8th and 9th grades), 65,438 for upper secondary (11th and 12th grades), and 66,579 for vocational (1st and 2nd grades) schools over three years (see Table 1). The response rate remained consistent between 2019 and 2023 in lower secondary (70–75 %), upper secondary (68–71 %), and vocational education (28–32 %).

THL's Institutional Review Board approved the survey protocol. Students completed the survey under their teachers' supervision. Participation was voluntary, with students providing informed consent by completing the survey. Guardians of participants under 15 years old could withdraw their children from participation. The students completed the survey anonymously online; it was designed to be accessible with various assistive devices and was available in several languages. Most respondents used the Finnish version: 94.3 % Finnish, 4.6 % Swedish, .6 % English, .1 % Russian, and .01 % Northern Sami on

[1] In Finland, most students in lower secondary school are about 13–15 years old. Although there might be some differences in age (e.g., school starts earlier), a similar school level can be found in several other countries, and this lower secondary phase is also referred to as middle school or junior high school.In Finland, most students in upper secondary school are about 15–18 years old. Upper secondary school students attend either general upper secondary school (i.e., academic track) or vocational school (i.e., vocational track). Similar school levels can be found in other countries, and this secondary phase is also referred to as senior high school.

Table 1
Disabilities and sociodemographic statistics of students in lower secondary, general upper secondary, and vocational education schools by study year.

	2019	2021	2023	Missing data (%)[a]
Lower secondary (8th and 9th grades)				
Sample size	119,642	122,523	124,787	
Total, n	86,075	89,730	84,775	
Disability status				4.5
No disability, % (*n*)	78.3 (64,643)	73.6 (62,602)	72.4 (58,115)	
Any disabilities[b], % (*n*)	22.2 (18,477)	27.2 (23,381)	28.2 (22,881)	
Only cognitive, % (*n*)	14.8 (12,252)	18.9 (16,055)	21.7 (17,396)	
Only sensory, % (*n*)	3.5 (2882)	3.2 (2730)	1.7 (1389)	
Only mobility, % (*n*)	.3 (282)	.3 (281)	.3 (217)	
Several[c], % (*n*)	3.0 (2496)	4.0 (3421)	4.0 (3185)	
Sociodemographic				
Age, *M* (*SD*)	15.3(.64)	15.3(.62)	15.3(.63)	.5
Sex: Girls, %	51.0	51.7	51.6	.3
Parent migrant status, %	5.2	5.6	6.2	4.6
Family's poor economic situation, %	4.6	4.3	5.0	4.7
School burnout, %	15.2	19.6	20.0	2.2
General upper secondary (1st and 2nd grades)				
Sample size	64,239	66,507	65,570	
Total, *n*	44,478	47,267	44,606	
Disability status				3.0
No disability, % (*n*)	80.8 (35,157)	75.5 (34,643)	75.1 (32,738)	
Any disabilities[b], % (*n*)	19.4 (8484)	24.9 (11,478)	25,2 (11,008)	
Only cognitive, % (*n*)	14.4 (6287)	19.4 (8918)	20.1 (8743)	
Only sensory, % (*n*)	2.5 (1110)	2.5(1136)	2.1(894)	
Only mobility, % (*n*)	.2 (75)	.2 (79)	.2 (68)	
Several[c], % (*n*)	2.1 (895)	2.4(1111)	2.6 (1149)	
Sociodemographic				
Age, *M* (*SD*)	17.3(.67)	17.3(.66)	17.3(.63)	.4
Sex: Girls, %	59.0	59.7	58.7	.2
Parent migrant status, %	4.6	5.0	6.3	1.4
Family's poor economic situation, %	6.4	5.3	5.4	1.4
School burnout	15.5	21.1	17.5	1.0
Vocational education (1st and 2nd grades)				
Sample size	62,855	67,544	69,339	
Total, *n*	23,209	21,534	18,745	
Disability status				4.1
No disability, % (*n*)	77.5 (17,306)	71.2 (14,580)	69.8 (12,487)	
Any disabilities[b], % (*n*)	23.0 (5164)	29.5 (6095)	30.8 (5547)	
Only cognitive, % (*n*)	16.2 (3626)	21.7 (4450)	23.8 (4257)	
Only sensory, % (*n*)	2.9(642)	2.8(563)	1.9(336)	
Only mobility, % (*n*)	.3 (78)	.3 (62)	.3 (48)	
Several[c], % (*n*)	3.0(677)	4.0(811)	4.3(762)	
Sociodemographic				
Age, *M* (*SD*)	17.5(.92)	17.5(.93)	17.4(.87)	.6
Sex: Girls, %	40.3	42.4	43.2	.3
Parent migrant status, %	4.8	4.5	5.9	4.2
Family's poor economic situation, %	8.3	7.6	7.8	4.2
School burnout	7.6	11.3	9.2	1.7

Note. *M* = mean; *SD* = standard deviation.
[a] Missing data over all study years.
[b] Disabilities in at least one of the three domains: cognitive, sensory, or mobility.
[c] Disabilities in at least two out of the three domains.

average over the three study years.

2.2. Measures

Disability. Disability was assessed using a modified Washington Group/UNICEF Child Functioning Module (CFM).[30] The modifications involved changing from parent-to self-reporting and reducing the items to one question per function. The questions were adapted using a conceptual method and evaluated in focus groups and cognitive interviews with students. The results indicated that students understood the questions well. The intra-rater reliability of the questions showed sufficient agreement among people younger than those in this study.[31]

Data on seeing, hearing, walking, learning, memory, and concentration were available for every data collection year. The questions included:

(1) Do you have difficulty seeing? (If you wear glasses or contact lenses, evaluate your vision while wearing them.)
(2) Do you have difficulty hearing people's voices? (If you use a hearing aid, evaluate your hearing with your hearing aid on.)
(3) Do you have difficulty learning things?
(4) Do you have difficulty remembering things?
(5) Do you have difficulty concentrating on an activity that you enjoy doing?
(6) Do you have difficulty walking about 500 m, for example, once around a sports field?

The response categories were (a) no difficulty, (b) some difficulty, (c) a lot of difficulty, and (d) cannot do at all. We classified individuals who reported "a lot of difficulty" or "cannot do at all" as having disabilities. This cutoff point was recommended by the WG/UNICEF collaboration for reporting data internationally and disaggregating outcomes by disability.[32] *Any disabilities* refer to respondents who have disabilities in at least one of the three domains: sensory, cognitive, or mobility.[30] The specific disability groups were created by combining the questions/items as follows: *Only sensory disabilities* refer to respondents who have at least "a lot of difficulty" hearing or seeing. *Only cognitive disabilities* refer to respondents who have at least "a lot of difficulty" learning, remembering, or concentrating. *Only mobility disabilities* refer to respondents who have at least "a lot of difficulty" walking. *Several disabilities* mean the respondents who have disabilities in at least two out of the three domains: mobility, sensory, or cognitive. *No disabilities* mean the respondent had no or only some difficulty in all six functions.

Outcome. School burnout was measured using the Short School Burnout Inventory (SSBI)[22] developed for the SHP survey.[29] The SSBI was developed from the validated School Burnout Inventory.[2] The SSBI has demonstrated acceptable internal consistency in previous studies.[22] It contains three items measuring the theoretically defined dimension of school burnout—exhaustion at school, cynicism toward the meaning of school, and a sense of inadequacy at school. It is based on the following question: Have you had the following feelings relating to schoolwork? The associated items are:

(1) I feel I am drowning in schoolwork (exhaustion at school).
(2) It feels like my studies have no meaning (cynicism toward the meaning of school).
(3) I feel inadequate in my studies (sense of inadequacy at school).

The response options were scored as follows: (a) almost never = 0; (b) a few times a month = 0; (c) a few days a week = 1, and (d) almost daily = 2. A total score of 3 or more indicated school burnout. This divided students into those who experience more than one type of burnout symptom several days a week and those who do not.[33] In our study, the internal consistency (Cronbach's alpha) of the SSBI was good (2019: .80, 2021: .81, and 2023: .82).

Sociodemographic control variables. Parents' migrant status (yes

= both parents were born abroad, no = at least one parent was born in Finland), family economic situation (yes = fairly–very poor, no = moderate–very good), gender (boys and girls), school levels (lower secondary, general upper secondary, and vocational education), and respondent's age were selected as sociodemographic control variables. These variables (except school level) were based on students' self-reporting. The results were stratified by gender and school levels. Previous studies[20,21,34,35] and our analysis indicated that all these variables were associated with school burnout.

2.3. Data analysis

Unreliable respondents (2019: .9 %, 2021: 1.4 %, and 2023: 2.0 %) were eliminated based on the SHP study working group's recommendations and statistical analysis.[36] First, we removed individuals whose response techniques were inconsistent. Specifically, respondents who consistently selected answers from only one side of the options or consistently followed a diagonal pattern across the matrix question were excluded.[36] Second, those who reported being unable to perform any of the six disability functions (mobility, seeing, hearing, learning, remembering, and concentrating) were excluded as unreliable because these inabilities would have prevented them from completing the survey. We used a complete case analysis to handle the missing data. Among the students included in the analysis, less than 5 % were missing in each study variable (Table 1).

Analyses were conducted separately for each school level and gender using the R program (version 4.3.3).[37] First, frequency analyses were performed to examine the prevalence of disabilities, demographic characteristics, and school burnout. Second, logistic regression analyses were conducted to investigate the differences in burnout prevalence between students with and without disabilities in the years 2019, 2021, and 2023 combined, while controlling for sociodemographic covariates. Third, logistic regression analyses were performed to assess changes in burnout prevalence across 2019, 2021, and 2023 while controlling for sociodemographic covariates. We constructed models with burnout as the dependent variable and any disabilities (0 = no disability, 1 = disability in at least one of the domains) or specific disabilities (0 = no disability, 1 = only cognitive, 2 = only sensory, 3 = only mobility, 4 = several), time (2019, 2021, and 2023), and the interaction between disabilities and time as the predictor variables. When time significantly affected burnout, there was a significant temporal change in burnout prevalence. When the interaction between time and disabilities significantly affected burnout, the changes differed between students with and without disabilities. The odds ratio (OR) with a 95 % confidence interval (CI) was used to measure the effects in the logistic regression.

3. Results

3.1. Sociodemographic characteristics

Table 1 presents the prevalence of disabilities, sociodemographic characteristics, and school burnout by year and school level. Cognitive disabilities were most common in all years at all school levels, whereas mobility disabilities were the least common.

The prevalence of cognitive disabilities in all school levels ($p < .001$) increased from 2019 to 2021 and continued to increase from 2021 to 2023 in lower secondary ($p < .001$), vocational ($p < .001$), and upper secondary education ($p = .01$). The prevalence of several disabilities increased from 2019 to 2021 for all levels ($p < .001$) and persisted afterward. Contrarily, sensory disabilities decreased from 2021 to 2023 for all school levels ($p < .001$), with no change between 2019 and 2021. The prevalence of mobility disabilities remained stable from 2019 to 2023 across all school levels.

3.2. School burnout among students with and without disabilities

Among both genders and at all school levels, students with any disabilities reported school burnout significantly more often than students without disabilities (Table 2, Fig. 1). At the vocational level, the burnout prevalence was about half that of the other levels among girls and boys with and without any disabilities ($p < .001$). Girls reported burnout significantly more often than boys among both students with and without any disabilities at all school levels (in all cases, gender differences $p < .001$).

Regarding specific disabilities, students with several disabilities were the most vulnerable to school burnout (girls: OR = [6.3, 7.4]; boys: OR = [6.8, 9.2]) compared to those without disabilities across all school levels (Fig. 1; Table 2).

3.3. Changes in burnout prevalence in lower secondary education

Burnout prevalence increased among girls with and without any disabilities from 2019 to 2021 and persisted from 2021 to 2023 (Fig. 2, Table 3). Burnout increased among boys without disabilities from 2019 to 2021 and remained steady until 2023. There were no significant changes in burnout among boys with any disabilities from 2019 to 2021, but burnout began to increase post-pandemic (2021–2023). The changes among boys with any disabilities differed from boys without disabilities, from 2019 to 2021 (OR = .89[95 %CI:.81–.99], $p < .05$) and from 2021 to 2023 (OR = 1.13[95 %CI:1.03–1.25], $p < .05$).

Regarding specific disabilities, the increase in burnout during the pandemic (2019–2021) was significant among girls with cognitive, sensory, and several disabilities (Appendix A). Burnout remained stable during the pandemic among boys with all types of disabilities. The significant post-pandemic increase (2021–2023) was observed particularly among boys with sensory disabilities.

3.4. Changes in burnout prevalence in upper secondary and vocational education

In upper secondary and vocational education, burnout increased from 2019 to 2021 among girls and boys with and without any disabilities and started to decrease post-pandemic (2021–2023) (Fig. 3; Table 3). In vocational education, the increase in burnout during the pandemic (2019–2021) among girls with any disabilities (OR = 1.29 [1.07–1.55], $p < .001$) was greater than that among girls without disabilities.

Regarding specific disabilities, the significant increase in burnout during the pandemic (2019–2021) and the subsequent decrease post-pandemic (2021–2023) were observed particularly among boys with cognitive disabilities (Appendix A). The increase during the pandemic and the subsequent decrease post-pandemic reached significance among girls with cognitive disabilities and several disabilities in upper secondary and vocational schools, and among girls with mobility disabilities in upper secondary school.

4. Discussion

We found that boys and girls with any disabilities reported school burnout more often than those without disabilities in lower secondary, upper secondary, and vocational schools. Our analyses of three cross-sectional surveys revealed four important findings: 1) School burnout increased during the pandemic (2019–2021) among lower secondary girls with and without any disabilities and persisted post-pandemic (2021–2023). 2) Among lower secondary boys, burnout rose only among those without disabilities during the pandemic and remained steady until 2023. 3) Contrarily, there were no changes in burnout among disabled boys at this school level during the pandemic, but burnout began to increase post-pandemic. 4) In upper secondary and vocational education, burnout increased during the pandemic among

Table 2
The prevalence of school burnout, with 95 % confidence intervals, in the three school levels stratified by disability and gender, for the years 2019, 2021, and 2023 combined.

Girls	Lower secondary		General upper secondary		Vocational education	
	% [95 % CI]	OR [95 % CI]	% [95 % CI]	OR [95 % CI]	% [95 % CI]	OR [95 % CI]
No	14.6 [14.4, 14.9]	ref.	15.4 [15.1, 15.7]	ref.	7.2 [6.7, 7.6]	ref.
Any disabilities[a]	46.1 [45.7, 46.6]	5.09*** [4.95, 5.24]	44.3 [43.7, 45.0]	4.46*** [4.30, 4.62]	25.5 [24.6, 26.4]	4.47*** [4.13, 4.83]
Only cognitive	47.1 [46.5, 47.7]	5.30*** [5.14, 5.46]	45.4 [44.7, 46.2]	4.67*** [4.49, 4.85]	25.4 [24.4, 26.4]	4.45*** [4.10, 4.83]
Only sensory	24.3 [22.8, 25.8]	1.88** [1.73, 2.05]	23.7 [21.9, 25.5]	1.72*** [1.54, 1.91]	13.5 [10.9, 16.2]	2.03*** [1.60, 2.57]
Only mobility	29.3 [24.6, 34.1]	2.45*** [1.94, 3.0]	27.1 [20.0, 34.3]	2.06*** [1.43, 2.98]	10.2 [3.0, 17.3]	ns.
Several[b]	55.4 [54.0, 56.8]	7.42*** [7.00, 7.88]	55.1 [53.1, 57.2]	6.94*** [6.37, 7.57]	32.4 [29.8, 34.9]	6.29*** [5.50, 7.20]
Boys	**% [95 % CI]**	**OR [95 % CI]**	**% [95 % CI]**	**OR [95 % CI]**	**% [95 % CI]**	**OR [95 % CI]**
No	7.0 [6.8, 7.2]	ref.	6.2 [5.9, 6.4]	ref.	3.2 [3.0, 3.4]	ref.
any disabilities[a]	27.0 [26.4, 27.6]	4.95*** [4.75, 5.15]	28.5 [27.5, 29.5]	6.17*** [5.79, 6.57]	14.4 [13.6, 15.3]	5.16*** [4.67, 5.70]
Only cognitive	29.5 [28.7, 30.2]	5.59*** [5.34, 5.85]	30.4 [29.2, 31.6]	6.79*** [6.34, 7.27]	15.2 [14.2, 16.3]	5.50*** [4.94, 6.13]
Only sensory	10.9 [9.9, 12.0]	1.63*** [1.46, 1.83]	11.6 [9.7, 13.6]	2.02*** [1.66, 2.45]	6.2 [4.6, 7.7]	1.99*** [1.50, 2.65]
Only mobility	24.0 [19.5, 28.6]	4.23*** [3.28, 5.45]	12.6 [4.9, 20.3]	2.21* [1.09, 4.49]	11.9 [5.8, 18.0]	4.14*** [2.30, 7.45]
Several[b]	33.7 [31.9, 35.5]	6.82*** [6.27, 7.42]	37.0 [33.4, 40.7]	9.18*** [7.79, 10.81]	19.3 [16.6, 22.1]	7.38*** [6.10, 8.92]

Note. Adjusted for sociodemographic covariates (age, parents' migrant status, and family's economic situation) and year (2019, 2021, 2023); CI = confidence interval; OR = odds ratio; ns. = not significant.
[a] Disabilities in at least one of the three domains: cognitive, sensory, or mobility.
[b] Disabilities in at least two out of the three domains.
* $p < .05$.
** $p < .01$.
*** $p < .001$.

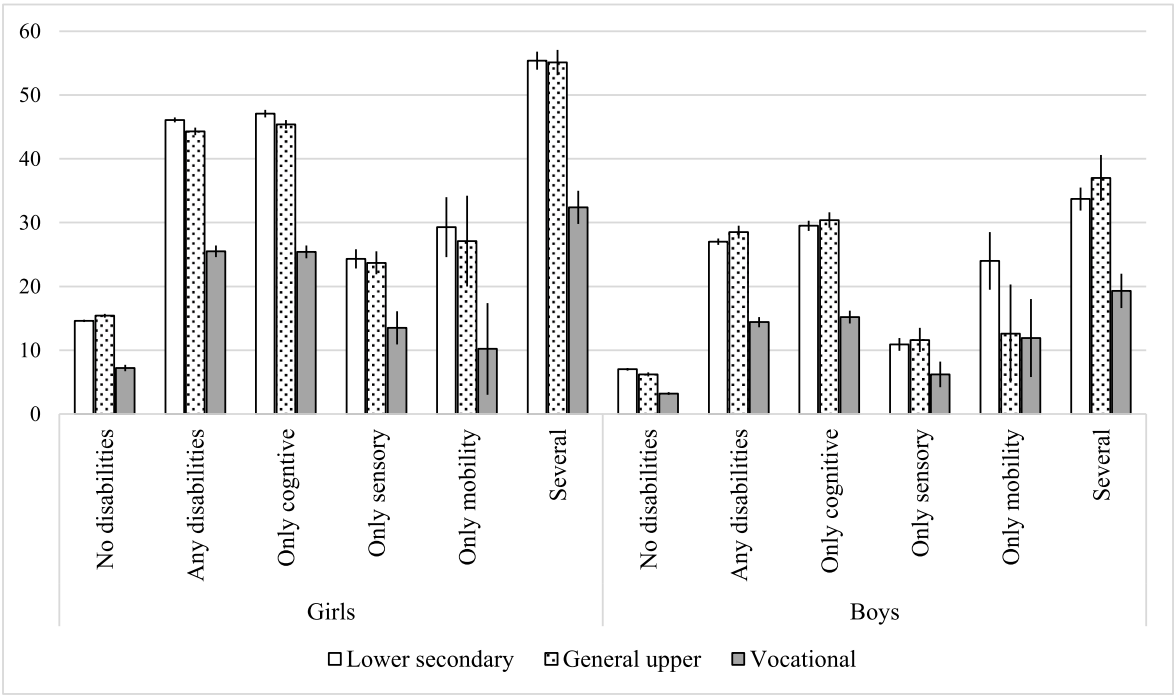

Fig. 1. The prevalence (%) of school burnout, with 95 % confidence interval, by disability and school level among both genders, for the years 2019, 2021, and 2023 combined. Adjusted for sociodemographic covariates (age, parents' migrant status, and family's economic situation) and time variable (2019, 2021, 2023). Any disabilities = disabilities in at least one of the three functions: cognitive, sensory, or mobility; Several = disabilities in at least two out of the three domains.

both girls and boys with and without any disabilities, but this upward trend declined post-pandemic.

4.1. School burnout among students with and without disabilities

Our results align with previous studies that have found that university students with disabilities experience more school burnout than their peers without disabilities,[11,12] and that girls are more prone to school burnout than boys.[20,21] We further found that girls and boys with any disabilities reported burnout more often than their non-disabled counterparts at all school levels, with those with several disabilities being the most vulnerable. We further found that girls with any disabilities experienced more burnout than boys with any disabilities at all school levels. Disabled girls may have lower self-worth than disabled boys,[38,39] making them more prone to school burnout. Our results highlight the importance of addressing the learning needs of disabled students at all school levels, particularly girls with several disabilities.

We observed that school burnout at vocational level was about half that of the other school levels for girls and boys with and without any disabilities. This finding aligns with previous studies which have

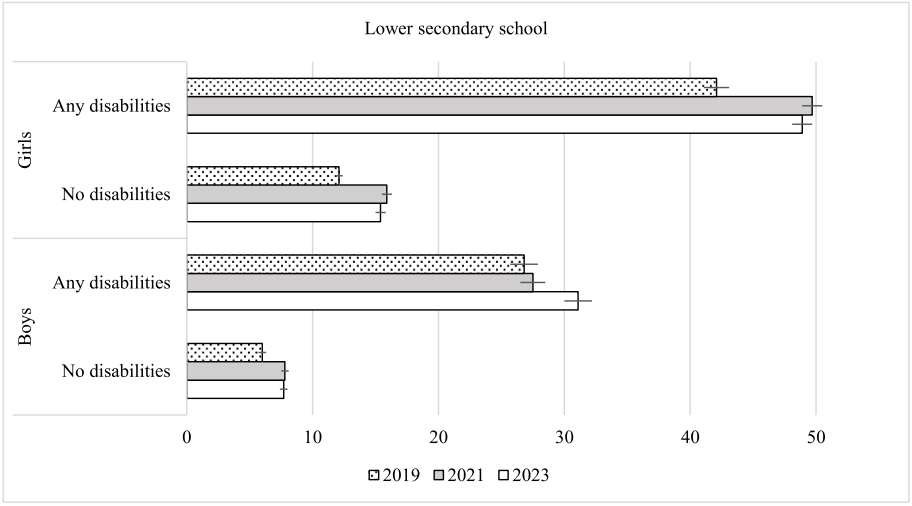

Fig. 2. The prevalence (%) of school burnout with 95 % confidence interval in 2019, 2021, and 2023 stratified by disability and gender among the lower secondary school students. Adjusted for sociodemographic covariates (age, parents' migrant status, and family's economic situation). Any disabilities = Disabilities in at least one of the three functions: cognitive, sensory, or mobility.

Table 3
Changes in the prevalence of school burnout among students with and without any disabilities in the three school levels, with 95 % confidence interval, in 2019, 2021, and 2023 stratified by gender.

Lower secondary	2019	2021	2023	2019 vs. 2021	2021 vs. 2023
	% [95 % CI]	% [95 % CI]	% [95 % CI]	OR [95 % CI]	OR [95 % CI]
Girls					
No	12.1 [11.8, 12.5]	15.9 [15.5, 16.3]	15.4 [15.0, 15.9]	1.37 [1.31, 1.43]***	ns.
Any disabilities[a]	42.1 [41.1, 43.0]	49.7[48.9, 50.5]	48.9 [48.1, 49.7]	1.36[1.29, 1.43]***	ns.
Boys					
No	6.0 [5.7, 6.3]	7.8 [7.5, 8.2]	7.7 [7.4, 8.0]	1.22 [1.14, 1.30]***	ns.
Any disabilities[a]	26.8[25.7, 27.8]	27.5[26.5, 28.5]	31.1[30.0, 32.2]	ns.	1.14[1.06, 1.22]**
General upper	**2019**	**2021**	**2023**	**2019 vs. 2021**	**2021 vs. 2023**
	% [95 % CI]	% [95 % CI]	% [95 % CI]	OR [95 % CI]	OR [95 % CI]
Girls					
No	13.7 [13.2, 14.2]	17.9 [17.4, 18.5]	13.8 [13.3, 14.4]	1.39 [1.31, 1.46]***	.73 [.69, .78]***
Any disabilities[a]	41.8 [40.6, 43.1]	49.4 [48.3, 50.5]	43.8 [42.8, 44.9]	1.36[1.27, 1.46]***	.80[.75, .85]***
Boys					
No	5.4 [5.0, 5.7]	7.5 [7.1, 7.9]	5.4 [5.0, 5.7]	1.44 [1.31, 1.58]***	.69 [.63, .76]***
Any disabilities	27.3[25.6, 29.1]	31.8[30.1, 33.5]	28.8[27.0, 30.5]	1.24[1.10, 1.40]**	.89[.79, 1.00]*
Vocational	**2019**	**2021**	**2023**	**2019 vs. 2021**	**2021 vs. 2023**
	% [95 % CI]	% [95 % CI]	% [95 % CI]	OR [95 % CI]	OR [95 % CI]
Girls					
No	6.3 [5.7, 6.9]	8.4 [7.6, 9.2]	6.4 [5.7, 7.1]	1.34 [1.16, 1.56]***	.74 [.63. 87]***
Any disabilities[a]	21.3[19.8, 22.8]	31.9[30.4, 33.5]	24.8[23.4, 26.3]	1.75[1.55, 1.96]***	.70[.63, .78]***
Boys					
No	2.8 [2.5, 3.1]	3.9 [3.5, 4.4]	3.0 [2.6, 3.3]	1.32 [1.12, 1.55]**	.80 [.67, .95]*
Any disabilities[a]	14.4[12.9, 15.9]	17.4[15.9, 19.0]	14.7[13.1, 16.3]	1.22[1.03, 1.44]*	.84[.71, .99]*

Note. Adjusted for sociodemographic covariates (age, parents' migrant status, and family's economic situation); CI = confidence interval; OR = odds ratio; ns. = not significant.

[a] Disabilities in at least one of the three domains: cognitive, sensory, or mobility.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

indicated that academic-track students are more prone to burnout than vocational-track students, perhaps due to the higher study demands and pressure to succeed in academically.[20] Our findings highlight the importance of addressing burnout disparities between school types, especially among vulnerable disabled students.

4.2. Changes in school burnout prevalence during the pandemic

From 2019 to 2021, we observed that school burnout increased among girls with and without any disabilities at all school levels. Higher school pressure and pandemic-related factors such as isolation from friends, lack of support, and distance learning challenges may have contributed to the changes in these female groups.[13,14,20,21] We found that in vocational education, school burnout increased more among girls with any disabilities than among girls without disabilities. During the pandemic, distance learning posed challenges in vocational education because students were accustomed to hands-on learning.[20] Our results suggest that this is particularly evident for disabled girls in vocational

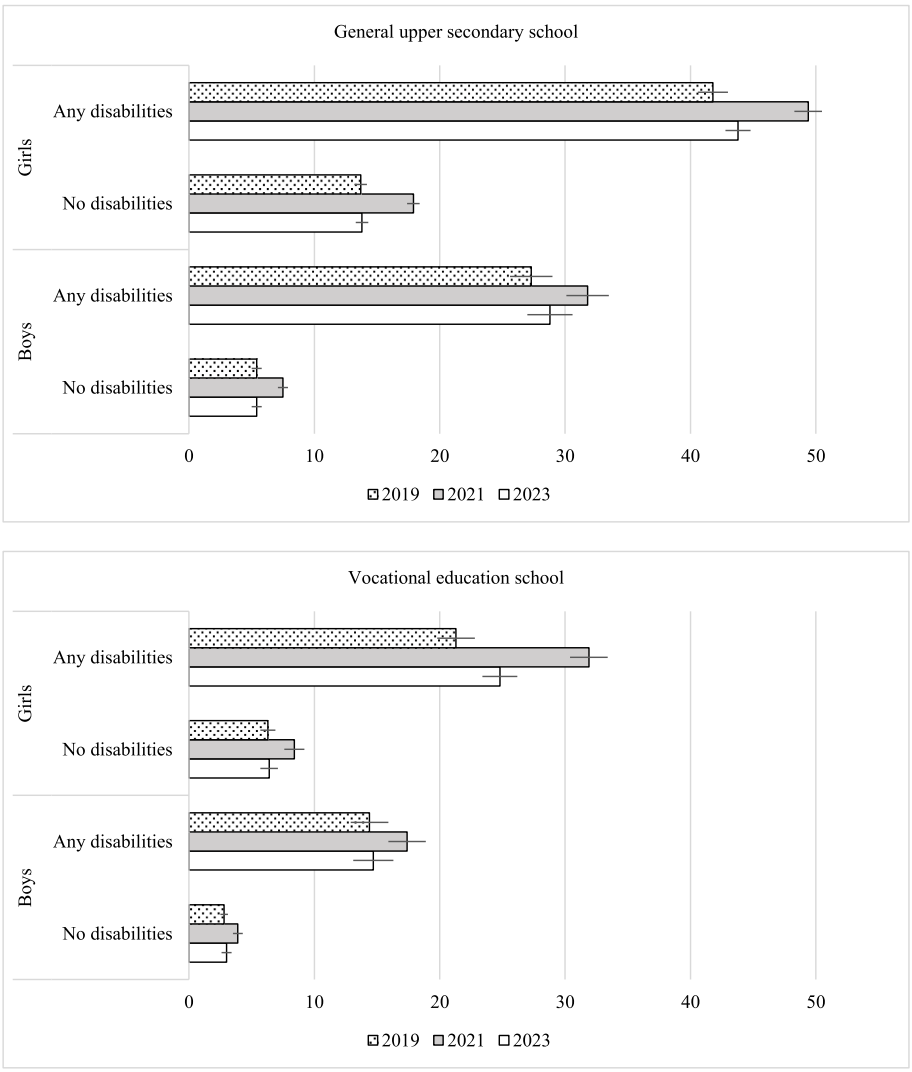

Fig. 3. The prevalence (%) of school burnout with 95 % confidence intervals in 2019, 2021, and 2023 stratified by disability and gender among the general upper secondary and vocational education schools. Adjusted for sociodemographic covariates (age, parents' migrant status, and family's economic situation). Any disabilities = Disabilities in at least one of the three functions: cognitive, sensory, or mobility.

education.

Regarding specific disabilities, we found that burnout increased during the pandemic among girls with cognitive and several disabilities across all school levels. Furthermore, burnout increased among girls with sensory disabilities in lower secondary school and among girls with mobility disabilities in upper secondary school. Girls with these specific disabilities may receive less support for distance learning, find online lessons more stressful, and have lower self-worth and coping skills than boys with similar disabilities,[25,38–41] contributing to increased burnout among disabled girls during the pandemic.

Contrary to assumptions, we found that in lower secondary school there were no changes in burnout among disabled boys during the pandemic, while burnout increased only among those without disabilities. The insignificant changes during the pandemic were evident among boys with all types of disabilities—cognitive, sensory, mobility, and several. Disabled boys reported less stress from online lessons and the use of digital devices than disabled girls.[25] Distance learning may have provided greater freedom without the constant teacher oversight and classroom pressure in lower secondary education. Disabled students may have experienced fewer learning distractions and less pressure during the pandemic.[42] These benefits may have been more significant for disabled boys in lower secondary schools, potentially preventing increased school burnout. Additionally, boys without disabilities may have higher scholastic achievement than disabled boys, which could create pressure to perform well in exceptional situations[43] and lead to increased burnout.

However, we found that burnout increased among boys with any disabilities during the pandemic in upper secondary and vocational schools. Our results regarding specific disabilities indicated that this was particularly evident for boys with cognitive disabilities. During the pandemic, students with cognitive disabilities faced learning challenges and lacked teacher support in online learning.[16,17] Academic success in general upper and vocational education is crucial for students' future careers, potentially increasing distress if studies do not go as expected during the pandemic.[44] These issues could have led to burnout among boys with cognitive disabilities at these school levels.

4.3. *Changes in school burnout prevalence post-pandemic*

Contrary to assumptions, we found that burnout remained high among lower secondary girls with and without any disabilities and among boys without disabilities. Lower secondary students may have low motivation, complex learning needs, and received insufficient support post-pandemic.[45] Learning debt increased during the pandemic in lower secondary schools, and this is reflected in the post-pandemic period.[45] Our results suggest that these challenges in lower secondary

school are evident among disabled girls, as well as among girls and boys without disabilities, potentially leading to persistent school burnout post-pandemic.

We found that the stable trend during the pandemic among lower secondary boys with any disabilities shifted to an increase post-pandemic. Therefore, our research indicates vulnerability among lower secondary boys with disabilities in the post-pandemic period rather than during the pandemic. Our analysis of specific disabilities showed that this was evident among boys with sensory disabilities. After the pandemic, classroom teaching increased, leading to more noise and disruptions in lower secondary schools, which may impact students with sensory disabilities. Noise makes communication difficult and following instructions challenging for those with sensory disabilities.[18] Our results suggest that these adversities disturbed lower secondary boys with sensory disabilities and contributed to school burnout.

We found that the increased burnout during the pandemic began to decrease post-pandemic among girls and boys with and without any disabilities in upper secondary and vocational education. The increase in school burnout in upper secondary level may have been due to pandemic-related challenges,[44] and the situation improved after the pandemic. At these higher levels, students may be more independent and resilient in the face of adversity, allowing them to adapt to studying and recover after a crisis.

We found that the prevalence of any disabilities increased from 2019 to 2023, with cognitive disabilities particularly rising. One could argue that changes in disability prevalence would affect changes in burnout. However, we often observed similar changes in burnout among those with and without disabilities. We also found that post-pandemic, the negative changes in school burnout were often reversed in vocational and general upper secondary schools but persisted in lower secondary schools despite a continued rise in any disability prevalence. Therefore, the increase in disability prevalence does not necessarily influence the changes in burnout. Other factors, such as distance learning challenges[7,13,14] and the learning debt incurred after the pandemic,[45] may contribute to changes in school burnout.

4.4. Limitations and strengths

One research strength was the extensive population-based dataset covering lower secondary, upper secondary, and vocational education and the ability to identify individuals with and without disabilities. The response rate was high among lower and upper secondary students but relatively low among vocational education students. Despite the considerable number of research participants, the missing data and nonresponse rate—particularly among vocational education students—weakens the generalization of the results to the entire population. The non-respondent group may have included disabled students who were unable to complete the survey. Nevertheless, the web survey was made technically accessible, and some improvements recommended by the Finnish Center for Easy Language were implemented to enhance its accessibility.

In this study, disability status was collected via self-report rather than relying on the school register or receipt of school-based services. The population-based Finnish SHP study was conducted anonymously, and data cannot be linked to other sources, such as local or national registers. However, the disability metrics were based on a globally accepted and validated measure, the CFM.[30] As the surveys were based on students' self-reports, the original parent-reporting CFM was modified for the students to respond for themselves. Self-reporting has been found to be a reliable method for assessing disabilities in young people.[31] It is important to prioritize youth voices in accordance with children's rights. We defined disabled students using a cutoff of "at least a lot of difficulty." To understand disabilities comprehensively, it is essential to consider individuals with some difficulties alongside those with a lot of difficulties.[46] However, the analyses would have become more complicated with a three-category disability variable. Additionally, the WG/UNICEF collaboration recommended a cutoff—at least a lot of difficulty—for reporting disability status internationally.[32] This study was unable to identify a wider array of disabilities than mobility, cognitive and/or sensory disabilities because of the limited number of disability questions in the surveys. In our population data, mobility disabilities were rare, which may affect the reliability of the analysis.

Lastly, school burnout measures based on the SSBI have shown good internal consistency in this and previous studies.[22] Some studies treat school burnout as a continuous variable,[22] while others treat it as a dichotomous variable.[33] We also analyzed results where school burnout was defined as a continuous variable, and the significance of the results did not change. There may be various factors related to individuals' school burnout, such as learning pressure, school climate, lack of support, learning-related self-esteem, and worries about academic achievement.[1,21,47] Future research should focus on factors associated with school burnout among students with and without disabilities.

5. Conclusions

We observed that students with sensory, mobility, and/or cognitive disabilities, and particularly those with several disabilities, were more vulnerable to school burnout than their peers without disabilities. Thus, students with disabilities—particularly those with several disabilities—require targeted support, such as emotional support from teachers and sensitivity.[48] To prevent burnout, schools need additional resources to help teachers provide comprehensive support and encouragement for disabled students, both academically and emotionally. Our research highlights the resilience of vocational education students with and without disabilities as the prevalence of burnout in this group was often about half that in the other school levels for both genders. Thus, it is important to provide support for burnout to lower and upper secondary students, especially the most vulnerable disabled students. Practical teaching methods and reduced academic pressure may help prevent burnout at these levels.[20]

Our results highlighted that students with and without disabilities were often prone to increased burnout from 2019 to 2021, except for disabled boys in lower secondary school. Hence, to address their needs during crises, decision-makers and educators should create distance learning options and ensure adequate support—particularly for disabled girls experiencing burnout most often. Future studies could also explore whether distance learning has potential benefits for disabled boys in lower secondary school.

We found that post-pandemic school burnout among lower secondary students with and without disabilities often persists, while it has decreased in upper secondary and vocational schools. Therefore, it is important for educators to support lower secondary students, both with and without disabilities, to prevent school burnout from becoming a persistent phenomenon. Without prevention efforts, these students are at risk of dropping out of school[1]—especially disabled students who often suffer school burnout.

CRediT authorship contribution statement

Marja Eliisa Holm: Writing – review & editing, Writing – original draft, Visualization, Validation, Methodology, Funding acquisition, Formal analysis, Conceptualization. **Päivi Sainio:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization. **Sinna Maija Henriikka Lehtola:** Writing – review & editing, Conceptualization. **Mika Gissler:** Writing – review & editing, Funding acquisition. **Minna-Liisa Luoma:** Writing – review & editing, Funding acquisition. **Katariina Salmela-Aro:** Writing – review & editing, Methodology, Funding acquisition. **Olli Kiviruusu:** Writing – review & editing, Methodology, Funding acquisition, Conceptualization.

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Conflicts of interest

Authors have no conflicts of interest to declare.

Appendix A

Changes in the prevalence of school burnout among students with specific disabilities in the three school levels, with 95 % confidence interval, in 2019, 2021, and 2023 stratified by gender.

Lower secondary	2019	2021	2023	2019 vs. 2021	2021 vs. 2023
	% [95 % CI]	% [95 % CI]	% [95 % CI]	OR [95 % CI]	OR [95 % CI]
Girls					
Only cognitive	43.8[42.7, 44.9]	50.7[49.7, 51.6]	49.1[48.2, 50.0]	1.32[1.25, 1.41]***	ns.
Only sensory	20.5[18.4, 22.7]	25.8[23.2, 28.2]	27.9[24.8, 31.1]	1.35[1.12, 1.63]**	ns.
Only mobility	24.9[16.6, 33.1]	33.5[25.4, 41.5]	31.9[23.0, 40.9]	ns.	ns.
Several[a]	54.7[52.0, 57.4]	59.6[57.4, 61.8]	56.6[54.4, 58.8]	1.22[1.06, 1.41]**	ns.
Boys					
Only cognitive	28.5[27.1, 29.9]	30.3[28.9, 31.6]	31.8[30.5, 33.1]	ns.	ns.
Only sensory	10.5[8.9, 12.2]	10.3[8.6, 11.9]	14.6[12.0, 17.9]	ns.	1.47[1.09, 1.97]**
Only mobility	23.5[16.5, 30.6]	27.8[19.7, 36.2]	24.8[15.3, 34.3]	ns.	ns.
Several[a]	38.7[35.3, 42.]	36.2[33.2, 49.1]	32.4[29.3, 35.5]	ns.	ns.
General upper	**2019**	**2021**	**2023**	**2019 vs. 2021**	**2021 vs. 2023**
	% [95 % CI]	**% [95 % CI]**	**% [95 % CI]**	**OR [95 % CI]**	**OR [95 % CI]**
Girls					
Only cognitive	43.3[41.8, 44.7]	50.7[49.5, 51.9]	44.3[43.1, 45.5]	1.35[1.25, 1.45]***	.77[.72, .83]***
Only sensory	24.6[21.5, 27.7]	25.6[22.4, 28.7]	21.4[18.0, 24.7]	ns.	ns.
Only mobility	24.4[17.0, 31.8]	41.8[29.8, 53.8]	17.3[6.9, 27.7]	2.22[1.00, 5.20]*	.27[11, 69]**
Several[a]	52.9[49.1, 56.8]	60.5[57.2, 63.7]	55.7[52.4, 59.0]	1.26[1.11, 1.67]**	.82[.68, .99]*
Boys					
Only cognitive	29.3[27.1, 31.4]	34.1[32.1, 31.4]	30.4[28.4, 32.4]	1.25[1.09, 1.43]**	.88[.77, 1.00]*
Only sensory	11.3[7.9, 14.6]	12.9[9.6, 16.3]	11.8[8.2, 15.5]	ns.	ns.
Only mobility	16.7[3.1, 30.2]	16.8[.0, 33.6]	5.5[.0, 15.5]	ns.	ns.
Several[a]	38.4[31.9, 44.8]	41.9[35.3, 48.4]	37.0[30.7, 43.2]	ns.	ns.
Vocational	**2019**	**2021**	**2023**	**2019 vs. 2021**	**2021 vs. 2023**
	% [95 % CI]	**% [95 % CI]**	**% [95 % CI]**	**OR [95 % CI]**	**OR [95 % CI]**
Girls					
Only cognitive	21.7[19.9, 23.4]	31.7[29.9, 33.4]	24.2[22.6, 25.8]	1.68[1.50, 1.92]***	.69[.61, .77]***
Only sensory	10.5[6.9, 14.2]	16.1[11.2, 21.0]	15.6[9.9, 21.3]	ns.	ns.
Only mobility	6.9[2.3, 16.1]	9.1[.0, 21.1]	16.7[.0, 33.9]	ns.	ns.
Several[a]	27.0[22.3, 31.7]	40.9[36.5, 45.3]	32.5[28.2, 36.8]	1.87[1.39, 2.55]***	.69[.53, .91]***
Boys					
Only cognitive	14.9[13.0, 16.7]	18.5[16.9, 20.7]	15.3[13.4, 17.2]	1.28[1.05, 1.56]*	.80[.66, .98]*
Only sensory	5.8[3.3, 8.2]	7.0[4.3, 9.8]	6.7[2.9, 10.6]	ns.	ns.
Only mobility	18.8[7.7, 29.8]	7.7[.0, 16.1]	6.9[2.3, 16.1]	ns.	ns.
Several[a]	21.4[16.3, 26.5]	23.4[18.3, 28.5]	18.1[13.4, 22.]	ns.	ns.

Note. Adjusted for sociodemographic covariates (age, parents' migrant status, and family's economic situation); CI = confidence interval; OR = odds ratio; ns. = not significant.

[a] Disabilities in at least two out of the three domains: cognitive, sensory, or mobility.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

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