Supplemental material

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Appendix

Student school affiliation

The available data did not include individual information on student school affiliation. However, the organizational number of all primary and lower secondary schools were available for the vast majority of students who turned in the mandatory national tests in the academic year of 2019/2020. In addition, all students could be linked to their geographically defined neighborhood of residence (>12 000 neighborhoods in Norway), and students were then linked to schools based on their place of residence and birth year. Private schools are very uncommon in Norway, and students are attributed schools according to the school catchment areas, which are based on these geographically defined neighborhoods. It is also very uncommon in Norway to start school before or after the calendar year the child turns 6 years of age. Failing class is extremely rare and almost solely due to serious health conditions. Our approach is thus considered to yield reliable student-school matches (1).

Tables

Table A-1. List of occupations included in the study population

Occupation	Code*
Teachers	2341, 2342
Child-care workers	5311
Teaching assistants	5312

Notes:

Occupation was identified using the Employer- and Employee-register, as described in Magnusson et al. (2).

*According to the International Standards for Classification of Occupation (ISCO-08/STYRK-08)

Table A-2. Distribution of index-cases across infection cluster size (n (%)).

	1 case (n=2230)	2 cases (n=631)	3-5 cases (n=669)	6-10 cases (n=275)	11-20 cases (n=165)	>20 cases (n=108)	Total (n=4078)
School relation							
Students	1708 (53.0)	511 (15.9)	565 (17.5)	218 (6.8)	135 (4.2)	83 (2.6)	3220 (100.0)
Staff members	522 (60.8)	120 (14.0)	104 (12.1)	57 (6.6)	30 (3.5)	25 (2.9)	858 (100.0)
School level							
Primary school	1310 (56.0)	367 (15.7)	383 (16.4)	132 (5.6)	89 (3.8)	60 (2.6)	2341 (100.0)
Combined schoolsª	304 (54.7)	78 (14.0)	95 (17.1)	36 (6.5)	22 (4.0)	21 (3.8)	556 (100.0)
Lower secondary schools	616 (52.2)	186 (15.7)	191 (16.2)	107 (9.1)	54 (4.6)	27 (2.3)	1181 (100.0)
Sex							
Female	1208 (55.8)	323 (14.9)	341 (15.7)	149 (6.9)	85 (3.9)	60 (2.8)	2166 (100.0)
Male	1022 (53.5)	308 (16.1)	328 (17.2)	126 (6.6)	80 (4.2)	48 (2.5)	1912 (100.0)
School size							
< 100	152 (75.6)	29 (14.4)	16 (8.0)	4 (2.0)	0 (0.0)	0 (0.0)	201 (100.0)
100-299	715 (64.1)	164 (14.7)	171 (15.3)	44 (3.9)	16 (1.4)	5 (0.4)	1115 (100.0)
300+	1363 (49.3)	438 (15.9)	482 (17.5)	227 (8.2)	149 (5.4)	103 (3.7)	2762 (100.0)

ªSchools where primary and lower secondary school are combined

Table A-3: Attack rates (%) within 14 days after index test date (AR14) stratified by demographic characteristics of index case.

Characteristics of index case	Overall AR14	AR14 to students	AR14 to staff
All index cases	**0.33 (5,816/1,784,982)**	**0.33 (5,089/1,555,139)**	**0.31 (727/230,843)**
Primary school	0.32 (3,153/973,337)	0.32 (2,710/847,431)	0.35 (443/125,906)
Combined schools	0.28 (840/300,475)	0.28 (718/259,214)	0.30 (122/41,261)
Lower secondary schools	0.36 (1,823/511,711)	0.37 (1,661/447,953)	0.25 (162/63,758)
County			
Oslo	0.33 (1,340/408,765)	0.31 (1,110/352,516)	0.42 (230/55,249)
Rogaland	0.21 (271/129,137)	0.22 (245/113,692)	0.17 (26/15,445)
Møre og Romsdal*	0.11 (-)	0.12 (-)	0.038 (-)
Nordland	0.25 (56/22,110)	0.27 (51/18,757)	0.15 (5/3,353)
Viken	0.37 (2,396/647,188)	0.38 (2,131/567,430)	0.33 (265/79,758)
Innlandet	0.36 (296/81,840)	0.37 (260/69,963)	0.30 (36/11,877)
Vestfold og Telemark	0.35 (497/142,775)	0.36 (447/124,501)	0.27 (50/18,274)
Agder	0.29 (250/87,805)	0.29 (223/76,671)	0.24 (27/11,134)
Vestland	0.24 (438/172,783)	0.25 (380/150,024)	0.25 (58/22,759)
Trøndelag	0.24 (174/77,255)	0.23 (154/66,662)	0.19 (20/10,593)
Troms og Finnmark	0.23 (54/26,864)	0.20 (46/23,242)	0.22 (8/3,622)
Sex			
Women	0.32 (3,034/942,725)	0.32 (2,640/820,244)	0.32 (394/122,481)
Men	0.33 (2,782/842,257)	0.33 (2,449/733,895)	0.31 (333/108,362)
School size			
< 100	0.60 (92/15,256)	0.69 (78/11,228)	0.35 (14/4,028)
100-299	0.36 (1,023/281,337)	0.38 (899/239,469)	0.30 (124/41,868)
300+	0.32 (4,701/1,488,389)	0.32 (4,112/1,303,442)	0.32 (589/185,947)
Students	**0.32 (4,566/1,419,148)**	**0.33 (4,071/1,239,420)**	**0.28 (495/179,728)**
Primary school	0.31 (2,665/859,332)	0.31 (2,330/749,302)	0.30 (335/110,030)
Lower secondary school	0.34 (1,901/559,816)	0.36 (1,741/490,118)	0.23 (160/69,698)
School staff	**0.34 (1,250/365,834)**	**0.32 (1,018/314,719)**	**0.45 (232/51,115)**
Primary schools	0.37 (813/219,525)	0.35 (660/189,175)	0.50 (153/30,350)
Combined schools	0.26 (184/72,805)	0.23 (145/62,039)	0.36 (39/10,776)
Lower secondary schools	0.34 (253/73,504)	0.34 (213/63,505)	0.40 (40/9,999)
Teacher	0.37 (1,058/285,867)	0.35 (864/246,442)	0.49 (194/39,425)
Teaching assistants	0.25 (124/50,329)	0.24 (101/42,968)	0.31 (23/7,361)
Child-care workers	0.23 (68/29,638)	0.21 (53/25,309)	0.35 (15/4,329)

Notes:

AR14 was calculated using the number of subsequent cases (infected non-index students and staff members within 14 days of the index case) in the numerator and the total number of non-index students and staff members in the denominator, multiplied by 100. This equation is given in parentheses (numerator/denominator) [b]Schools where primary and lower secondary school are combined.

* Fewer than five secondary cases were censored due to privacy considerations.

Table A-4: Percentage of students and staff tested within 14 days of index case.

Characteristics of index case	% students and staff tested	% students tested	% staff tested
All index cases, all school levels	**10.8 (10.8-10.9)**	**10.2 (10.2-10.3)**	**15.0 (14.9-15.2)**
School size (all index cases)			
< 100	18.4 (17.8-19.0)	18.4 (17.7-19.1)	18.6 (17.4-19.8)
100-299	13.1 (13.0-13.2)	12.4 (12.2-12.5)	17.3 (16.9-17.6)
300+	10.3 (10.3-10.4)	9.8 (9.7-9.8)	14.4 (14.3-14.6)
Students	**11.0 (10.9-11.0)**	**10.5 (10.4-10.5)**	**14.7 (14.5-14.8)**
Primary school	9.9 (9.8-9.9)	9.3 (9.2-9.3)	14.1 (13.9-14.3)
Lower secondary school	12.7 (12.6-12.8)	12.3 (12.2-12.4)	5.6 (15.3-15.9)
School staff	**10.3 (10.2-10.4)**	**9.3 (9.2-9.4)**	**16.3 (15.9-16.6)**
Primary school	9.9 (9.8-10.1)	8.9 (8.8-9.0)	16.5 (16.1-17.0)
Combined schools[b]	9.2 (8.9-9.4)	8.2 (8.0-8.4)	14.7 (14.0-15.4)
Lower secondary school	12.3 (12.0-12.5)	11.5 (11.3-11.8)	17.1 (16.4-17.9)
Teacher	10.7 (10.6-10.8)	9.8 (9.6-9.9)	16.8 (16.4-17.2)
Teaching assistants	7.7 (10.6-10.8)	6.7 (6.4-6.9)	13.7 (12.9-14.5)
Child-care workers	10.0 (9.7-10.4)	9.0 (8.7-9.4)	15.7 (14.7-16.8)

Notes:

95 % confidence intervals in parentheses calculated using the Wilson method for binomial proportions, multiplied by 100 to obtain percentages. Test percentages were calculated as the number of non-index students and staff members who were tested for SARS-CoV-2 with a PCR test within 14 days of the confirmed COVID-19 index case, regardless of test result, divided by the total number of non-index students and staff members (analogously to the calculation of AR14), multiplied by 100. Students or staff who had more than one test within 14 days are counted once.

[b]Schools where primary and lower secondary school are combined.

Table A-5: Attack rates (%) within 14 days after index test date (AR14) with co-index case clusters included.

Characteristics of index case	Overall AR14	AR14 among students	AR14 among school staff
All index cases	0.38 (0.37-0.39)	0.32 (0.31-0.33)	0.31 (0.29-0.33)

Notes:

AR14 was calculated using the number of subsequent cases (infected non-index students and staff members) in the numerator and the total number of non-index students and staff members in the denominator. All co-index cases were excluded from both the numerator and the denominator. 95 % confidence intervals in parentheses calculated using the Wilson method for binomial proportions.

Table A-6: Attack rates (%) within 14 days after index test date (AR14) stratified by demographic characteristics of index case, random effects model.

Characteristics of index case	Overall AR14	AR14 to students	AR14 to staff
All index cases, all school levels	**0.34 (0.32-0.37)**	**0.35 (0.32-0.38)**	**0.30 (0.27-0.33)**
School size (all index cases)			
< 100	0.61 (0.39-0.83)	0.67 (0.44-0.90)	0.35 (0.16-0.53)
100-299	0.35 (0.29-0.40)	0.36 (0.30-0.42)	0.27 (0.21-0.33)
300+	0.32 (0.29-0.35)	0.32 (0.30-0.35)	0.31 (0.27-0.34)
Students	**0.31 (0.27-0.34)**	**0.35 (0.32-0.38)**	**0.26 (0.23-0.29)**
Primary school age	0.33 (0.30-0.37)	0.34 (0.31-0.38)	0.28 (0.25-0.33)
Lower secondary school age	0.34 (0.30-0.38)	0.36 (0.31-0.41)	0.22 (0.18-0.26)
School staff	**0.36 (0.30-0.43)**	**0.35 (0.29-0.41)**	**0.44 (0.35-0.53)**
Primary school	0.41 (0.23-0.49)	0.39 (0.31-0.48)	0.50 (0.38-0.62)
Combined schools[b]	0.25 (0.11-0.39)	0.24 (0.09-0.38)	0.32 (0.10-0.53)
Lower secondary school	0.33 (0.22-0.44)	0.32 (0.20-0.43)	0.38 (0.21-0.55)
Teacher	0.40 (0.33-0.48)	0.39 (0.31-0.46)	0.50 (0.39-0.61)
Teaching assistants	0.21 (0.14-0.28)	0.20 (0.13-0.27)	0.29 (0.16-0.43)
Child-care workers	0.25 (0.14-0.36)	0.24 (0.12-0.36)	0.32 (0.10-0.54)

Notes:

AR14 was estimated using a linear regression model with random intercept for each school and presented as the mean intercept. Estimates were multiplied by 100 to obtain percentages. Associated 95 % confidence intervals in parentheses.
[b]Schools where primary and lower secondary school are combined.

Figures

Figure A-1. Percentage of total student (left) and school staff (right) population by county with confirmed COVID-19 throughout the academic year of 2020/2021.
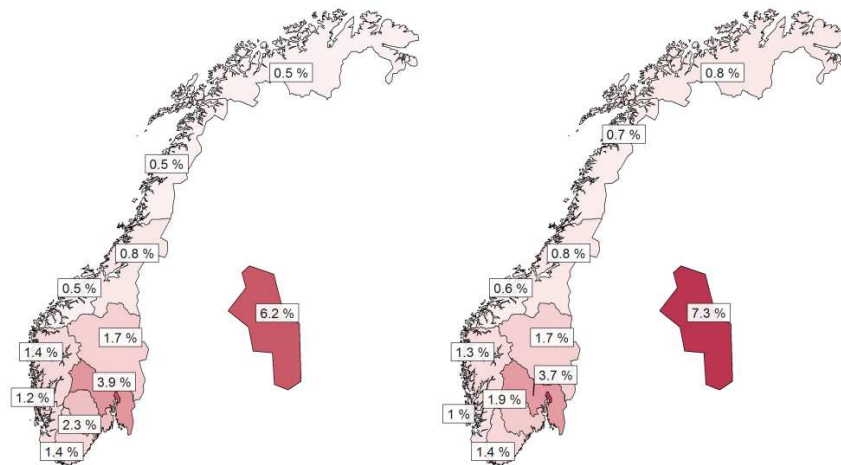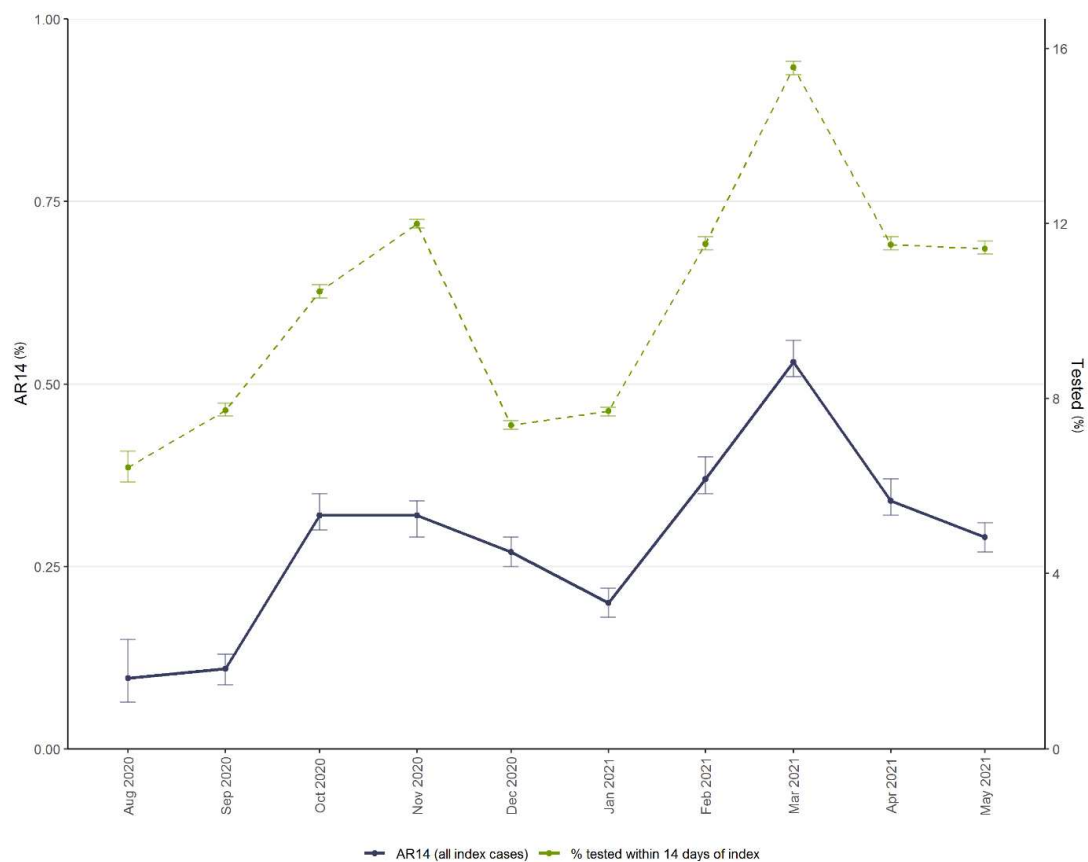
Figure A-2. Attack rates (AR14) and percentage of non-index students and staff tested for COVID-19 (secondary axis) within 14 days of index case positive.

Notes:

AR14 was calculated using the daily cumulative number of subsequent cases (infected non-index students and staff members) in the numerator and the total number of non-index students and staff members in the denominator. Test percentages were calculated by dividing the daily cumulative sum of tested students and staff by the total number of non-index students and staff. 95 % confidence intervals calculated using the Wilson method for binomial proportions.

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