Appendix C

We constructed two sets of parsimonious SPFs with the stepwise regression approach. We first included all the independent variables in the SPF (Table 2). Then, using stepwise regression, we subsequently dropped the variables that were insignificant at the 0.05 level. This process yielded a set of SPFs we refer to as the SPFs with exposure. We then manually dropped pedestrian count and bicycle count from these parsimonious SPFs and developed the set of SPFs without exposure. We note that not all the SPFs with exposure variables include all three exposure variables (i.e., some exposure variables were not significant and were dropped in the stepwise procedure). We also note that the same exposure variables were significant in the "theoretically complete" models and the parsimonious models. That is, while the significance of a few independent variables changed in the parsimonious models, none of the exposure variables did.

Table C1. Pedestrian parsimonious model results

	Pedestrian intersection models				Pedestrian mid-block models			
	With exposure		Without exposure		With exposure		Without exposure	
	Coefficient	Elasticity	Coefficient	Elasticity	Coefficient	Elasticity	Coefficient	Elasticity
Exposure to risk								
Ln(Actual pedestrian count)	0.53	0.53			0.32	0.32		
Ln(Actual bike count)	-0.29	-0.29						
Ln(Actual AADT)	1.34	1.34	1.33	1.33	1.10	1.10	1.24	1.24
Built environment								
Population density	2.04×10^{-3}	0.07						
Job density	-2.20×10^{-4}	-0.04	-1.61×10^{-4}	-0.03				
Presence of transit stop			0.63	0.38				
Share of office area	-0.96	-0.13	-1.11	-0.15				
Share of industrial area			-2.79	-0.12				
Share of open space	-2.35	-0.15	-3.50	-0.22				
Traffic facilities								
Presence of traffic signal	0.80	0.53	1.07	0.71				
Travel width of lane					-0.03	-0.73	-0.03	-0.76
Number of legs	-0.41	-1.60						
Number of secondary roads	0.18	0.28						
Socio-demographics								
Share of seniors	-4.58	-0.40	-5.84	-0.51				
Average household size	-0.36	-0.81	-0.30	-0.66	-0.83	-1.88	-1.03	-2.33
Share of white population	-0.89	-0.54	-1.05	-0.63				
Share of poverty population					2.24	0.87	2.70	1.04
Constant and model performance								
Constant	-11.58		-11.33		-11.79		-10.78	
Dispersion factor	0.14		0.26		2.86		3.19	
Deviance R^2	0.77		0.71		0.28		0.26	
AIC	569		592		447		451	
BIC	616		630		476		475	

Note: All variables are significant at level 95% in the model.

Table C2. Bicycle parsimonious model results

	Bicycle intersection models				Bicycle mid-block models			
	With exposure		Without exposure		With exposure		Without exposure	
	Coefficient	Elasticity	Coefficient	Elasticity	Coefficient	Elasticity	Coefficient	Elasticity
Exposure to risk								
Ln(Actual bike count)	0.59	0.59			0.48	0.48		
Ln(Actual AADT)	0.50	0.50	0.84	0.84	0.63	0.63	0.72	0.72
Built environment								
Population density	2.48×10^{-3}	0.09	2.71×10^{-3}	0.09				
Share of commercial area					1.42	0.23	1.40	0.23
Share of industrial area					1.49	0.08	1.71	0.09
Share of open space					1.75	0.16	2.31	0.21
Land use entropy			0.64	0.41				
Downtown					0.92	0.15	1.16	0.19
Traffic facilities								
Presence of traffic signal	0.52	0.34						
Travel width of lane					-0.03	-0.73	-0.03	-0.74
Number of secondary roads	0.28	0.45	0.22	0.36				
Socio-demographics								
Share of children			-1.98	-0.29				
Share of seniors	-2.36	-0.21						
Average household size	-0.26	-0.59	-0.30	-0.68				
Share of poverty population			1.32	0.52				
Constant and model performance								
Constant	-8.05		-8.00		-9.88		-8.01	
Dispersion factor	0.24		0.39		1.92		2.35	
Deviance R^2	0.49		0.42		0.25		0.19	
AIC	591		613		476		488	
BIC	620		642		512		520	

Note: All variables are significant at level 95% in the model.

Table C3. Comparison between Empirical Bayes estimation by parsimonious SPFs and two-year historical crash numbers (2018-2019) in terms of RMSE

Pedestrian	Intersection models		Mid-block models	
	With exposure	Without exposure	With exposure	Without exposure
Average historical crash number		0.0738		0.0127
Average estimated crash number	0.0688	0.0925	0.0084	0.0126
RMSE	0.2890	0.2913	0.1206	0.1210
Bicycle	**Intersection models**		**Mid-block models**	
	With exposure	**Without exposure**	**With exposure**	**Without exposure**
Average historical crash number		0.0452		0.0084
Average estimated crash number	0.0488	0.1082	0.0083	0.0160
RMSE	0.2180	0.2355	0.0943	0.0958

Table C4. Share of high-risk locations in the city identified by both the parsimonious SPFs with and without exposure

	Pedestrian		Bicycle	
	Intersection (N = 6,639)	**Mid-block (N = 12,589)**	**Intersection (N = 6,639)**	**Mid-block (N = 12,589)**
Top 1%	74%	88%	68%	83%
Top 5%	79%	85%	71%	78%
Top 10%	83%	86%	77%	78%

Table C5. Share of high-risk locations in the ACP50s identified by both the parsimonious SPFs with and without exposure

	Pedestrian		Bicycle	
	Intersection (N = 6,639)	**Mid-block (N = 12,589)**	**Intersection (N = 6,639)**	**Mid-block (N = 12,589)**
Top 1%	63%	97%	81%	76%
Top 5%	76%	92%	77%	77%
Top 10%	88%	92%	85%	74%

Table C6. Comparison of the number of high-risk locations in the ACP50s identified by both the parsimonious SPFs with and without exposure

Pedestrian						
	Intersection (N = 6,639)			**Mid-block (N = 12,589)**		
	SPFs with exposure	**SPFs without exposure**	**Difference**	**SPFs with exposure**	**SPFs without exposure**	**Difference**
Top 1%	19	16	-16%	33	39	18%
Top 5%	104	116	12%	204	225	10%
Top 10%	208	234	13%	379	408	8%
Bicycle						
	Intersection (N = 6,639)			**Mid-block (N = 12,589)**		
	SPFs with exposure	**SPFs without exposure**	**Difference**	**SPFs with exposure**	**SPFs without exposure**	**Difference**
Top 1%	21	21	0%	17	18	6%
Top 5%	102	115	13%	94	98	4%
Top 10%	175	194	11%	215	208	-3%