**SARS-CoV-2 infection, antibody positivity and seroconversion rates in staff and students following full reopening of secondary schools in England: prospective cohort study, September-December 2020**

Ladhani et al.

Supplementary material

**Supplementary Figure S1:** Numbers of students and staffs participating in rounds 1 and 2.

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**Supplementary Table S2. Risk factors for participant drop out in students and staff between rounds 1 and 2 in secondary schools participating in sKIDsPlus**

*OR = odds ratio; CI = confidence interval*

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|   | **Students** |  |  |  |  |  |   | **Staff** |  |  |  |  |  |
|   | Number  | Percent | OR (95% CI) | p-value | adjusted OR (95% CI) | p-value |   | Number  | Percent | OR (95% CI) | p-value | adjusted OR (95% CI) | p-value |
| **Sex** |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Male | 101/373 | 27.1 | 1.19 (0.89-1.61) | 0.25 | 0.95 (0.67-1.34) | 0.77 |   | 39/272 | 14.3 | 0.97 (0.65-1.46) | 0.89 | 0.87 (0.56-1.34) | 0.53 |
| Female | 135/569 | 23.7 | 1 (ref) | 1 (ref) |   | 89/605 | 14.7 | 1 (ref) | 1 (ref) |
| Non-binary | 2/4 | 50.0 |   |   |   |   |   |   |   |   |   |   |   |
| Missing | 1/2 | 50.0 |   |   |   |   |   |   |   |   |   |   |   |
| **Age cat** |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 11-12 | 85/325 | 26.2 | 1 (ref) | 0.43 | 1 (ref) | 0.052 |   |   |   |   |   |   |   |
| 13-14 | 102/381 | 26.8 | 1.03 (0.74-1.44) | 0.87 (0.59-1.26) |   |   |   |   |   |
| 15-16 | 31/135 | 23.0 | 0.84 (0.53-1.35) | 0.71 (0.42-1.19) |   |   |   |   |   |
| 17-18 | 21/107 | 19.6 | 0.69 (0.40-1.18) | 0.42 (0.22-0.79) |   |   |   |   |   |   |   |
| 19-29 |   |   |   |   |   |   |   | 16/161 | 9.9 | 1 (ref) | 0.22 | 1 (ref) | 0.12 |
| 30-39 |   |   |   |   |   |   |   | 44/243 | 18.1 | 2.00 (1.09-3.69) | 2.31 (1.22-4.40) |
| 40-49 |   |   |   |   |   |   |   | 34/219 | 15.5 | 1.67 (0.88-3.14) | 1.88 (0.96-3.67) |
| 50-59 |   |   |   |   |   |   |   | 29/211 | 13.7 | 1.44 (0.76-2.76) | 1.56 (0.78-3.09) |
| 60+  |   |   |   |   |   |   |   | 5/43 | 11.6 | 1.19 (0.41-3.46) | 1.31 (0.43-3.94) |
| **Ethnicity** |   |   |   |   |   |   |   |   |   |   |   |   |   |
| White | 139/608 | 22.9 | 1 (ref) | 0.026 | 1 (ref) | 0.034 |   | 96/717 | 13.4 | 1 (ref) | 0.10 | 1 (ref) | 0.26 |
| Black | 10/43 | 23.3 | 1.02 (0.49-2.13) | 1.50 (0.69-3.30) |   | 10/34 | 29.4 | 2.70 (1.25-5.81) | 2.27 (0.99-5.18) |
| Asian | 60/170 | 35.3 | 1.84 (1.27-2.66) | 1.94 (1.27-2.94) |   | 15/86 | 17.4 | 1.37 (0.75-2.48) | 1.24 (0.65-2.36) |
| Mixed | 18/78 | 23.1 | 1.01 (0.58-1.77) | 1.35 (0.73-2.48) |   | 3/25 | 12.0 | 0.88 (0.26-3.00) | 0.49 (0.11-2.16) |
| Other | 10/38 | 26.3 | 1.21 (0.57-2.54) | 1.66 (0.76-3.64) |   | 3/13 | 23.1 | 1.94 (0.52-7.18) | 1.42 (0.37-5.53) |
| Missing | 2/11 | 18.2 |   |   |   |   |   | 1/2 | 50.0 |   |   |   |   |
| **School area** |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Derbyshire | 64/213 | 30.0 | 1 (ref) | 0.0011 | 1 (ref) | 0.0002 |   | 40/243 | 16.5 | 1 (ref) | <0.0001 | 1 (ref) | 0.0001 |
| East London | 62/224 | 27.7 | 0.89 (0.59-1.35) | 0.72 (0.46-1.14) |   | 49/199 | 24.6 | 1.66 (1.04-2.65) | 1.54 (0.94-2.55) |
| Greater Manchester | 29/87 | 33.3 | 1.16 (0.68-1.98) | 0.89 (0.49-1.61) |   | 5/58 | 8.6 | 0.48 (0.18-1.27) | 0.48 (0.18-1.29) |
| Hertfordshire | 29/102 | 28.4 | 0.92 (0.55-1.56) | 0.77 (0.42-1.39) |   | 10/65 | 15.4 | 0.92 (0.43-1.96) | 0.93 (0.43-1.99) |
| West London | 18/146 | 12.3 | 0.33 (0.18-0.58) | 0.24 (0.13-0.46) |   | 15/102 | 14.7 | 0.88 (0.46-1.67) | 0.88 (0.45-1.73) |
| Birmingham | 37/176 | 21.0 | 0.62 (0.39-0.99) | 0.41 (0.23-0.71) |   | 9/210 | 4.3 | 0.23 (0.11-0.48) | 0.24 (0.11-0.50) |
| **Round 1 antibody result** |   |   |   |   |   |   |   |   |   |   |   |   |   |
| Negative | 198/779 | 25.4 | 1 (ref) | 0.16 | 1 (ref) | 0.17 |   | 115/782 | 14.7 | 1 (ref) | 0.62 | 1 (ref) | 0.48 |
| Positive | 22/114 | 19.3 | 0.70 (0.43-1.15) | 0.70 (0.42-1.16) |   | 10/79 | 12.7 | 0.84 (0.42-1.68) | 0.77 (0.37-1.59) |
| Missing | 19/55 | 34.5 |   |   |   |   |   | 3/16 | 18.8 |   |   |   |   |
| **Total** | 239/948 | 25.2 |   |   |   |   |   | 128/877 | 14.6 |   |   |   |   |

**Supplementary Table S3. Risk factors for antibody seroconversion between rounds 1 and 2 in students participating in secondary school surveillance for SARS-CoV-2, England**

*OR = odds ratio; IQR = Interquartile Range; CI = confidence interval*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   | **Antibody positive** |  | **Univariable analysis** |  | **Multivariable analysis adjusted for clustering by school (p=1.00)** |
|   |  | **n=549** |  | **N=539** |
| **Factor** | **n/N (%)** |  | **OR (95% CI)** | **P value** |  | **OR (95% CI)** | **P value** |
| **Sex** |
| Female | 19/336 (5.7) |   | REF | 0.27 |   |   | 0.39 |
| Male | 17/211 (8.1) |   | 1.46 (0.74-2.88) |   | 1.45 (0.62-3.37) |
| Non-binary/Missing | 0/2 (0.0) |   |   |   |   |   |   |
| **Year Group** |
| Years 7-9 | 20/295 (6.8) |   | REF | 0.14 |   | REF | 0.83 |
| Years 10-11 | 12/127 (9.4) |   | 1.43 (0.68-3.03) |   | 0.98 (0.41-2.30) |
| 6th Form/College | 4 /127 (3.1) |   | 0.45 (0.15-1.34) |   | 0.69 (0.20-2.34) |
| **Ethnicity** |
| White | 22/374 (5.9) |   | REF | 0.73 |   | REF | 0.37 |
| Black | 2/21 (9.5) |   | 1.68 (0.37-7.70) |   | 2.96 (0.52-16.84) |
| Asian | 6/81 (7.4) |   | 1.28 (0.50-3.27) |   | 0.98 (0.33-2.90) |
| Mixed | 5/46 (10.9) |   | 1.95 (0.70-5.43) |   | 2.61 (0.83-8.14) |
| Other  | 1/19 (5.3) |   | 0.89 (0.11-6.97) |   | 2.10 (0.23-18.95) |
| Missing | 0/8 (0.0) |   |   |   |   |   |   |
| **School area** |
| Derbyshire | 11/130 (8.5) |   | 1.01 (0.39-2.60) | 0.081 |   | 0.87 (0.27-2.84) | 0.83 |
| East London | 6/118 (5.1) |   | 0.58 (0.19-1.74) |   | 2.05 (0.42-9.99) |
| Greater Manchester | 7/46 (15.2) |   | 1.95 (0.66-5.76) |   | 0.95 (0.24-3.77) |
| Hertfordshire | 3/61 (4.9) |   | 0.56 (0.14-2.21) |   | 1.42 (0.22-9.28) |
| West London | 1/99 (1.0) |   | 0.11 (0.01-0.91) |   | 0.59 (0.04-7.86) |
| Birmingham | 8/95 (8.4) |   | REF |   | REF |
| **Additional household members** |   |   |   |   |   |   |   |
| per additional member |   |   | 1.08 (0.83-1.41) | 0.55 |   |   |   |
| median size (IQR)  | 3 (3-4) |   |   |   |   |   |   |
| **Additional children in household** |   |   |   |   |   |   |   |
| per additional child |   |   | 1.16 (0.77-1.76) | 0.47 |   |   |   |
| median size (IQR)  | 1 (0-2) |   |   |   |   |   |   |
| **Parental occupation** |  |  |  |  |  |  |  |
| Neither healthcare or key worker | 27/357 (7.6) |   | REF |   |   |   |   |
| Key worker | 7/148 (4.7) |   | 0.61 (0.26-1.43) | 0.44 |   |   |   |
| Healthcare worker | 2/44 (4.5) |   | 0.58 (0.13-2.54) |   |   |   |   |
| **School Capacity** |   |   |   |   |  |  |  |
| Per 10 student increase  |   |   | 1.02 (1.01-1.03) | 0.003 |   | 1.00 (0.99-1.02) | 0.69 |
| Median size (IQR) \* | 1215 (793-1380) |   |   |   |   |   |   |
| **Ave year size** |  |  |  |  |  |  |  |
| per 1 increase in students per year |  |  | 1.00 (1.00-1.00) | 0.79 |  |  |  |
| median (IQR) \* | 192 (160-275) |   |   |   |   |   |   |
| **% FSM** |  |  |  |  |   |   |   |
| per % increase in FSM |   |   | 1.05 (1.01-1.08) | 0.005 |  | 1.00 (0.93-1.06) | 0.91 |
| median (IQR) \* | 17.5 (9.2-20.6) |   |   |   |   |   |   |
| **Number of positive cases in school** |  |  |  |  |   |   |   |
| per 1 additional case |  |  | 1.03 (1.02-1.05) | <0.001 |   | 1.04 (1.01-1.07) | 0.004 |
| median (IQR) \* | 35 (15-56) |   |   |   |   |   |   |
| \* based on included students and not school |

**Supplementary Table S4. Risk factors for antibody seroconversion between rounds 1 and 2 in staff participating in secondary school surveillance for SARS-CoV-2, England**

*OR = odds ratio; IQR = Interquartile Range; CI = confidence interval*

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|   | **Antibody positive** |  | **Univariable analysis** |  | **Multivariable analysis adjusted for clustering by school (p=1.00)** |
|   |  | **n=652** |  | **N=607** |
| **Factor** | **n/N (%)** |  | **OR (95% CI)** | **P value** |  | **OR (95% CI)** | **P value** |
| **Sex** |
| Female | 41/452 (9.1) |   | REF | 0.66 |   | REF | 0.86 |
| Male | 16/200 (8.0) |   | 0.87 (0.48-1.59) |   | 1.06 (0.55-2.05) |
| **Year Group** |
| 19-29 | 15/127 (11.8) |   | 2.22 (0.96-5.13) | 0.15 |   | 4.13 (1.52-11.21) | 0.066 |
| 30-39 | 10/176 (5.7) |   | REF |   | REF |
| 40-49 | 19/162 (11.7) |   | 2.01 (0.99-4.90) |   | 1.50 (0.61-3.67) |
| 50-59 | 9/151 (6.0) |   | 1.05 (0.42-2.66) |   | 1.51 (0.54-4.20) |
| 60+ | 4/36 (11.1) |   | 2.08 (0.61-7.03) |   |   | 2.66 (0.68-10.44) |   |
| **Ethnicity** |
| White | 48/547 (8.8) |   | REF | 0.90 |   | REF | 0.94 |
| Black | 2/16 (12.5) |   | 1.49 (0.33-6.73) |   | 0.83 (0.09-8.04) |
| Asian | 6/61 (9.8) |   | 1.13 (0.46-2.77) |   | 1.36 (0.45-4.06) |
| Mixed | 1/18 (5.6) |   | 0.61 (0.08-4.70) |   | 0.78 (0.09-6.82) |
| Other  | 0/10 (0.0) |   | omitted |   | omitted |
| **School area** |
| Derbyshire | 24/183 (13.1) |   | 1.18 (0.62-2.25) | 0.0067 |   | 1.26 (0.57-2.78) | 0.86 |
| East London | 4/133 (3.0) |   | 0.24 (0.08-0.73) |   | 0.77 (0.21-2.82) |
| Greater Manchester | 7/47 (14.9) |   | 1.37 (0.54-3.49) |   | 1.03 (0.37-2.89) |
| Hertfordshire | 1/51 (2.0) |   | 0.16 (0.02-1.20) |   | 0.40 (0.04-4.01) |
| West London | 2/70 (2.9) |   | 0.23 (0.05-1.02) |   | 0.44 (0.05-4.05) |
| Birmingham | 19/168 (11.3) |   | REF |   | REF |
| **Additional household members** |   |   |   |   |   |   |   |
| per additional member |   |   | 1.04 (0.85-1.27) | 0.70 |   |   |   |
| median size (IQR)  | 2 (1-3) |   |   |   |   |   |   |
| **Additional children in household** |   |   |   |   |   |   |   |
| per additional child |   |   | 1.29 (1.00-1.67) | 0.048 |   | 1.47 (1.03-2.09) | 0.032 |
| median size (IQR)  | 0 (0-1) |   |   |   |   |   |   |
| **Parental occupation** |  |  |  |  |  |  |  |
| Neither healthcare or key worker | 34/438 (7.8) |   | REF | 0.40 |   |   |   |
| Key worker | 20/192 (10.4) |   | 1.38 (0.77-2.47) |   |   |
| Healthcare worker | 3/22 (13.6) |   | 1.88 (0.53-6.66) |   |   |
| **School Capacity** |
| Per 10 student increase  |   |   | 1.01 (1.00-1.02) | 0.009 |   | 0.99 (0.98-1.00) | 0.17 |
| Median size (IQR) \* | 1300 (1075-1500) |   |   |   |   |   |   |
| **Average students year** |  |  |  |  |  |  |  |
| per 1 increase in students per year |  |  | 1.00 (1.00-1.00) | 0.95 |  |  |  |
| median (IQR) \* | 197 (177-300) |   |   |   |   |   |   |
| **% FSM** |
| per % increase in FSM |   |   | 1.03 (1.00-1.06)  | 0.045 |   | 0.99 (0.93-1.04) | 0.58 |
| median (IQR) \* | 19.7 (14.3-29.4) |   |   |   |   |   |   |
| **Students in contact with a week** |  |  |  |  |  |  |  |
| 0-19  | 1/25 (4.0) |   | 0.43 (0.05-3.50) | 0.62 |   |   |   |
| 20-99 | 3/57 (5.3) |  | 0.58 (0.16-2.13) |  |  |  |
| 100-199 | 12/137 (8.8) |   | REF |   |   |   |
| 200+ | 20/205 (9.8) |   | 1.13 (0.53-2.39) |   |   |   |
| Missing | 21/228 (9.2) |   |   |   |   |   |   |
| **Number of positive cases in school** |  |  |  |  |  |  |  |
| per 1 additional case |   |   | 1.03 (1.02-1.04) | <0.001 |   | 1.04 (1.02-1.06) | <0.001 |
| median (IQR) \* | 35 (20-66) |   |   |   |   |   |   |
| \* based on included staff and not school |   |   |   |   |   |   |