Technical Appendix for Modeling the dynamics of oral poliovirus vaccine cessation

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Distribution for sampling R_0 values in the policy analysis

Table A1 shows the non-uniform distribution used in the policy analysis to generate a representative sample of R_0 values for currently OPV-using countries.

Full set of policy permutations

Table A2 lists the 16 policy permutations we analyzed. The first 12 policy permutations approximate a two-way analysis involving the number of years without SIAs before OPV cessation and routine coverage (Figure 2A), with the number of SIA rounds per year fixed at the median value of 3 and the SIA impact fixed at the medium level. The next 4 complement one-way policy analyses for the number of SIAs per year and the SIA impact, each fixing the number of years without SIAs before OPV cessation to 0 (given that for this value SIA specifics matter the most) other policy choices at their median values.

Additional results

Figure A1 expands the y-axis scale of Fig 1A to show the long-term population immunity trend in the absence of any vaccination or LPV transmission. Figure A2 shows the relationships between the SIA frequency and SIA impact on the post-cessation cVDPV risk, with other policy inputs fixed. Figure A3 shows Spearman's rank correlation between each variability input and two model outputs related to post-cessation cVDPV risks across all 16 policy permutations, which reveals the dominant importance of R_0. Figure A4 shows the resulting relationships between each variability input and the post-cessation cVDPV risk.

Table A1: Assumed distribution for R_0 in the policy analysis

R_0*	Density
5	0.05
6	0.1
7	0.15
8	0.15
9	0.15
10	0.15
11	0.1
12	0.1
13	0.05

* The effective R_0 for type 2 multiplies the value shown for R_0 for type 1 in the left column by 0.9[17]

Table A2: Details of the 16 policy permutations performed

Permutation number	Years without SIAs before OPV cessation	Routine coverage	SIA impact[a]	Number of SIAs per year
1	0	0.3	Medium	3
2	0.5	0.3	Medium	3
3	1	0.3	Medium	3
4	2	0.3	Medium	3
5	0	0.6	Medium	3
6	0.5	0.6	Medium	3
7	1	0.6	Medium	3
8	2	0.6	Medium	3
9	0	0.9	Medium	3
10	0.5	0.9	Medium	3
11	1	0.9	Medium	3
12	2	0.9	Medium	3
13	0	0.6	Medium	1
14	0	0.6	Medium	5
15	0	0.6	Low	3
16	0	0.6	High	3

[a] As defined in Table 2

Figure A1: Long-term population immunity trend in the absence of any vaccination or LPV transmission, based on Figure 1a with full y-axis scale

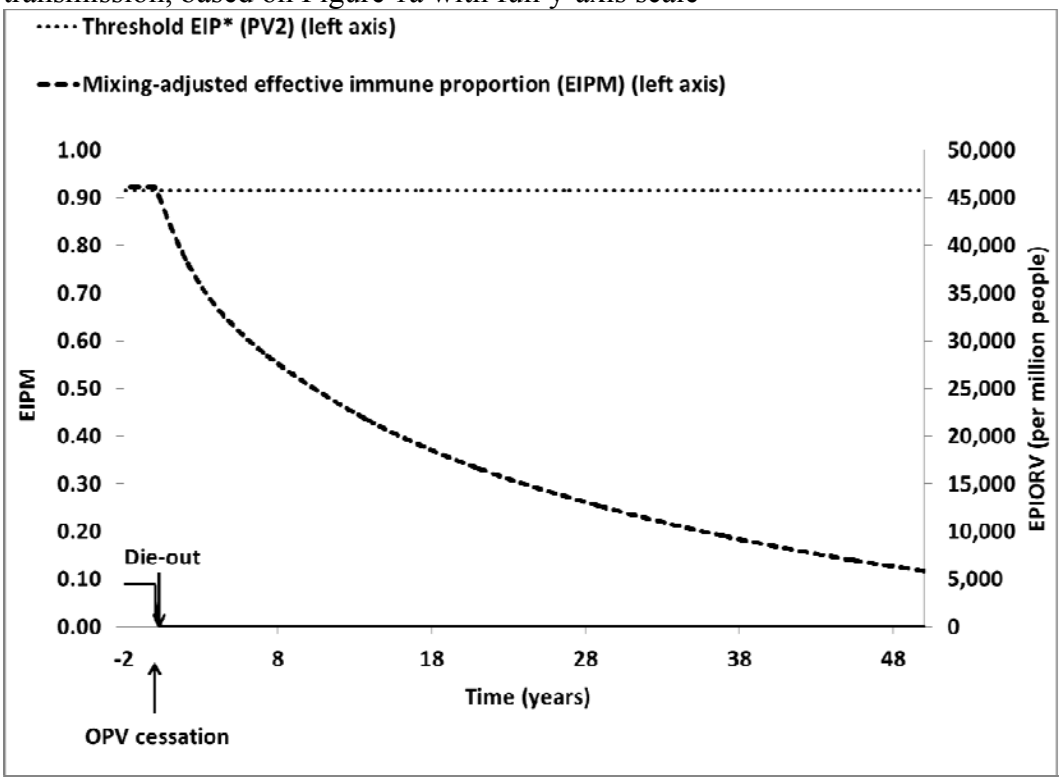
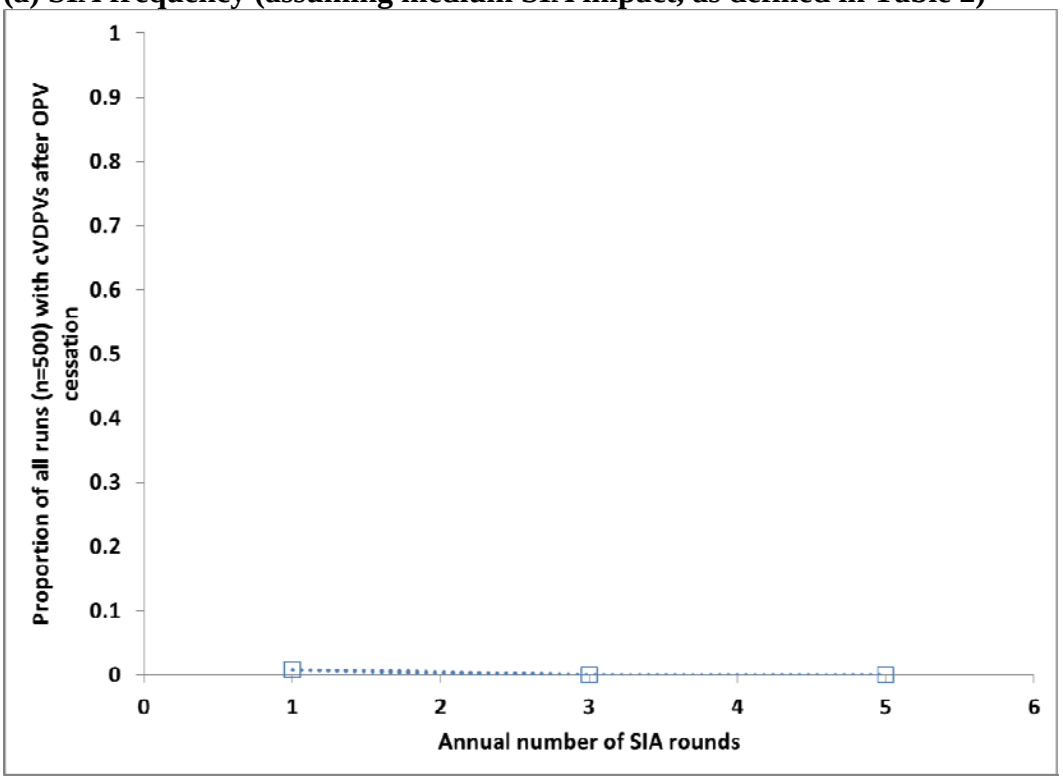


Figure A2: Relationship between SIA policy specifics and post-cessation cVDPV risk, with the number of years without SIAs fixed 0 and the routine coverage fixed at 0.6 (Table A1).
(a) SIA frequency (assuming medium SIA impact, as defined in Table 2)



(b) SIA impact, as defined in Table 2 (assuming 3 SIA rounds per year)

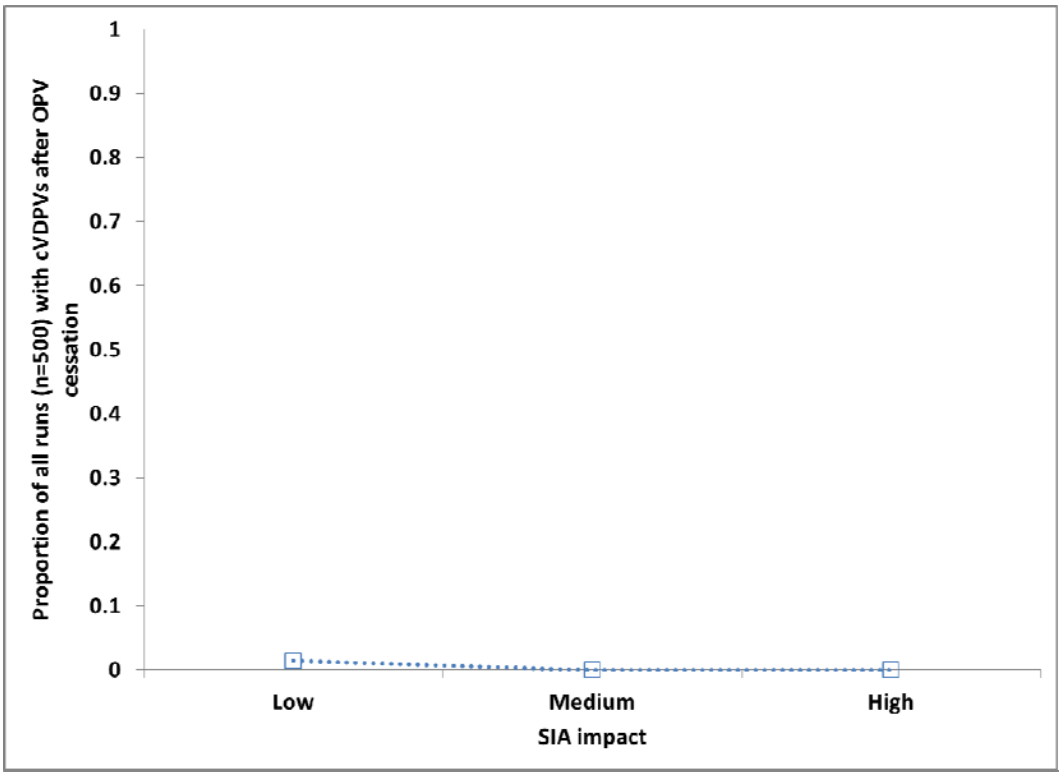
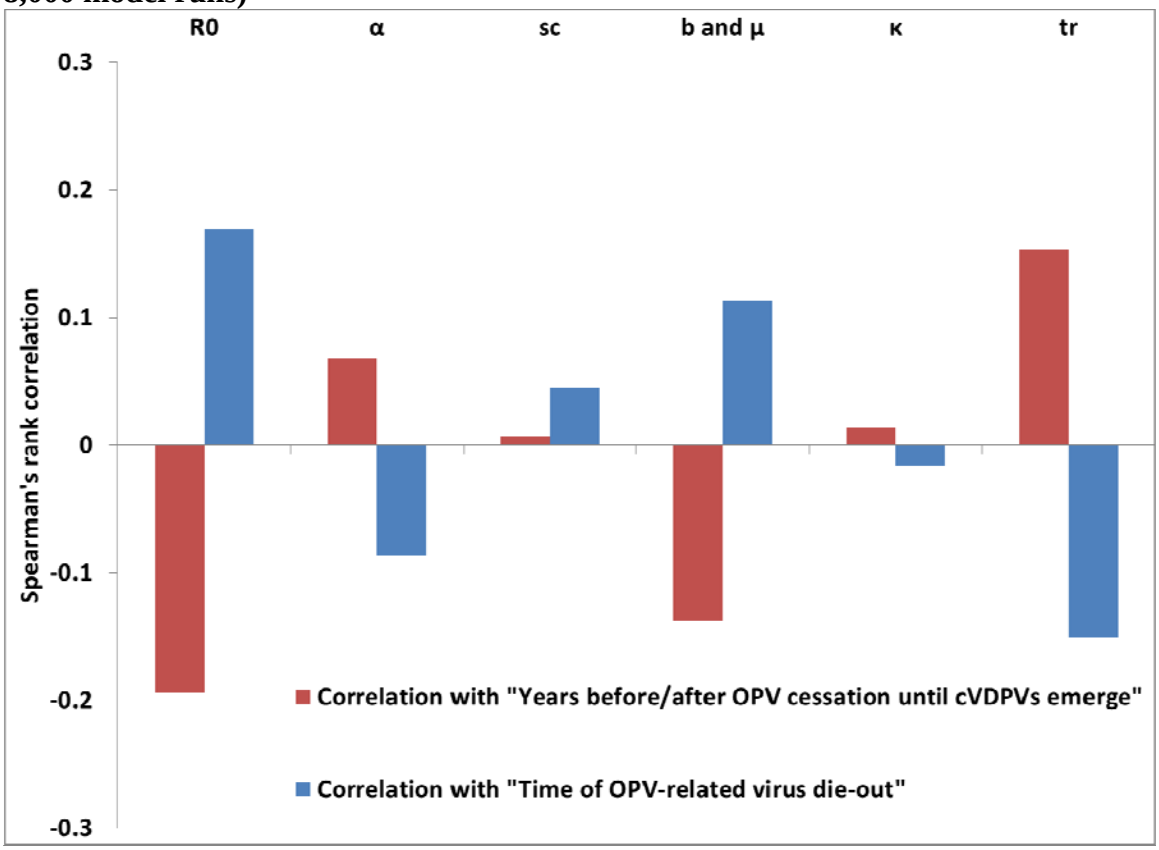
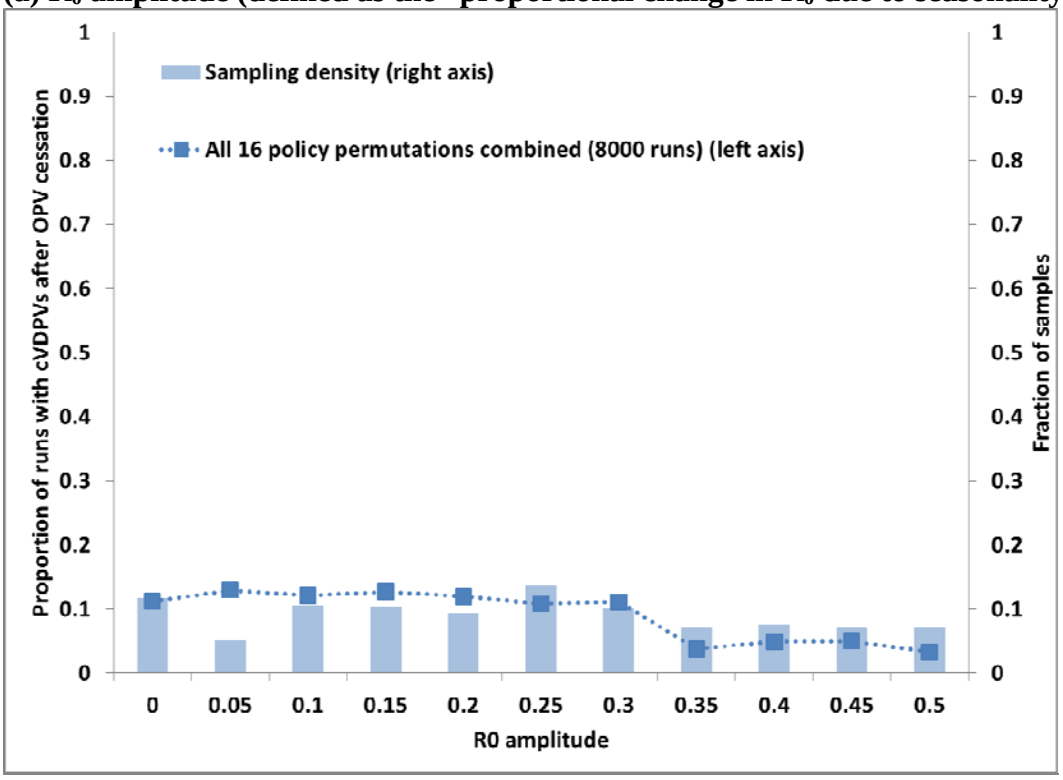

Proportion of all runs (n=500) with cVDPVs after OPV cessation
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Low
Medium
High
SIA impact

Figure A3: Spearman's rank correlation between each variability input and two model outputs related to post-cessation cVDPV risks across all 16 policy permutations (total of 8,000 model runs)

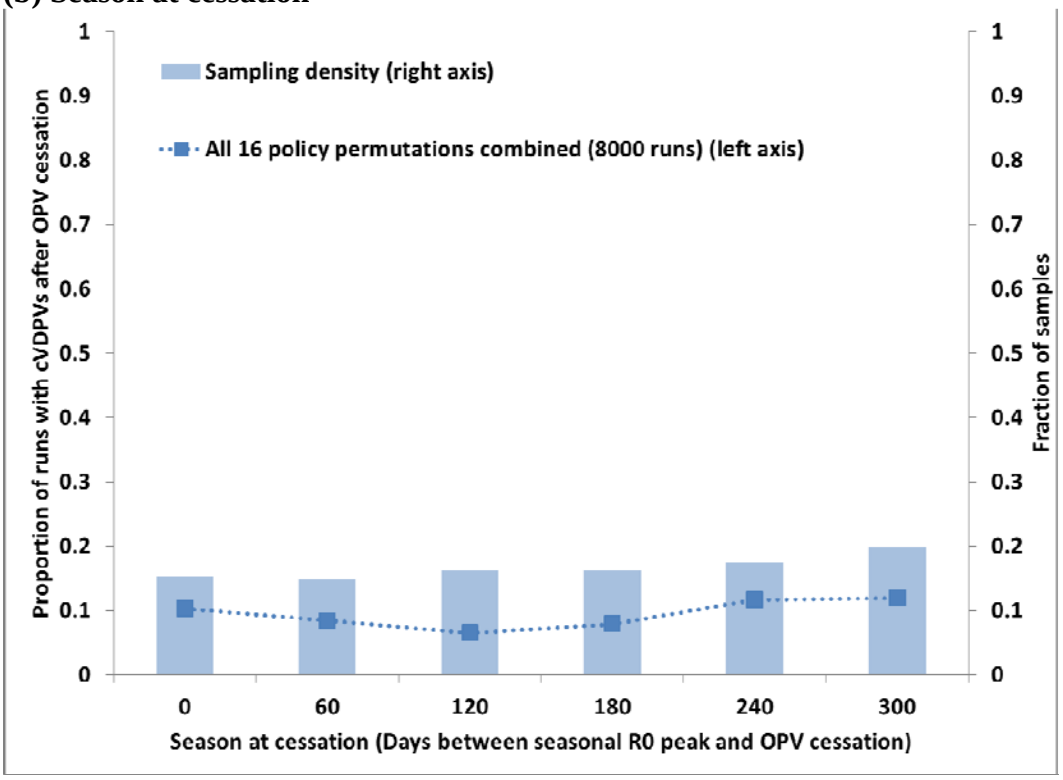


R_0=basic reproductive number; α = R_0 amplitude; sc = Season at cessation (time between seasonal R_0 peak and OPV cessation); b and μ = (equal) birth and mortality rates; κ = strength of preferential mixing; tr = average per-dose OPV take rate

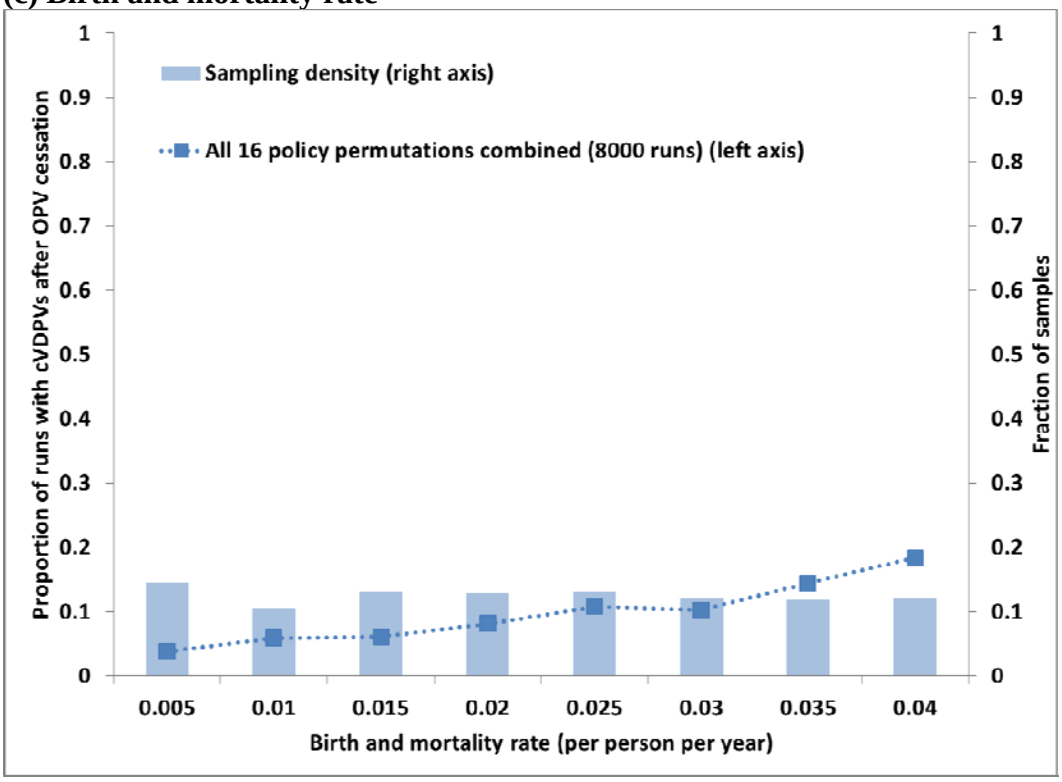
Figure A4: Relationship between each variability input other than R_0 (shown in Figure 2B) and the post-cessation cVDPV risk.
(a) R_0 amplitude (defined as the "proportional change in R_0 due to seasonality" [17, p. 717])



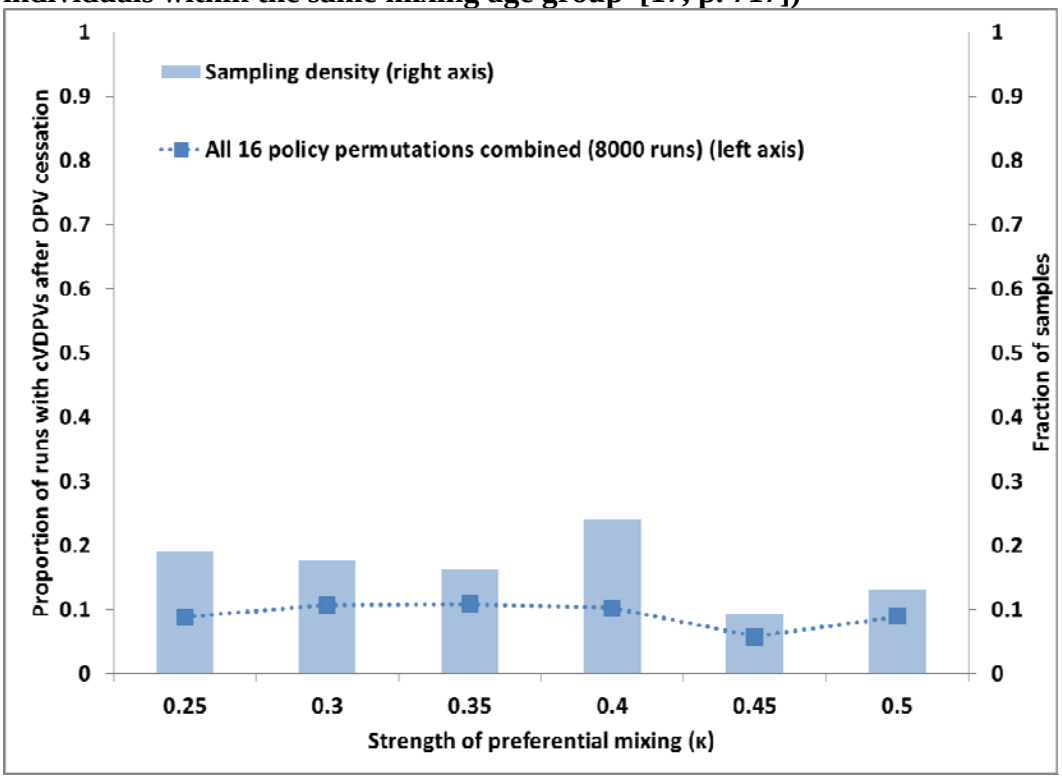
(b) Season at cessation



(c) Birth and mortality rate



(d) Strength of preferential mixing (Defined as the "proportion of contacts reserved for individuals within the same mixing age group"[17, p. 717])



(e) Average per-dose take rate of OPV