SUPPLEMENTAL DIGITAL CONTENT

Auranen et al. "Social distancing and SARS-CoV-2 transmission potential early in the epidemic in Finland"

eAppendix 1. Weights in the likelihood function.

Consider a given 10-year age class k with n_k respondents. Divide the class into H subclasses so that $\sum_{h=1}^{H} n_{hk} = n_k$. Define individual-specific weights by membership in subclass h as follows: If individual belongs to age subclass h, the weight is $w_i = \pi_{hk}/p_{hk}$ where π_{hk} is the population proportion of individuals of age class k belonging to subclass h, and p_{hk} is the corresponding proportion in the survey sample. The weights are normalised in the sense that

$$\sum_{k=1}^{n_k} w_i = \sum_{h=1}^{H} n_{hk} \frac{\pi_{hk}}{p_{hk}} = \sum_{h=1}^{H} n_{hk} \frac{\pi_{hk}}{n_{hk}/n_k} = n_k.$$

In practice, weights were used in age class 10–19 years to balance the age distribution and in each of the four age classes (20–29, 30–39, 40–49, and 50–59 years) to balance the proportions of those with and without children. In age class 10, 19, the the inverse probability weights were (1.65, 0.98, 0.56) in three subclasses (10–13, 14–17 and 18–19 years). In the four adult age classes, the inverse probability weights were (4.442,0.894), (1.655,0.697), (1.372,0.685), and (1.584,0.844), where the first entry is the weight for respondents in households with children and the second for those without.

eAppendix 2. Frequency of contacts by place in 2020 vs 2005.

Based on the raw data, 51% of all contacts in April 2020 took place at home while the proportion was 25% in the Polymod data. For school/work the corresponding proportions were 17% (April 2020) and 35% (Polymod), and for leisure 10% and 23%. Regarding physical contacts, the proportions in the April 2020 and Polymod data were 85% vs. 45% (home), 6% vs. 23% (school/work) and 3% vs. 21% (leisure). The proportions of at-home contacts that were physical were smaller in 10–29y (45% vs. 68%) when comparing to the Polymod data. In the other age classes, the proportions did not differ as much (79% vs. 67% in 30–49y; 48% vs. 55% in 50–69y).

eTable 1. Posterior expectations of the mean numbers of contacts (m_{jk}) based on 3171 reported person-to-person contacts by 1320 survey respondents, Finland, April 2020. The estimates are based on a negative binomial model. The 95% credible intervals are given in the parentheses. The posterior expectations are also presented in Figure 2 (panel A) of the main text.

Contactee age class (years)	Participant age class (years)							
	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70+
0–9	1.30 (0.89, 1.84)	0.28 (0.20, 0.39)	0.19 (0.12, 0.29)	0.85 (0.74, 1.01)	0.43 (0.33, 0.55)	0.12 (0.08, 0.18)	0.11 (0.07, 0.16)	0.06 (0.03, 0.09)
10–19	0.31 (0.21, 0.42)	1.39 (1.19, 1.61)	0.19 (0.13, 0.26)	0.14 (0.10, 0.19)	0.80 (0.69, 0.91)	0.37 (0.30, 0.45)	0.04 (0.03, 0.07)	0.03 (0.02, 0.05)
20–29	0.23 (0.14, 0.34)	0.21 (0.14, 0.29)	0.83 (0.66, 1.01)	0.25 (0.18, 0.32)	0.26 (0.19, 0.34)	0.39 (0.32, 0.47)	0.17 (0.13, 0.22)	0.05 (0.03, 0.07)
30–39	1.07 (0.89, 1.27)	0.16 (0.12, 0.22)	0.26 (0.20, 0.34)	0.89 (0.73, 1.07)	0.36 (0.29, 0.44)	0.30 (0.24, 0.38)	0.24 (0.19, 0.30)	0.10 (0.07, 0.13)
40–49	0.51 (0.39, 0.65)	0.87 (0.75, 1.00)	0.25 (0.19, 0.34)	0.33 (0.27, 0.41)	0.72 (0.59, 0.87)	0.44 (0.36, 0.53)	0.22 (0.17, 0.27)	0.13 (0.10, 0.18)
50–59	0.16 (0.10, 0.23)	0.44 (0.36, 0.53)	0.42 (0.34, 0.51)	0.31 (0.24, 0.38)	0.49 (0.40, 0.58)	0.79 (0.65, 0.94)	0.25 (0.20, 0.31)	0.13 (0.10, 0.17)
60–69	0.14 (0.09, 0.20)	0.05 (0.03, 0.08)	0.18 (0.14, 0.24)	0.24 (0.19, 0.30)	0.24 (0.19, 0.30)	0.25 (0.20, 0.30)	0.59 (0.50, 0.70)	0.23 (0.19, 0.28)
70+	0.09 (0.05, 0.14)	0.04 (0.02, 0.07)	0.06 (0.04, 0.09)	0.12 (0.08, 0.16)	0.17 (0.13, 0.23)	0.16 (0.12, 0.20)	0.28 (0.23, 0.34)	0.55 (0.45, 0.65)

eTable 2. Posterior expectations of the overdispersion parameters (θ_{jk}) in the negative binomial model of the numbers of contacts, based on 3171 reported person-to-person contacts by 1320 survey respondents, April 2020, Finland. The 95% credible intervals are given in the parentheses.

Contactee age class (years)	Participant age class (years)							
	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70+
0–9	0.68 (0.13, 1.53)	1.79 (0.61, 3.52)	5.66 (2.50, 10.11)	0.67 (0.22, 1.28)	1.72 (0.70, 3.14)	4.93 (2.05, 8.96)	3.34 (0.73, 7.28)	2.81 (0.41, 6.64)
10–19	1.87 (0.09, 5.48)	0.18 (0.02, 0.43)	4.59 (2.21, 7.96)	2.55 (0.50, 5.70)	0.85 (0.31, 1.56)	1.21 (0.37, 2.38)	1.16 (0.03, 3.91)	0.97 (0.03, 3.51)
20–29	0.88 (0.03, 2.95)	1.92 (0.15, 5.01)	0.35 (0.05, 0.79)	0.96 (0.07, 2.58)	3.96 (1.96-6.77)	1.21 (0.34, 2.39)	1.60 (0.24, 3.77)	1.36 (0.05, 4.25)
30–39	0.12 (0.00, 0.44)	0.83 (0.03, 2.66)	2.56 (0.86, 5.04)	0.36 (0.08, 0.74)	1.19 (0.39, 2.32)	2.79 (1.47, 4.58)	1.01 (0.15, 2.32)	0.70 (0.02-2.39)
40–49	0.74 (0.05, 2.09)	0.07 (0.00, 0.25)	1.88 (0.43, 4.08)	0.90 (0.08, 2.32)	0.24 (0.01, 0.63)	0.93 (0.36, 1.69)	1.01 (0.14, 2.34)	0.62 (0.02, 2.11)
50–59	1.21 (0.04, 4.12)	0.74 (0.08, 1.77)	1.05 (0.20, 2.30)	0.91 (0.05, 2.48)	2.01 (0.87, 3.60)	0.54 (0.22, 0.94)	1.02 (0.18, 2.26)	1.27 (0.09, 3.36)
60–69	1.48 (0.08, 4.34)	1.13 (0.03, 3.88)	2.13 (0.42, 4.82)	1.69 (0.30, 3.82)	0.92 (0.04, 2.70)	0.92 (0.07, 2.37)	0.08 (0.00, 0.28)	0.99 (0.15, 2.27)
70+	1.06 (0.03, 3.88)	1.67 (0.05, 5.17)	1.22 (0.03, 4.47)	1.20 (0.05-3.90)	5.10 (2.42, 8.90)	0.63 (0.02, 2.13)	0.39 (0.01, 1.22)	0.14 (0.00, 0.44)

eTable 3. Posterior expectations of the mean numbers of physical contacts (m_{jk}) based on 1154 reported physical contacts by 1320 survey respondents, April 2020, Finland. The estimates are based on a negative binomial model. The 95% credible intervals of the parameters are given in the parentheses. The posterior expectations are also presented in Figure 2 (panel B) of the main text.

Contactee age class (years)	Participant age class (years)							
	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70+
0–9	0.94 (0.62, 1.35)	0.15 (0.10, 0.22)	0.12 (0.07, 0.19)	0.75 (0.62, 0.88)	0.37 (0.28, 0.48)	0.06 (0.03, 0.10)	0.07 (0.04, 0.12)	0.03 (0.01, 0.06)
10–19	0.17 (0.11, 0.24)	0.49 (0.36, 0.63)	0.06 (0.04, 0.10)	0.08 (0.05, 0.12)	0.48 (0.40, 0.57)	0.11 (0.07, 0.14)	0.01 (0.00, 0.02)	0.00 (0.00, 0.02)
20–29	0.15 (0.09, 0.23)	0.07 (0.04, 0.11)	0.33 (0.24, 0.44)	0.09 (0.06, 0.12)	0.03 (0.01, 0.05)	0.07 (0.05, 0.11)	0.01 (0.00, 0.02)	0.01 (0.00, 0.02)
30–39	0.94 (0.79, 1.11)	0.09 (0.06, 0.14)	0.09 (0.06, 0.13)	0.45 (0.35, 0.57)	0.12 (0.08, 0.16)	0.03 (0.01, 0.05)	0.02 (0.01, 0.04)	0.01 (0.00, 0.02)
40–49	0.44 (0.33, 0.56)	0.53 (0.44, 0.63)	0.03 (0.01, 0.05)	0.11 (0.08, 0.15)	0.37 (0.28, 0.46)	0.11 (0.08, 0.15)	0.03 (0.01, 0.05)	0.03 (0.02, 0.05)
50–59	0.08 (0.04, 0.12)	0.14 (0.09, 0.17)	0.08 (0.05, 0.11)	0.03 (0.01, 0.05)	0.12 (0.09, 0.17)	0.23 (0.17, 0.31)	0.07 (0.05, 0.10)	0.01 (0.01, 0.03)
60–69	0.09 (0.05, 0.15)	0.01 (0.00, 0.02)	0.01 (0.00, 0.02)	0.02 (0.01, 0.04)	0.03 (0.02, 0.05)	0.07 (0.05, 0.10)	0.25 (0.19, 0.32)	0.05 (0.03, 0.07)
70+	0.05 (0.02, 0.10)	0.01 (0.00, 0.02)	0.01 (0.00, 0.02)	0.01 (0.00, 0.02)	0.04 (0.02, 0.07)	0.02 (0.01, 0.03)	0.06 (0.04, 0.08)	0.22 (0.16, 0.29)

eTable 4. Posterior expectations of the overdispersion parameters (θ_{jk}) in the negative binomial model of the numbers of physical contacts, based on 1154 physical contacts by 1320 survey respondents, April 2020, Finland. The 95% credible intervals of the parameters are given in the parentheses.

Contactee age class (years)	Participant age class (years)							
	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70+
0–9	0.64 (0.06, 1.62)	1.19 (0.08-3.34)	3.89 (0.97, 8.33)	0.34 (0.02, 0.87)	1.35 (0.38-2.71)	1.42 (0.05, 4.43)	3.79 (0.78, 8.36)	2.21 (0.15, 6.13)
10–19	1.62 (0.05, 5.18)	0.89 (0.22-1.86)	1.48 (0.08, 4.41)	3.64 (0.82, 8.03)	0.76 (0.10-1.70)	1.33 (0.07, 3.84)	0.98 (0.02, 3.63)	1.04 (0.03, 3.74)
20–29	1.22 (0.03, 3.96)	1.17 (0.04, 4.16)	0.15 (0.00, 0.57)	0.76 (0.02, 2.79)	1.84 (0.08, 5.60)	1.40 (0.06, 4.41)	1.00 (0.02, 3.72)	0.99 (0.02, 3.67)
30–39	0.10 (0.00, 0.39)	1.58 (0.08, 4.60)	1.28 (0.06, 3.85)	0.07 (0.00, 0.24)	0.60 (0.02-2.17)	1.80 (0.09, 5.34)	0.98 (0.02, 3.72)	0.97 (0.02, 3.67)
40–49	0.45 (0.02, 1.59)	0.31 (0.01, 0.91)	1.31 (0.04, 4.41)	0.54 (0.01, 1.99)	0.09 (0.00, 0.33)	0.49 (0.01, 1.78)	0.86 (0.02, 3.24)	1.61 (0.04, 5.25)
50–59	0.92 (0.03, 3.39)	0.99 (0.04, 3.14)	0.90 (0.03, 3.11)	1.04 (0.03, 3.81)	0.94 (0.02, 3.12)	0.50 (0.02, 1.51)	0.62 (0.01, 2.33)	1.00 (0.03, 3.83)
60–69	1.48 (0.07, 4.48)	0.98 (0.02, 3.61)	1.01 (0.03, 3.64)	1.27 (0.03, 4.31)	1.04 (0.03, 3.77)	0.71 (0.01, 2.63)	0.13 (0.00, 0.48)	1.17 (0.05, 3.90)
70+	1.01 (0.03, 3.74)	0.99 (0.02, 3.64)	1.00 (0.02, 3.71)	1.03 (0.03, 3.75)	9.44 (4.67, 15.88)	1.36 (0.05, 4.51)	1.16 (0.04, 3.95)	0.17 (0.01, 0.65)

eTable 5. Posterior expectations of the relative reductions in between-age-class numbers of contacts (all contacts). The 95% credible intervals are given in the parentheses. The matrix is symmetrical by definition. The posterior expectations are also presented in Figure 4 (panel A) of the main text.

Contactee age class (years)	Participant age class (years)							
	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70+
0–9	0.69 (0.55, 0.80)	0.72 (0.60, 0.81)	0.70 (0.45, 0.82)	0.40 (0.27, 0.51)	0.51 (0.35, 0.64)	0.74 (0.60, 0.84)	0.76 (0.64, 0.85)	0.66 (0.39, 0.84)
10–19	0.72 (0.60, 0.81)	0.80 (0.75, 0.84)	0.78 (0.69, 0.84)	0.85 (0.79, 0.90)	0.44 (0.34, 0.53)	0.30 (0.10, 0.46)	0.82 (0.64, 0.88)	0.83 (0.69, 0.91)
20–29	0.70 (0.54, 0.82)	0.78 (0.69, 0.86)	0.78 (0.71, 0.93)	0.86 (0.81, 0.90)	0.79 (0.72, 0.85)	0.64 (0.54, 0.73)	0.65 (0.49, 0.77)	0.78 (0.60, 0.90)
30–39	0.40 (0.27, 0.51)	0.85 (0.79, 0.90)	0.86 (0.81, 0.90)	0.73 (0.66, 0.79)	0.82 (0.77, 0.86)	0.81 (0.76, 0.86)	0.74 (0.66, 0.81)	0.70 (0.52, 0.83)
40–49	0.51 (0.35, 0.64)	0.44 (0.34, 0.53)	0.79 (0.85, 0.72)	0.82 (0.77, 0.84)	0.72 (0.65, 0.79)	0.74 (0.67, 0.80)	0.66 (0.54, 0.75)	0.69 (0.53, 0.80)
50–59	0.74 (0.60, 0.84)	0.30 (0.10, 0.46)	0.64 (0.54, 0.73)	0.81 (0.76, 0.86)	0.74 (0.67, 0.80)	0.68 (0.59, 0.75)	0.75 (0.67, 0.81)	0.71 (0.57, 0.82)
60–69	0.76 (0.64, 0.85)	0.78 (0.64, 0.88)	0.65 (0.49, 0.77)	0.74 (0.66, 0.81)	0.66 (0.54, 0.75)	0.75 (0.67, 0.81)	0.70 (0.61, 0.77)	0.76 (0.67, 0.84)
70+	0.66 (0.39, 0.84)	0.93 (0.69, 0.92)	0.78 (0.60, 0.90)	0.70 (0.52, 0.83)	0.69 (0.53, 0.89)	0.71 (0.57, 0.82)	0.76 (0.67, 0.84)	0.79 (0.60, 0.92)

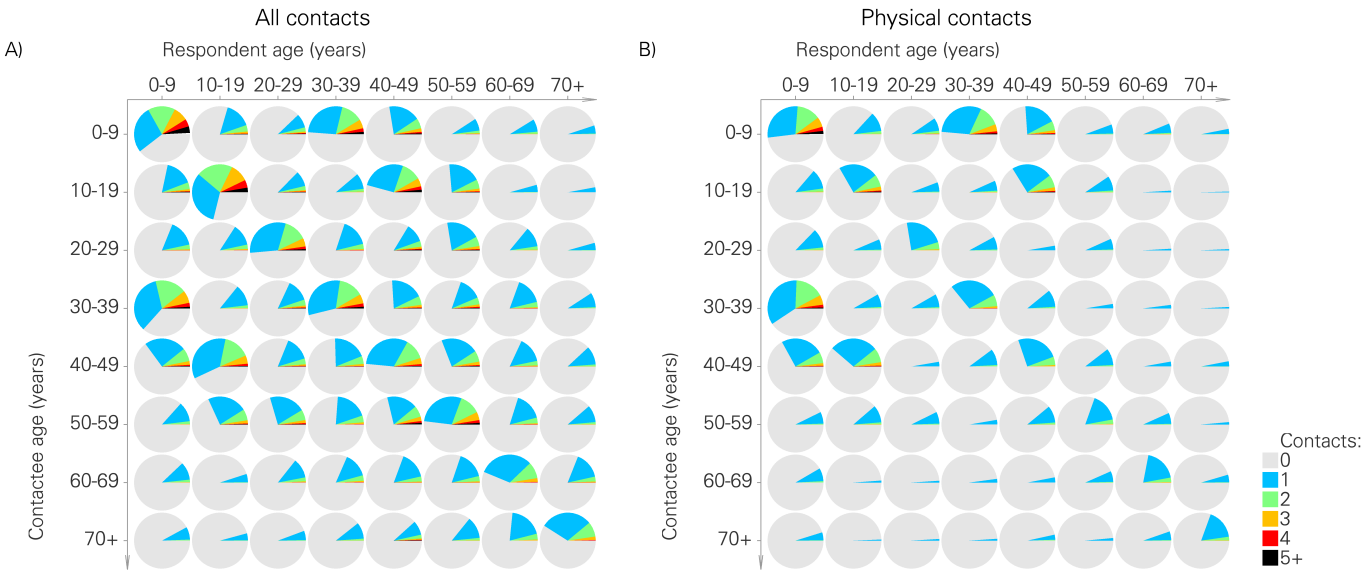
eTable 6. Posterior expectations of the relative reductions in between-age-class numbers of contacts (physical contacts). The 95% credible intervals are given in the parentheses. The matrix is symmetrical by definition. The posterior expectations are also presented in Figure 4 (panel B) of the main text.

Contactee age class (years)	Participant age class (years)							
	0–9	10–19	20–29	30–39	40–49	50–59	60–69	70+
0–9	0.62 (0.43, 0.75)	0.76 (0.64, 0.85)	0.68 (0.48, 0.82)	0.20 (0.02, 0.35)	0.28 (0.03, 0.48)	0.72 (0.54, 0.85)	0.79 (0.66, 0.88)	0.61 (0.15, 0.87)
10–19	0.76 (0.64, 0.85)	0.82 (0.77, 0.88)	0.78 (0.63, 0.88)	0.79 (0.67, 0.87)	0.29 (0.12, 0.43)	0.34 (0.02, 0.58)	0.90 (0.76, 0.97)	0.95 (0.80, 1.00)
20–29	0.68 (0.48, 0.82)	0.78 (0.63, 0.88)	0.77 (0.66, 0.85)	0.76 (0.62, 0.86)	0.84 (0.69, 0.94)	0.69 (0.52, 0.82)	0.90 (0.75, 0.97)	0.75 (0.20, 0.97)
30–39	0.20 (0.02, 0.35)	0.79 (0.67, 0.87)	0.76 (0.62, 0.86)	0.56 (0.42, 0.68)	0.69 (0.55, 0.80)	0.90 (0.82, 0.96)	0.89 (0.80, 0.96)	0.91 (0.77, 0.98)
40–49	0.28 (0.03, 0.48)	0.29 (0.12, 0.43)	0.84 (0.69, 0.94)	0.69 (0.55, 0.80)	0.54 (0.37, 0.68)	0.69 (0.56, 0.80)	0.86 (0.74, 0.83)	0.80 (0.61, 0.91)
50–59	0.72 (0.54, 0.85)	0.34 (0.02, 0.58)	0.69 (0.52, 0.82)	0.90 (0.82, 0.96)	0.69 (0.56, 0.80)	0.66 (0.52, 0.77)	0.77 (0.66, 0.86)	0.91 (0.81, 0.97)
60–69	0.79 (0.66, 0.88)	0.90 (0.76, 0.97)	0.90 (0.75, 0.97)	0.89 (0.80, 0.96)	0.86 (0.74, 0.93)	0.77 (0.66, 0.86)	0.74 (0.63, 0.83)	0.89 (0.82, 0.94)
70+	0.61 (0.15, 0.87)	0.95 (0.80, 1.00)	0.75 (0.20, 0.97)	0.91 (0.77, 0.98)	0.80 (0.61, 0.91)	0.91 (0.81, 0.97)	0.89 (0.82, 0.94)	0.88 (0.74, 0.96)

eFigure 1: Posterior predictive distributions of the numbers of daily contacts between the eight 10-year age classes. Panel A: all contacts. Panel B: physical contacts. The respondent's age class /years) is on the top row. The rows correspond to the contactees' age classes (years).

eFigure 2. Contact network. Grey lines: All contacs. Black lines (overlaid on the grey lines): physical contacts. The wider line, the larger the predictive total population-level number of contacts between the two age classes. The circle areas are proportional to the size of the age classes.

eFIGURE 1


A)
All contacts
Respondent age (years)
0-9
10-19
20-29
30-39
40-49
50-59
60-69
70+
Contactee age (years)
B)
Physical contacts
Contacts:
0
1
2
3
4
5+

eFIGURE 2