

Supplementary Information

- Table of regression results
- Table of sample sizes by recruitment site
- Supplementary Figures
 - 1. Sensitivity analysis: Results if only single co-infections were included
 - 2. Age and recruitment distributions of coinfections
 - 3. Crt versus number of coinfectors by pathogen
 - 4. *SPn* positivity versus number of viral coinfections in the population over time
 - 5. Sample exclusions flow diagram

Supplementary Data: Full regression model results for each interaction summarized in Main Figure 3. Includes results for an unadjusted effect and the full model which adjusts for month, age, and recruitment mode.

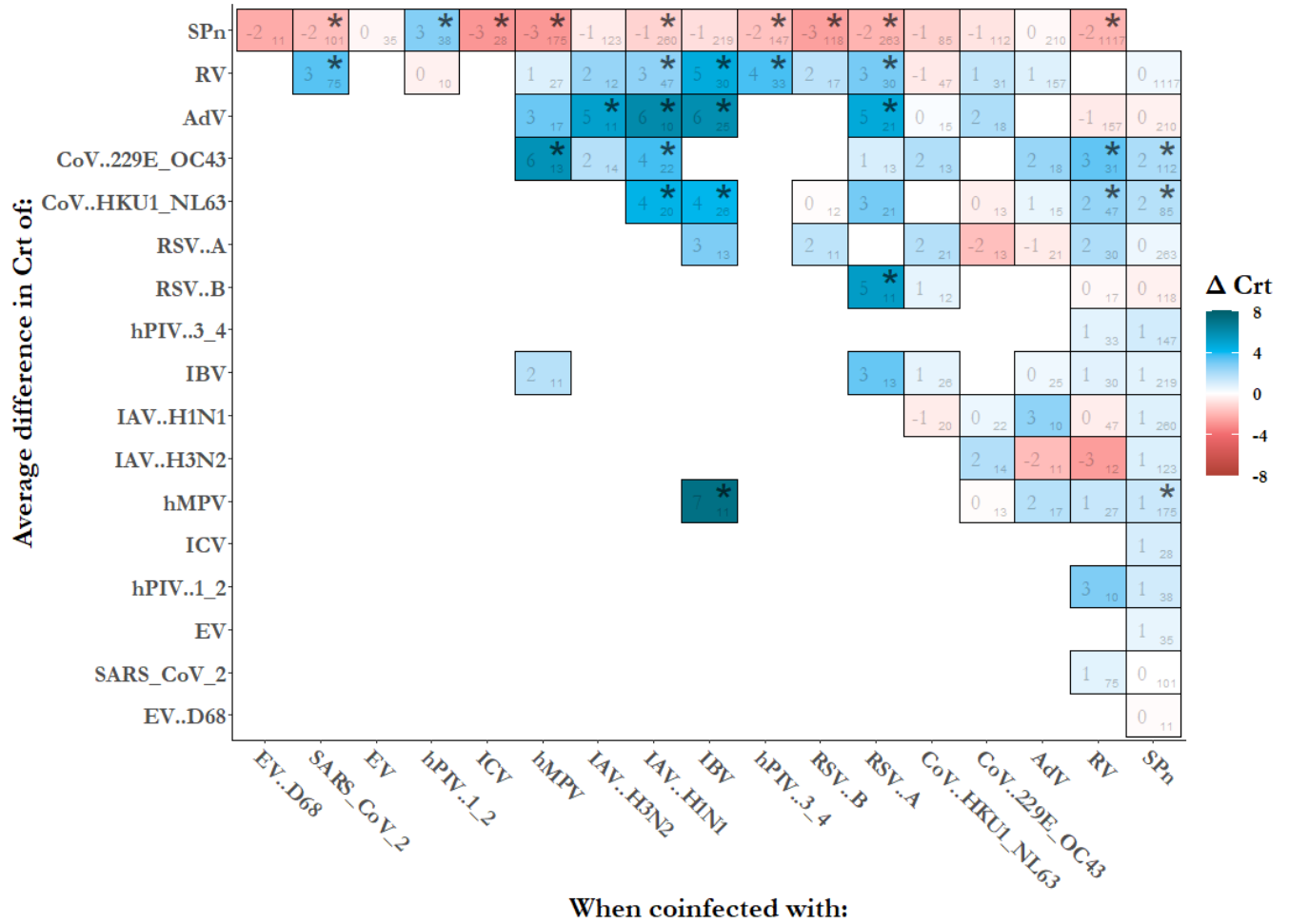
<https://docs.google.com/spreadsheets/d/1RfSaEnRhTuwOf5AEPB-blapupCr4DIlpCvvZBvwEskM/edit?usp=sharing>

Supplementary Table 1: Number of samples by recruitment site

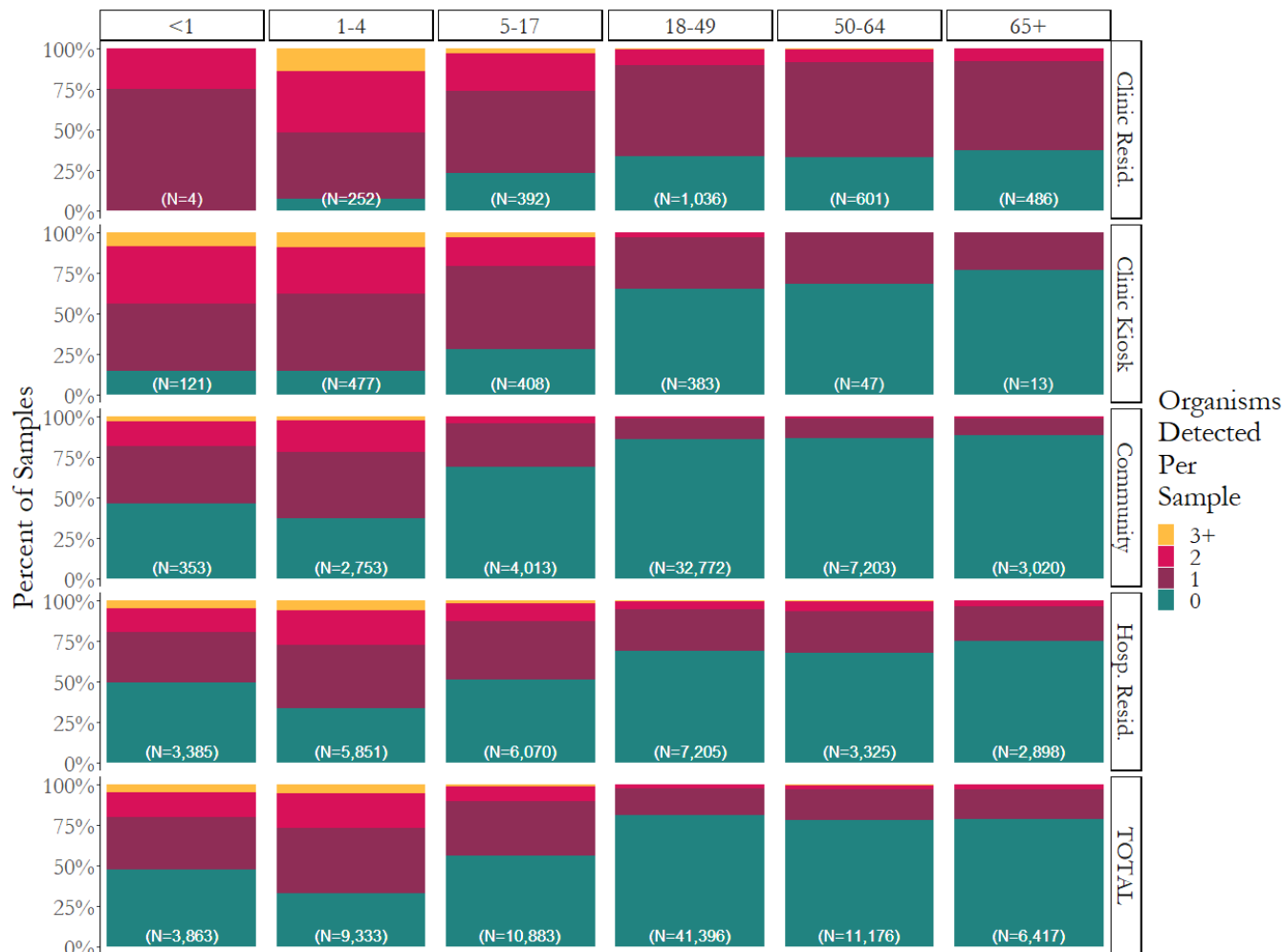
Recruitment Type	Site	Sample Size
Clinic (Kiosk)	ChildrensHospitalSeattle	621
	ChildrensHospitalSeattleOutpatientClinic	168
	UWHallHealth	43
	UWSeaMar	40
	PioneerSquare	27
	ChildrensHospitalBellevue	25
	ChildrensSeaMar	16
Clinic (Flu VE Network)	KaiserPermanente	1931
Community	SCAN	5720
	swabNSend	1347
	WestlakeMall	153
	HUB	100
	UWSuzzalloLibrary	83
	HarborviewLobby	81
	FredHutchLobby	69
	SeattleCenter	12
	CapitolHillLightRailStation	12
	Harborview	10
	UWGreek	10
	ColumbiaCenter	6
	HealthSciencesRotunda	5
	Costco	5
	UWClub	5
KingStreetStation	4	
SeaTacInternational	3	
UWReopeningSwabNSend	3	

	PICAWA	2
	WestCampusChildCareCenter	1
	SeaTacDomestic	1
	UWOdegaardLibrary	1
Hospital (Residual)	RetrospectiveChildren’sHospitalSeattle	7600
	RetrospectiveHarborview	2000
	RetrospectiveNorthwest	982
	RetrospectiveUWMedicalCenter	592

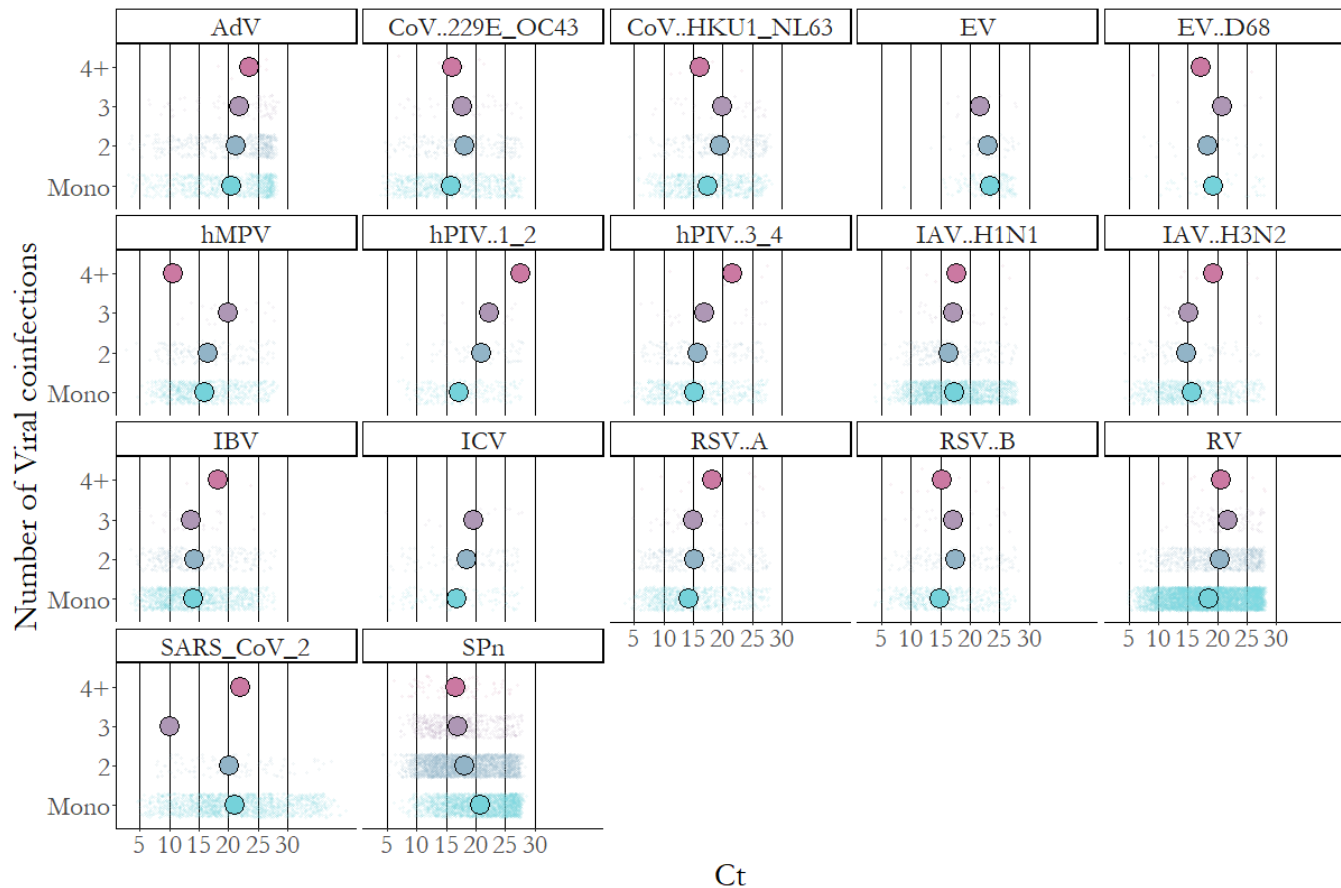
Supplementary Figure 1: Sensitivity analyses - replication of main Figure 3. Keeping only monoinfected and coinfecting samples with only two pathogens. Findings are largely qualitatively similar with some pathogen pairs removed as sample size is reduced.



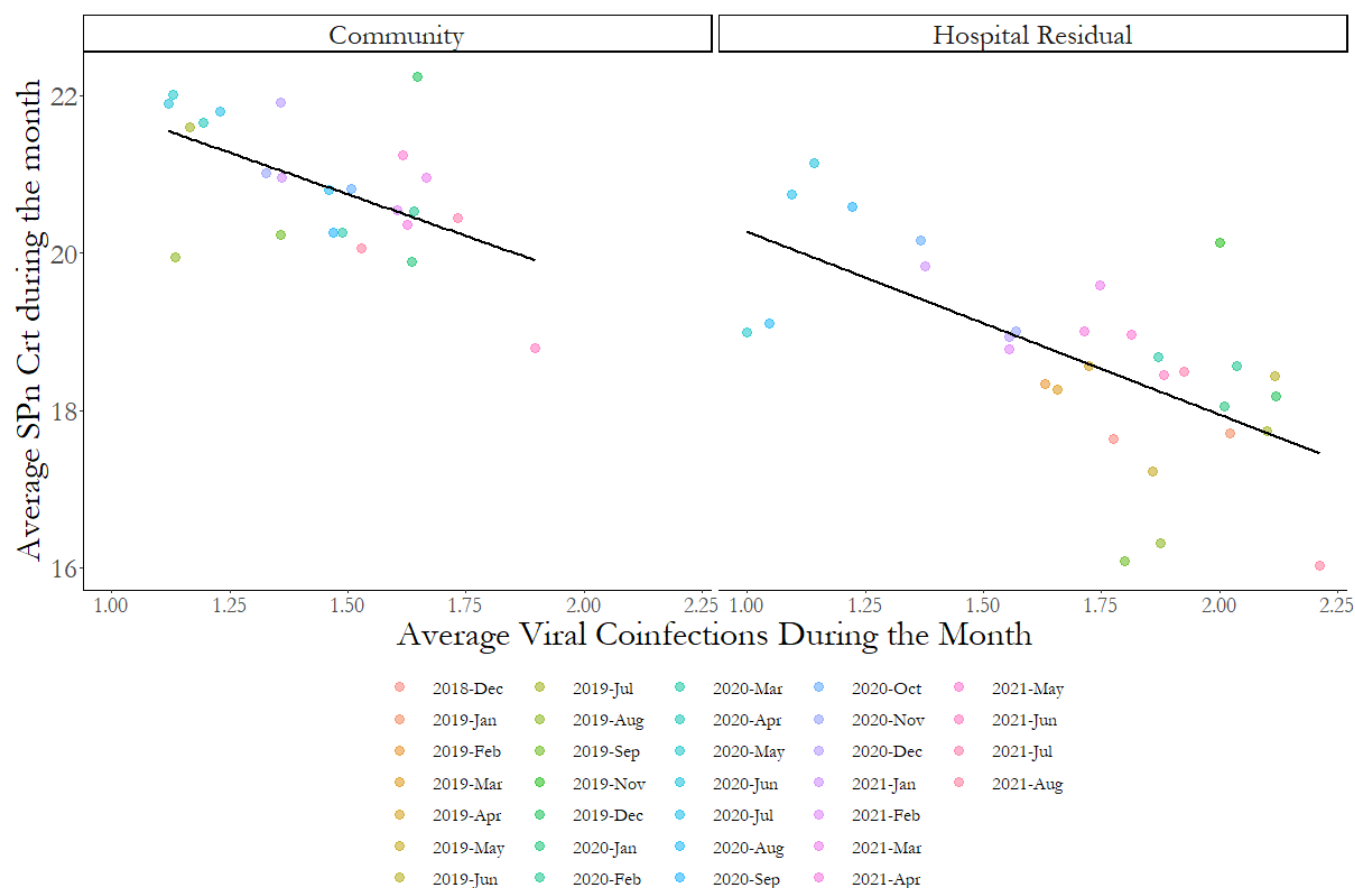
Supplementary Figure 2: Frequency of sample infections by age and recruitment type across 83,068 samples with complete metadata. Children and adolescents are more likely than adults to have one or more infections.



Supplementary Figure 3: Average Ct values by number of viral coinfections. Strong gradient observed for SPn, where more viral coinfectors are strongly associated with more bacterial replication in the upper respiratory tract.



Supplementary Figure 4: Ecological association between average number of circulating viruses in a month and the average SP_n values for SP_n in community and hospital samples, suggesting population-level evidence for the individual-level interaction explored in this paper.



Supplementary Figure 5: Sample exclusions

