Supplementary

Expected value of the incidence for the analysis of age-specific data to test the validity of the assumption of linear trend

We set $\widehat{Y_{at}}$ as representing the outcome, i.e., the incidence of influenza or RSV in age group *a* in year *t*. If the baseline trend varies with time during the pre-intervention period (i.e., T_t =0) by age group, the resulting expected incidence is

$$\widehat{Y_{at}} = \widehat{\alpha_{a,0}} + \widehat{\alpha_{a,1}}(t-t_0) + \widehat{\gamma_a} RSV_g + \widehat{\alpha_{a,2}}(t-t_0) RSV_g \quad [4]$$

where RSV_g and T_t are the same dummy variables as defined for Eq. [1] in the main text. $\widehat{\alpha_{a,0}}$ and $\widehat{\alpha_{a,1}}$ describe the age-specific baseline incidence of both influenza and RSV infection that are assumed to be in parallel over time, and t_0 is the first year of our analysis (i.e., t_0 =2008/09). $\widehat{\alpha_{a,2}}$ measures the difference in the linear trend of RSV incidence compared with that of influenza during the pre-intervention period. $\widehat{\gamma_a}$ is the difference in baseline incidence for RSV infection compared to influenza.

Expected value of the incidence for the analysis of age-specific data

We set $\widehat{\gamma_a}$ as representing the incidence of age group *a* in year *t*. The expected incidence by age group was calculated as

$$\widehat{Y_{at}} = \widehat{\alpha_a} + \widehat{\beta_a}(RSV_g T_t) + \widehat{\gamma_a} RSV_g + \widehat{\delta_a} T_t \quad [5]$$

Since Eq. [5] independently estimates the incidences of RSV and influenza infection for every single age group, the parameters $\widehat{\alpha_a}$, $\widehat{\beta_a}$, $\widehat{\gamma_a}$, and $\widehat{\delta_a}$ were independently handled by age-group a in Eq. [5] where *a* =0–4, 5–9, 10–14, 15–19, or ≥20. Both diseases are commonly seen among children, and it was not plausible that the causal impact among adults is dependent on that of children.

Models to select the best model

We considered not only Eq. [1] and Eq. [5], both of which account for a constant baseline (without time trend) and causal effect, but also possible combinations of time-dependence in the baseline trend and causal effect as follows.

Assuming that both the baseline trend and causal effect vary with time, the expected value of the incidence in prefecture g and year t is calculated as

$$\widehat{Y_{gt}} = \widehat{\alpha_0} + \widehat{\alpha_1}(t-t_0) + \hat{\beta}(t-t_v)(RSV_g T_t) + \hat{\gamma} RSV_g + \hat{\delta} T_t \quad [6]$$

where $\widehat{\alpha_0}$ and $\widehat{\alpha_1}$ describe the incidence of both influenza and RSV infection that are assumed to be parallel over time during the pre-intervention period, t_0 is the first year of our analysis (i.e., t_0 =2008/09), and t_v is the first year in which the insurance coverage for bedside RSV antigen testing was introduced (i.e., t_v =2012/13). If only the baseline trend varies with time, the expected incidence value is

$$\widehat{Y_{gt}} = \widehat{\alpha_0} + \widehat{\alpha_1}(t-t_0) + \hat{\beta}(RSV_g T_t) + \hat{\gamma} RSV_g + \hat{\delta} T_t \quad [7]$$

If only the causal effect varies with time, we have

$$\widehat{Y_{gt}} = \hat{\alpha} + \hat{\beta}(t-t_v)(RSV_g T_t) + \hat{\gamma} RSV_g + \hat{\delta} T_t \quad [8]$$

Using similarly structured models, age-specific incidence data were also explored.

Table S1 Comparison of four DID models based on the AIC

Data	Models	Number of parameters	AIC value
Age	Time-dependent α, β	25	563
Age	Constant α, β	20	552
Age	Constant α, time-dependent β	25	558
Age	Time-dependent α, constant β	20	544
Prefecture	Time-dependent α, β	5	4,164
Prefecture	Constant α, β	4	4,161
Prefecture	Constant α, time-dependent β	4	4,164
Prefecture	Time-dependent α, constant β	5	4,159

The results of AIC comparison for four different models are shown. Each AIC value was estimated by $\mathrm{AIC} = 2\log\left(\frac{SSE}{n}\right) + 2k$ [9], where SSE is the sum of the squared error and *n* and *k* represent the number of sample data points and the number of parameters, respectively. DID, difference-in-differences; AIC, Akaike information criterion.

Table S2 Summary of the estimates from four DID models analyzing age- and prefecture-specific data

Model	Parameters	Age					
		Overall	0–4	5–9	10–14	15–19	≥20
Time-dependent α, constant β	α_0	1,372 [1,326, 1,418]	5,499 [4,604, 6,394]	9,683 [8,788, 10,578]	5,318 [4,423, 6,213]	1,367 [472, 2,262]	265 [–629, 1,160]
	α_1	24 [9, 38]	224 [–62, 511]	243 [–43, 530]	89 [–197, 376]	10 [–277, 296]	10 [–276, 297]
	β	162 [85, 239]	1,255 [–234, 2,744]	1,912 [423, 3,401]	995 [–494, 2,484]	281 [–1,208, 1,769]	–112 [–1,601, 1,377]
	γ	–1,347 [–1,404, 1,290]	–4,714 [–5,824, –3,605]	–10,023 [–11,133, –8,914]	–5,450 [–6,559, –4,340]	–1,382 [–2,491, –272]	–280 [–1,390, 829]
	δ	–230 [–316, –144]	–1,432 [–3,097, 232]	–2,995 [–4,659, –1,330]	–1,395 [–3,059, 270]	–325 [–1,990, 1,339]	67 [–1,598, 1,731]
Constant α, time-dependent β	α	1,386 [1,348, 1,424]	5,700 [4,944, 6,456]	9,782 [9,026, 10,538]	5,313 [4,557, 6,069]	1,343 [587, 2,099]	296 [–460, 1,052]
	β	29 [10, 47]	256 [–108, 621]	319 [–45, 683]	166 [–198, 530]	47 [–318, 411]	–19 [–383, 346]
	γ	–1,305 [–1,354, –1,255]	–4,444 [–5,423, –3,465]	–9,493 [–10,472, –8,514]	–5,174 [–6,153, –4,194]	–1,304 [–2,283, –325]	–312 [–1,291, 668]
	δ	–86 [–133, –38]	–180 [–1,127, 766]	–1,423 [–2,369, –476]	–746 [–1,692, 201]	–210 [–1,157, 736]	84 [–862, 1,031]
Time-dependent α, β	α_0	1,354 [1,305, 1,403]	5,381 [4,378, 6,384]	9,468 [8,464, 10,471]	5,236 [4,232, 6,239]	1,356 [353, 2,359]	259 [–745, 1,262]
	α_1	17 [1, 33]	167 [–167, 500]	164 [–169, 498]	40 [–293, 374]	–7 [–340, 327]	20 [–314, 353]
	β	20 [0, 40]	173 [–235, 581]	237 [–172, 645]	146 [–263, 554]	50 [–358, 459]	–29 [–437, 380]
	γ	–1,291 [–1,342, –1,239]	–4,306 [–5,345, –3,266]	–9,356 [–10,396, –8,316]	–5,140 [–6,180, –4,100]	–1,309 [–2,349, –270]	–295 [–1,335, 744]
	δ	–149 [–227, –72]	–805 [–2,387, 777]	–2,038 [–3,620, –457]	–897 [–2,479, 684]	–185 [–1,767, 1,397]	11 [–1,571, 1,592]
Constant α, β	α	1,408 [1,367, 1,448]	5,835 [5,048, 6,623]	10,048 [9,260, 10,835]	5,452 [4,664, 6,239]	1,382 [595, 2,170]	281 [–507, 1,068]
	β	162 [85, 240]	1,255 [–239, 2,749]	1,912 [418, 3,406]	995 [–499, 2,489]	281 [–1,214, 1,775]	–112 [–1,606, 1,382]
	γ	–1,347 [–1,405, –1,289]	–4,714 [–5,828, –3,601]	–10,023 [–11,137, –8,910]	–5,450 [–6,563, –4,336]	–1,382 [–2,495, –268]	–280 [–1,394, 833]
	δ	–124 [–179, –69]	–423 [–1,480, 633]	–1,900 [–2,957, –844]	–994 [–2,051, 62]	–281 [–1,337, 776]	112 [–944, 1,169]

All parameters from four different DID models using age- and prefecture-specific data are shown. Upper and lower 95% CIs, derived from profile likelihood, are shown in parenthesis. DID, difference-in-differences; CI, confidence interval.