

Table 1: Summary of the OLS regression Model

		Bicycle theft	Burglary	Criminal damage and arson	Robbery	Shoplifting	Theft from person
Social variables	The number of POIs	0.284 *** (0.023)	0.114 *** (0.008)	0.147 *** (0.010)	0.276 *** (0.018)	0.543 *** (0.032)	0.378 *** (0.021)
	The median income	0.132 *** (0.032)	0.061 *** (0.015)	-0.211 *** (0.014)	-0.169 *** (0.032)	-0.159 *** (0.043)	-0.202 *** (0.039)
	Vacancy rate	0.095 ** (0.030)	0.070 *** (0.011)	0.045 *** (0.013)	0.081 *** (0.023)		0.146 *** (0.027)
	Transport accessibility scores	0.477 *** (0.031)	0.076 *** (0.011)	0.057 *** (0.013)	0.269 *** (0.024)	0.174 *** (0.036)	0.501 *** (0.028)
	Ethnic diversity index		0.160 *** (0.029)		0.280 *** (0.060)		0.128 . (0.072)
	Adjusted R-squared	0.532	0.460	0.407	0.529	0.335	0.656
Streetscape environmental variables	Road	0.217 *** (0.065)	0.126 *** (0.031)	0.186 *** (0.032)	0.500 *** (0.093)	0.523 *** (0.094)	0.493 *** (0.074)
	Sidewalk			-0.069 ** (0.026)	0.110 . (0.057)		0.143 * (0.058)
	Building	0.431 *** (0.053)	0.121 *** (0.021)	0.043 . (0.023)	0.311 *** (0.051)		0.613 *** (0.062)
	Wall	0.171 *** (0.034)	0.028 * (0.014)	0.030 . (0.017)	0.105 ** (0.033)		0.067 . (0.037)
	Fence	0.050 (0.032)		0.068 *** (0.016)	0.154 *** (0.031)		0.125 *** (0.032)
	Pole	0.124 * (0.048)		0.038 (0.024)	0.098 * (0.045)	0.156 * (0.071)	
	Traffic light		0.017 * (0.007)	0.013 (0.008)	0.029 * (0.014)	0.062 ** (0.024)	0.048 ** (0.016)
	Traffic sign				-0.094 * (0.039)		-0.097 * (0.041)
	Vegetation	0.310 *** (0.037)	0.089 *** (0.016)		0.124 *** (0.035)	-0.103 * (0.048)	0.189 *** (0.037)

	Terrain				0.108 ** (0.036)		0.109 *** (0.030)
	Person	0.183 *** (0.026)	0.054 *** (0.011)	0.084 *** (0.013)	0.207 *** (0.023)	0.372 *** (0.033)	0.338 *** (0.026)
	Rider	0.072 *** (0.020)	0.012 (0.008)		0.060 *** (0.017)		0.061 ** (0.020)
	Car		-0.030 (0.019)		0.148 * (0.066)		
	Truck		0.025 ** (0.008)	0.024 * (0.010)	0.030 . (0.017)		
	Bus	0.065 *** (0.017)	0.015 * (0.007)	0.037 *** (0.009)	0.059 *** (0.015)	0.085 ** (0.026)	0.081 *** (0.018)
	Train			-0.013 (0.009)			0.033 . (0.018)
	Motorcycle	0.053 * (0.024)	0.025 * (0.010)			0.080 * (0.032)	
	Bicycle	0.170 *** (0.025)	0.025 * (0.010)	-0.018 (0.012)			0.053 * (0.024)
	Adjusted R-squared	0.560	0.341	0.241	0.414	0.271	0.600
Combination of both	The number of POIs	0.231 *** (0.024)	0.113 *** (0.010)	0.144 *** (0.011)	0.256 *** (0.02)	0.446 *** (0.036)	0.286 *** (0.023)
	The median income	0.118 *** (0.033)	0.047 ** (0.016)	-0.200 *** (0.015)	-0.155 *** (0.034)	-0.071 (0.046)	-0.153 *** (0.039)
	Vacancy rate	-0.055 . (0.030)	0.055 *** (0.012)	0.031 * (0.014)	0.036 (0.024)		0.031 (0.028)
	Transport accessibility scores	0.190 *** (0.036)	0.071 *** (0.014)	0.069 *** (0.017)	0.202 *** (0.030)	0.040 (0.042)	0.317 *** (0.035)
	Ethnic diversity index		0.140 *** (0.029)		0.265 *** (0.059)		0.132 . (0.068)
	Road	0.158 * (0.064)	0.071 * (0.029)	0.076 ** (0.029)	0.245 ** (0.085)	0.397 *** (0.089)	0.221 ** (0.069)
	Sidewalk			-0.068 **	0.043		0.047

				(0.023)	(0.050)		(0.051)
	Building	0.324 *** (0.059)	0.011 (0.023)	-0.028 (0.023)	0.035 (0.054)		0.290 *** (0.064)
	Wall	0.181 *** (0.032)	0.026 * (0.013)	0.066 *** (0.015)	0.120 *** (0.029)		0.079 * (0.033)
	Fence	0.085 ** (0.031)		0.026 . (0.014)	0.100 *** (0.028)		0.066 * (0.030)
	Pole	0.082 . (0.046)		-0.024 (0.021)	0.011 (0.039)	0.059 (0.068)	
	Traffic light		0.005 (0.006)	0.001 (0.007)	0.005 (0.012)	0.022 (0.022)	0.018 (0.014)
	Traffic sign				-0.081 * (0.034)		-0.109 ** (0.037)
	Vegetation	0.230 *** (0.037)	0.045 ** (0.015)		0.071 * (0.033)	-0.145 ** (0.046)	0.126 *** (0.035)
	Terrain				0.057 . (0.032)		0.057 * (0.027)
	Person	0.068 * (0.027)	-0.002 (0.011)	0.008 (0.012)	0.077 *** (0.022)	0.137 *** (0.038)	0.178 *** (0.025)
	Rider	0.045 * (0.019)	0 (0.007)		0.034 * (0.015)		0.032 . (0.018)
	Car		0.005 (0.018)		0.156 ** (0.058)		
	Truck		0.021 ** (0.007)	0.025 ** (0.008)	0.026 . (0.015)		
	Bus	0.032 . (0.016)	-0.002 (0.007)	0.017 * (0.008)	0.024 . (0.013)	0.045 . (0.024)	0.033 * (0.016)
	Train			-0.014 . (0.008)			0.030 . (0.015)
	Motorcycle	0.059 ** (0.022)	0.021 * (0.009)			0.080 * (0.031)	
	Bicycle	0.110 ***	-0.002	-0.015			0.008

		(0.024)	(0.009)	(0.011)			(0.022)
	Adjusted R-squared	0.617	0.472	0.437	0.560	0.373	0.696

Note: *** p<0.001, ** p<0.01, * p<0.05, . p<0.1

Table 2: Summary of the GWR Model

		Bicycle theft						Burglary					
	Index	Min.	1st Qu.	Median	3rd Qu.	Max.	P value	Min.	1st Qu.	Median	3rd Qu.	Max.	P value
Social variables	The number of POIs	0.009	0.217	0.290	0.350	0.611	0.997	0.054	0.108	0.124	0.139	0.182	0.817
	The median income	-0.494	-0.085	0.028	0.264	0.840	0.000 ***	-0.115	-0.032	0.030	0.074	0.167	0.075 .
	Vacancy rate	-0.350	-0.047	0.058	0.216	0.734	0.031 *	-0.013	0.039	0.057	0.103	0.299	0.000 ***
	Transport accessibility scores	-0.110	0.190	0.354	0.537	0.919	0.000 ***	0.008	0.047	0.075	0.098	0.189	0.485
	Ethnic diversity index							-0.291	-0.073	0.039	0.182	0.454	0.000 ***
	Adjusted R-squared	0.733						0.537					
Streetscape environmental variables	Road	-0.198	0.085	0.269	0.437	0.630	0.040 *	-0.077	0.065	0.143	0.206	0.336	0.004 **
	Sidewalk												
	Building	-0.059	0.289	0.384	0.480	0.761	0.649	-0.056	0.060	0.087	0.126	0.216	0.391
	Wall	-0.057	0.061	0.108	0.172	0.444	0.235	-0.036	0.003	0.028	0.048	0.103	0.406
	Fence	-0.133	0.004	0.058	0.095	0.258	0.675						
	Pole	-0.086	0.059	0.113	0.182	0.302	0.936						
	Traffic light							-0.011	0.004	0.018	0.031	0.065	0.581
	Traffic sign												
	Vegetation	-0.161	0.208	0.305	0.400	0.605	0.038 *	-0.049	0.046	0.080	0.099	0.156	0.060 .
	Terrain												
	Person	-0.016	0.133	0.176	0.213	0.401	0.960	-0.002	0.039	0.050	0.067	0.093	0.740
	Rider	-0.020	0.028	0.052	0.080	0.261	0.144	-0.016	-0.003	0.007	0.020	0.084	0.069 .
	Car							-0.192	-0.089	-0.034	0.004	0.095	0.039 *
	Truck							-0.015	0.001	0.014	0.040	0.061	0.104 .
	Bus	-0.024	0.018	0.046	0.090	0.155	0.789	-0.020	-0.000	0.016	0.032	0.056	0.145
	Train												
	Motorcycle	-0.079	-0.041	0.021	0.075	0.195	0.353	-0.030	0.015	0.025	0.032	0.071	0.481
	Bicycle		0.066	0.117	0.148	0.212	0.002 **	-0.029	0.009	0.024	0.040	0.082	0.213
	Adjusted R-squared	0.629						0.420					
	The number of POIs	0.058	0.181	0.223	0.268	0.336	0.730	0.083	0.097	0.112	0.125	0.142	0.723

Combination of both	The median income	-0.127	-0.000	0.132	0.231	0.413	0.001 **	-0.049	-0.011	0.022	0.055	0.101	0.105 .
	Vacancy rate	-0.188	-0.099	-0.044	0.049	0.468	0.000 ***	0.023	0.037	0.045	0.067	0.144	0.078 .
	Transport accessibility scores	0.037	0.137	0.203	0.295	0.650	0.020 *	0.042	0.062	0.079	0.095	0.118	0.691
	Ethnic diversity index							-0.231	-0.089	0.022	0.096	0.301	0.000 ***
	Road	-0.208	0.071	0.222	0.288	0.467	0.130	-0.096	0.025	0.084	0.158	0.261	0.001 **
	Sidewalk												
	Building	-0.173	0.154	0.214	0.319	0.588	0.474	-0.156	-0.057	-0.015	0.046	0.096	0.104 .
	Wall	-0.096	0.067	0.120	0.171	0.332	0.123	-0.015	0.008	0.023	0.038	0.080	0.893
	Fence	-0.040	0.038	0.065	0.106	0.238	0.793						
	Pole	-0.113	0.019	0.056	0.117	0.270	0.949						
	Traffic light							-0.016	-0.005	0.005	0.014	0.028	0.575
	Traffic sign												
	Vegetation	-0.104	0.150	0.228	0.342	0.498	0.034 *	-0.058	0.014	0.031	0.051	0.085	0.292
	Terrain												
	Person	-0.079	-0.005	0.075	0.104	0.216	0.759	-0.052	-0.017	0.003	0.013	0.037	0.568
	Rider	-0.047	0.001	0.030	0.055	0.207	0.260	-0.025	-0.010	-0.004	0.006	0.051	0.114
	Car							-0.127	-0.065	-0.027	0.004	0.124	0.004 **
	Truck							-0.020	-0.002	0.008	0.029	0.047	0.087 .
	Bus	-0.072	-0.020	0.012	0.050	0.084	0.484	-0.036	-0.015	-0.001	0.005	0.030	0.204
	Train												
	Motorcycle	-0.054	-0.019	0.030	0.071	0.159	0.593	-0.031	0.014	0.020	0.033	0.049	0.373
	Bicycle	-0.024	0.066	0.104	0.172	0.453	0.007 **	-0.047	-0.016	-0.003	0.016	0.054	0.039 *
	Adjusted R-squared	0.697						0.546					

		Criminal damage and arson						Robbery					
	Index	Min.	1st Qu.	Median	3rd Qu.	Max.	P value	Min.	1st Qu.	Median	3rd Qu.	Max.	P value
Social variables	The number of POIs	0.078	0.128	0.153	0.181	0.278	0.445	0.142	0.263	0.286	0.334	0.542	0.220
	The median income	-0.470	-0.307	-0.196	-0.131	-0.001	0.000 ***	-0.411	-0.246	-0.178	-0.121	0.041	0.488
	Vacancy rate	-0.119	-0.002	0.038	0.082	0.266	0.000 ***	-0.156	-0.005	0.066	0.120	0.379	0.039 *
	Transport accessibility scores	-0.071	0.032	0.078	0.135	0.343	0.001 **	0.031	0.194	0.278	0.440	0.636	0.000 ***

	Ethnic diversity index							-0.555	-0.026	0.098	0.231	0.782	0.010 **
	Adjusted R-squared	0.501						0.613					
Streetscape environmental variables	Road	-0.079	0.121	0.189	0.259	0.388	0.062 .	-0.118	0.273	0.383	0.530	0.872	0.323
	Sidewalk	-0.255	-0.125	-0.045	0.034	0.185	0.012 *	-0.278	-0.049	0.040	0.121	0.309	0.518
	Building	-0.116	-0.023	0.031	0.116	0.295	0.025 *	-0.031	0.104	0.187	0.273	0.636	0.506
	Wall	-0.071	-0.000	0.025	0.046	0.082	0.816	-0.036	0.031	0.068	0.107	0.227	0.755
	Fence	-0.012	0.033	0.051	0.084	0.171	0.295	-0.014	0.064	0.110	0.148	0.362	0.472
	Pole	-0.107	0.032	0.059	0.083	0.141	0.773	-0.097	0.065	0.100	0.129	0.183	0.998
	Traffic light	-0.035	-0.007	0.008	0.025	0.086	0.607	-0.023	0.010	0.029	0.057	0.175	0.504
	Traffic sign							-0.183	-0.110	-0.068	-0.022	0.207	0.551
	Vegetation							-0.197	0.055	0.113	0.142	0.176	0.099 .
	Terrain							-0.116	0.039	0.087	0.117	0.216	0.803
	Person	-0.016	0.067	0.089	0.116	0.168	0.781	0.108	0.187	0.218	0.249	0.358	0.889
	Rider							0.004	0.042	0.058	0.073	0.168	0.705
	Car							-0.353	-0.108	0.049	0.204	0.367	0.263
	Truck	-0.053	0.004	0.025	0.036	0.083	0.116	-0.076	-0.018	0.017	0.046	0.095	0.126
	Bus	-0.003	0.014	0.032	0.051	0.101	0.410	-0.010	0.027	0.047	0.072	0.152	0.533
	Train	-0.061	-0.027	-0.013	-0.002	0.010	0.814						
	Motorcycle												
	Bicycle	-0.096	-0.032	-0.003	0.008	0.082	0.053 .						
	Adjusted R-squared	0.322						0.499					
Combination of both	The number of POIs	0.113	0.129	0.138	0.149	0.181	0.938	0.200	0.235	0.246	0.273	0.364	0.846
	The median income	-0.346	-0.234	-0.180	-0.130	-0.070	0.001 **	-0.219	-0.174	-0.141	-0.106	-0.043	0.595
	Vacancy rate	-0.029	0.008	0.025	0.054	0.138	0.032 *	-0.062	0.008	0.048	0.072	0.166	0.457
	Transport accessibility scores	-0.003	0.052	0.077	0.100	0.133	0.173	0.131	0.176	0.200	0.255	0.376	0.176
	Ethnic diversity index							-0.202	-0.000	0.175	0.281	0.456	0.010 **
	Road	-0.046	0.045	0.089	0.124	0.187	0.706	-0.144	0.124	0.205	0.282	0.461	0.540
	Sidewalk	-0.155	-0.074	-0.041	-0.017	0.059	0.354	-0.221	-0.084	-0.026	0.041	0.162	0.574
	Building	-0.200	-0.087	-0.036	0.013	0.122	0.005 **	-0.254	-0.113	-0.045	0.011	0.098	0.824
	Wall	0.004	0.037	0.052	0.071	0.112	0.725	-0.004	0.069	0.091	0.118	0.193	0.794

	Fence	-0.008	0.008	0.016	0.026	0.051	0.973	-0.005	0.048	0.070	0.100	0.185	0.814
	Pole	-0.162	-0.028	0.005	0.022	0.052	0.356	-0.113	-0.017	0.012	0.048	0.116	0.982
	Traffic light	-0.020	-0.011	-0.005	0.005	0.037	0.769	-0.026	-0.009	0.005	0.015	0.076	0.439
	Traffic sign							-0.142	-0.106	-0.085	-0.039	0.098	0.570
	Vegetation							-0.174	0.027	0.051	0.072	0.096	0.512
	Terrain							-0.080	0.003	0.037	0.099	0.178	0.336
	Person	-0.026	-0.001	0.011	0.021	0.045	0.958	0.024	0.072	0.079	0.094	0.185	0.785
	Rider							-0.010	0.021	0.032	0.050	0.091	0.817
	Car							-0.280	-0.025	0.109	0.153	0.294	0.319
	Truck	-0.037	0.007	0.021	0.034	0.054	0.279	-0.037	-0.006	0.014	0.031	0.058	0.513
	Bus	-0.019	-0.004	0.010	0.022	0.047	0.371	-0.019	0.002	0.009	0.026	0.077	0.449
	Train	-0.041	-0.026	-0.019	-0.006	0.010	0.638						
	Motorcycle												
	Bicycle	-0.057	-0.034	-0.022	0.008	0.082	0.003 **						
	Adjusted R-squared	0.500						0.611					

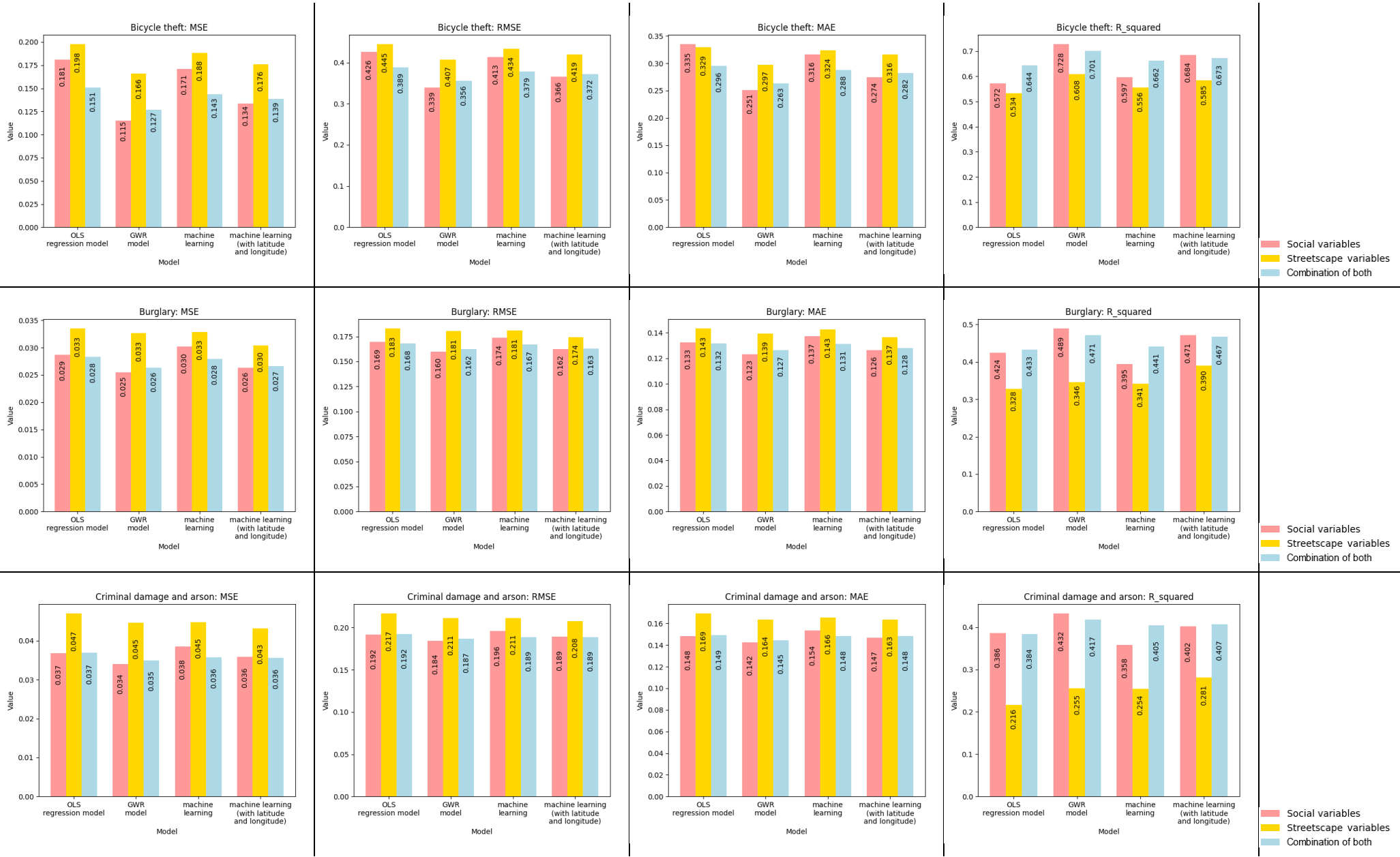
		Shoplifting						Theft from person					
	Index	Min.	1st Qu.	Median	3rd Qu.	Max.	P value	Min.	1st Qu.	Median	3rd Qu.	Max.	P value
Social variables	The number of POIs	0.330	0.503	0.612	0.682	0.890	0.741	0.106	0.305	0.377	0.487	0.728	0.087 .
	The median income	-0.598	-0.314	-0.185	-0.011	0.440	0.000 ***	-0.594	-0.280	-0.175	-0.045	0.270	0.326
	Vacancy rate							-0.252	-0.008	0.093	0.166	0.371	0.506
	Transport accessibility scores	-0.055	0.162	0.340	0.522	1.086	0.000 ***	0.059	0.328	0.489	0.699	1.368	0.000 ***
	Ethnic diversity index							-0.911	-0.186	-0.019	0.164	0.800	0.243
	Adjusted R-squared	0.397						0.753					
Streetscape environmental variables	Road	0.128	0.387	0.501	0.602	0.922	0.372	0.228	0.356	0.420	0.504	0.892	0.571
	Sidewalk							-0.154	-0.016	0.064	0.228	0.677	0.007 **
	Building							0.045	0.334	0.472	0.539	0.811	0.401
	Wall							-0.131	0.013	0.087	0.116	0.187	0.521
	Fence							-0.043	0.058	0.085	0.116	0.237	0.981
	Pole	0.075	0.140	0.182	0.220	0.332	0.986						

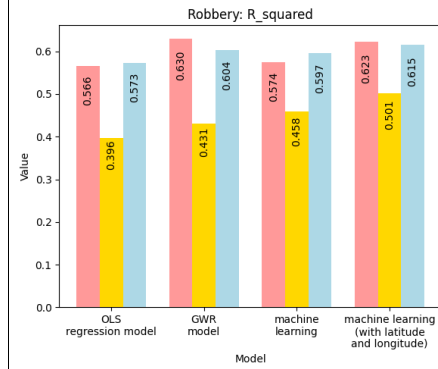
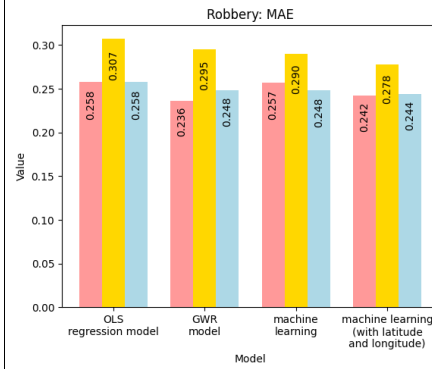
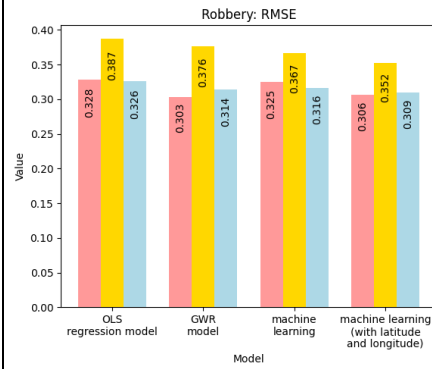
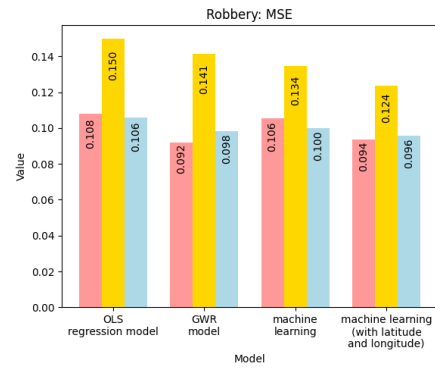
	Traffic light	-0.022	0.006	0.037	0.102	0.223	0.223	-0.028	0.017	0.047	0.089	0.195	0.690
	Traffic sign							-0.174	-0.102	-0.063	0.001	0.276	0.534
	Vegetation	-0.191	-0.135	-0.079	-0.026	0.058	0.521	-0.014	0.111	0.196	0.252	0.356	0.104 .
	Terrain							-0.062	0.021	0.080	0.130	0.282	0.187
	Person	0.250	0.301	0.358	0.460	0.620	0.134	0.135	0.309	0.346	0.395	0.511	0.818
	Rider							-0.009	0.029	0.046	0.062	0.198	0.335
	Car												
	Truck												
	Bus	-0.004	0.031	0.058	0.081	0.123	0.917	-0.013	0.053	0.087	0.104	0.174	0.630
	Train							-0.041	0.016	0.041	0.074	0.101	0.771
	Motorcycle	-0.107	0.038	0.078	0.117	0.220	0.200						
	Bicycle							-0.045	0.035	0.071	0.096	0.162	0.702
	Adjusted R-squared	0.293						0.665					
Combination of both	The number of POIs	0.306	0.377	0.486	0.605	0.843	0.523	0.212	0.278	0.303	0.324	0.359	0.737
	The median income	-0.323	-0.161	-0.093	-0.016	0.207	0.044 *	-0.225	-0.144	-0.116	-0.037	0.071	0.487
	Vacancy rate							-0.078	-0.004	0.022	0.068	0.160	0.827
	Transport accessibility scores	-0.093	0.016	0.141	0.280	0.684	0.001 **	0.180	0.270	0.311	0.400	0.638	0.085 .
	Ethnic diversity index							-0.379	0.033	0.108	0.144	0.269	0.417
	Road	-0.052	0.231	0.337	0.473	0.812	0.578	-0.081	0.128	0.227	0.319	0.567	0.315
	Sidewalk							-0.113	-0.062	-0.029	0.073	0.341	0.138
	Building							-0.328	0.009	0.221	0.311	0.481	0.013 *
	Wall							-0.078	0.026	0.087	0.114	0.186	0.271
	Fence							-0.044	0.017	0.055	0.101	0.139	0.853
	Pole	-0.234	0.001	0.083	0.133	0.332	0.819						
	Traffic light	-0.089	-0.024	0.004	0.067	0.200	0.100 .	-0.042	0.002	0.015	0.035	0.074	0.835
	Traffic sign							-0.178	-0.129	-0.093	-0.048	0.202	0.416
	Vegetation	-0.359	-0.170	-0.086	-0.035	0.099	0.415	-0.129	-0.002	0.142	0.226	0.356	0.000 ***
	Terrain							-0.107	0.006	0.036	0.104	0.182	0.025 *
	Person	-0.059	0.081	0.131	0.214	0.342	0.794	0.110	0.152	0.189	0.211	0.310	0.925
	Rider							-0.027	0.009	0.019	0.037	0.131	0.431

	Car												
	Truck												
	Bus	-0.079	-0.028	-0.008	0.014	0.080	0.983	-0.048	0.011	0.028	0.041	0.096	0.599
	Train							-0.044	0.013	0.040	0.056	0.094	0.774
	Motorcycle	-0.155	-0.003	0.053	0.110	0.270	0.201						
	Bicycle							-0.064	-0.010	0.016	0.042	0.114	0.563
	Adjusted R-squared	0.422						0.748					

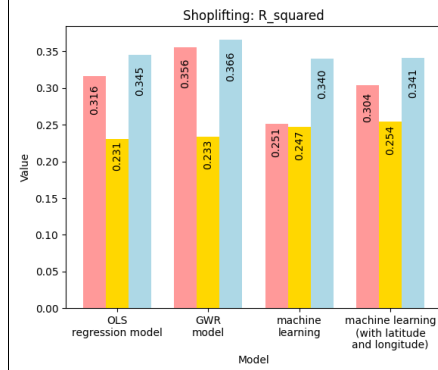
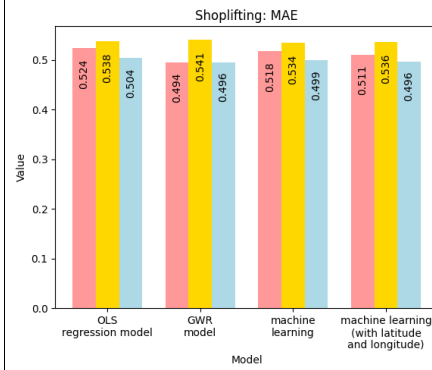
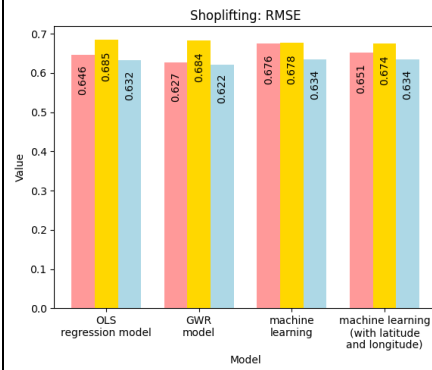
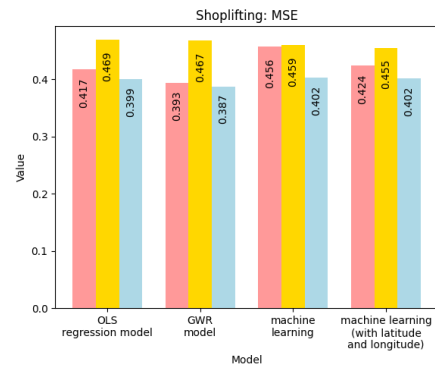
Note: *** p<0.001, ** p<0.01, * p<0.05, . p<0.1

Figure 1: MSE, MAE, RMSE and R-squared for predicting six types of crime rate in four models

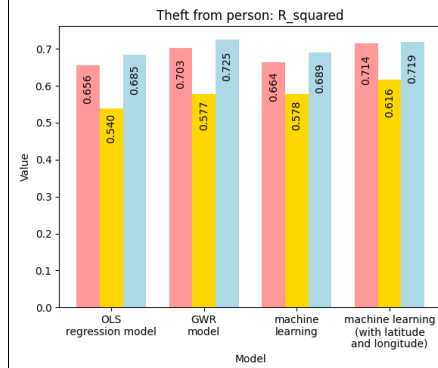
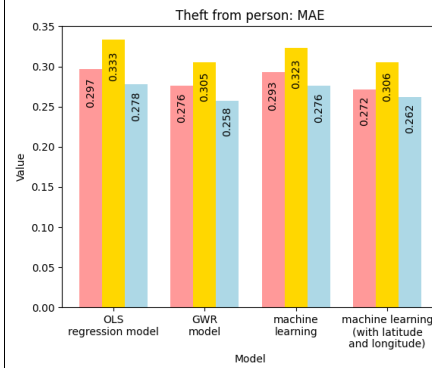
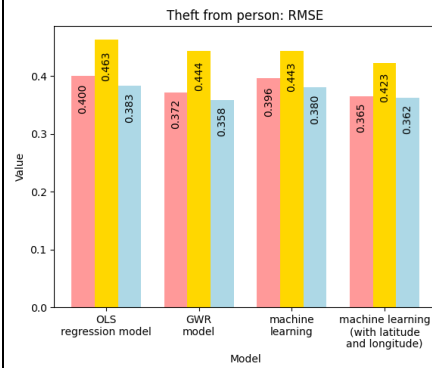
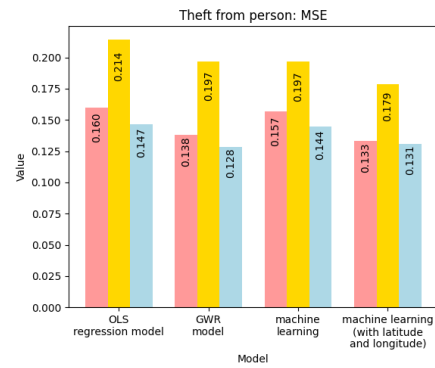




Social variables
Streetscape variables
Combination of both



Social variables
Streetscape variables
Combination of both



Social variables
Streetscape variables
Combination of both

Figure 2: Variable importance from random forest models for predicting crime rate

