

Data supplement for Vuolo and Kelly, Effects of County-Level Opioid Dispensing Rates on Individual-Level Patterns of Prescription Opioid and Heroin Consumption: Evidence From National U.S. Data. Am J Psychiatry (doi: 10.1176/appi.ajp.2021.21060602)

TABLE S1. Fixed-effects models for individual-level prescription opioid and heroin outcomes in the NSDUH from 2006-2016, odds ratios and 95% confidence intervals

| | Prescription opioids | | | Heroin | | |
|---|------------------------------|--|---------------------------|---------------------------|---|-------------------------|
| | Model 1: Past year misuse | Model 2: Frequency of past year misuse | Model 3: Dependence | Model 4: Past year use | Model 5: Frequency of past year use | Model 6: Dependence |
| County-level Opioid Dispensing Rate per 100 | 1.002*** (1.001,1.002) | 1.001** (1.001,1.002) | 1.003*** (1.001,1.004) | 0.999 (0.996,1.001) | 0.998 (0.994,1.002) | 0.999 (0.996,1.003) |
| <i>State-Level Policy Covariates</i> | | | | | | |
| Prescription Drug Monitoring Program | 1.037 (0.962,1.118) | 1.058 (0.974,1.150) | 0.949 (0.764,1.178) | 1.019 (0.746,1.393) | 1.257 (0.784,2.015) | 1.055 (0.678,1.641) |
| Good Samaritan Policy | 1.016 (0.956,1.081) | 1.005 (0.928,1.089) | 1.009 (0.843,1.207) | 0.746* (0.596,0.935) | 0.925 (0.657,1.303) | 0.671* (0.492,0.916) |
| Any Naloxone Access Expansion | 0.961 (0.898,1.029) | 0.952 (0.876,1.035) | 0.843 (0.704,1.010) | 1.158 (0.901,1.488) | 0.955 (0.625,1.461) | 1.224 (0.849,1.766) |
| Pain Management Clinic laws | 0.998 (0.931,1.071) | 0.990 (0.909,1.079) | 0.938 (0.778,1.131) | 1.176 (0.878,1.576) | 1.324 (0.839,2.087) | 1.244 (0.806,1.920) |
| Medical Marijuana Laws | 1.020 (0.949,1.097) | 1.011 (0.924,1.107) | 0.998 (0.804,1.238) | 1.102 (0.839,1.448) | 1.014 (0.681,1.511) | 1.015 (0.745,1.384) |
| <i>County-Level Covariates</i> | | | | | | |
| Percent Hispanic | 0.997 (0.994,1.000) | 0.997 (0.993,1.000) | 1.000 (0.992,1.008) | 1.014 (0.995,1.034) | 1.016 (0.994,1.039) | 1.009 (0.986,1.032) |
| Percent Black | 1.002 (0.998,1.005) | 1.001 (0.996,1.005) | 1.006 (0.996,1.016) | 1.006 (0.990,1.023) | 0.991 (0.972,1.011) | 1.002 (0.985,1.019) |
| Percent Unemployed | 1.045*** (1.021,1.070) | 1.060*** (1.030,1.091) | 1.029 (0.969,1.092) | 1.086 (0.990,1.191) | 1.216** (1.079,1.370) | 1.079 (0.966,1.206) |
| Percent Living in Poverty | 0.993 (0.980,1.006) | 0.997 (0.983,1.011) | 1.003 (0.979,1.027) | 0.947* (0.906,0.990) | 0.932* (0.876,0.991) | 0.945* (0.900,0.992) |
| Percent over 25 with a Bachelor's | 1.009*** (1.004,1.014) | 1.009*** (1.004,1.015) | 0.991 (0.981,1.002) | 1.013 (0.997,1.030) | 1.025* (1.003,1.047) | 1.018 (0.998,1.039) |
| Percent Foreign Born | 0.999 (0.994,1.003) | 0.997 (0.992,1.002) | 1.003 (0.993,1.014) | 0.986 (0.963,1.009) | 0.983 (0.954,1.013) | 0.998 (0.974,1.022) |

| | | | | | | |
|---------------------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Percent Female Headed Households | 1.001 (0.977,1.025) | 1.000 (0.974,1.028) | 0.989 (0.933,1.049) | 1.028 (0.945,1.119) | 1.087 (0.961,1.229) | 1.079 (0.980,1.188) |
| Household Income (thousands) | 0.999 (0.995,1.003) | 1.000 (0.996,1.005) | 1.008* (1.000,1.017) | 0.995 (0.980,1.009) | 0.997 (0.975,1.018) | 0.990 (0.974,1.005) |
| Metropolitan Area (vs. Large central) | | | | | | |
| Large central | 0.953 (0.882,1.031) | 0.944 (0.862,1.034) | 0.961 (0.806,1.147) | 0.780 (0.580,1.048) | 0.927 (0.605,1.419) | 0.899 (0.645,1.253) |
| Medium | 0.955 (0.889,1.025) | 0.959 (0.883,1.043) | 0.960 (0.806,1.142) | 0.821 (0.631,1.067) | 0.974 (0.690,1.374) | 0.684* (0.497,0.941) |
| Small | 0.927 (0.851,1.010) | 0.925 (0.837,1.021) | 0.945 (0.776,1.152) | 0.754 (0.519,1.095) | 0.900 (0.565,1.433) | 0.818 (0.498,1.343) |
| Micropolitan | 0.869** (0.792,0.955) | 0.862** (0.773,0.961) | 0.849 (0.686,1.052) | 0.636** (0.451,0.897) | 0.670 (0.438,1.026) | 0.557** (0.358,0.864) |
| Noncore | 0.846** (0.755,0.949) | 0.815** (0.713,0.931) | 0.821 (0.604,1.117) | 0.686 (0.441,1.067) | 1.233 (0.705,2.156) | 0.572* (0.330,0.990) |
| <i>Individual-Level Covariates</i> | | | | | | |
| Female (vs. Male) | 0.815*** (0.788,0.843) | 0.814*** (0.782,0.847) | 0.749*** (0.680,0.825) | 0.509*** (0.447,0.579) | 0.478*** (0.390,0.586) | 0.530*** (0.442,0.636) |
| Health Insurance | 0.774*** (0.737,0.813) | 0.749*** (0.711,0.789) | 0.696*** (0.625,0.776) | 0.578*** (0.499,0.669) | 0.532*** (0.418,0.677) | 0.543*** (0.448,0.658) |
| U.S. Born | 1.717*** (1.597,1.846) | 1.889*** (1.736,2.055) | 3.434*** (2.659,4.435) | 3.337*** (2.045,5.443) | 2.514* (1.118,5.651) | 3.860*** (1.971,7.562) |
| Race/Ethnicity (vs. White) | | | | | | |
| Black | 0.542*** (0.503,0.583) | 0.495*** (0.454,0.540) | 0.367*** (0.291,0.462) | 0.418*** (0.305,0.572) | 0.285*** (0.172,0.472) | 0.334*** (0.220,0.506) |
| Native American | 0.996 (0.845,1.174) | 1.037 (0.854,1.258) | 1.123 (0.711,1.773) | 0.756 (0.419,1.366) | 0.667 (0.338,1.315) | 0.611 (0.280,1.337) |
| Hawaiian Islander/Pacific Islander | 0.777 (0.557,1.083) | 0.767 (0.503,1.171) | 0.750 (0.335,1.679) | 0.757 (0.346,1.656) | 0.690 (0.143,3.329) | 0.609 (0.142,2.616) |
| Asian | 0.505*** (0.449,0.567) | 0.496*** (0.434,0.567) | 0.422*** (0.283,0.627) | 0.136*** (0.063,0.290) | 0.206*** (0.087,0.489) | 0.033*** (0.007,0.154) |
| Multi-racial | 1.000 (0.898,1.113) | 0.923 (0.804,1.058) | 0.877 (0.698,1.101) | 0.725 (0.465,1.129) | 0.843 (0.484,1.467) | 0.706 (0.379,1.312) |
| Hispanic | 0.693*** (0.656,0.733) | 0.654*** (0.611,0.700) | 0.495*** (0.401,0.610) | 0.615** (0.450,0.840) | 0.443** (0.261,0.750) | 0.654* (0.467,0.916) |

| | | | | | | |
|--|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Income bracket (vs. <20k) | | | | | | |
| 20k-49.9k | 0.909*** (0.874,0.946) | 0.917*** (0.874,0.963) | 0.904 (0.808,1.011) | 0.732*** (0.621,0.863) | 0.820 (0.613,1.097) | 0.647*** (0.509,0.822) |
| 50k-74.9k | 0.823*** (0.784,0.864) | 0.842*** (0.795,0.891) | 0.768*** (0.668,0.882) | 0.605*** (0.470,0.779) | 0.541*** (0.383,0.762) | 0.594*** (0.436,0.808) |
| 75k-99.9k | 0.759*** (0.712,0.808) | 0.797*** (0.742,0.856) | 0.704*** (0.591,0.840) | 0.574*** (0.438,0.751) | 0.540** (0.368,0.792) | 0.562** (0.398,0.793) |
| >100k | 0.757*** (0.716,0.800) | 0.764*** (0.715,0.817) | 0.795** (0.680,0.930) | 0.729* (0.565,0.942) | 0.712 (0.495,1.025) | 0.653** (0.479,0.890) |
| Educational Attainment (vs. < High School) | | | | | | |
| High School degree | 0.823*** (0.781,0.868) | 0.823*** (0.776,0.873) | 0.778*** (0.682,0.888) | 0.693*** (0.584,0.824) | 0.702* (0.534,0.924) | 0.739** (0.595,0.917) |
| Some College | 0.856*** (0.810,0.905) | 0.866*** (0.813,0.921) | 0.720*** (0.630,0.822) | 0.676*** (0.556,0.823) | 0.757* (0.575,0.997) | 0.763* (0.595,0.978) |
| BA/BS+ | 0.609*** (0.569,0.651) | 0.609*** (0.564,0.658) | 0.322*** (0.266,0.390) | 0.193*** (0.126,0.294) | 0.274*** (0.157,0.479) | 0.182*** (0.112,0.296) |
| 12-17 year-olds | 0.522*** (0.485,0.560) | 0.464*** (0.428,0.504) | 0.506*** (0.418,0.612) | 0.298*** (0.219,0.408) | 0.258*** (0.172,0.387) | 0.154*** (0.091,0.258) |
| Employment Status (vs. Full-time) | | | | | | |
| Part-time | 1.021 (0.971,1.074) | 0.996 (0.935,1.061) | 1.136 (0.977,1.321) | 1.380** (1.111,1.714) | 1.354 (0.999,1.835) | 1.180 (0.886,1.573) |
| Unemployed | 1.297*** (1.215,1.384) | 1.259*** (1.161,1.365) | 1.882*** (1.634,2.168) | 2.891*** (2.330,3.589) | 2.046*** (1.527,2.741) | 2.948*** (2.322,3.743) |
| Other/Not in labor force | 1.044 (0.987,1.104) | 1.007 (0.942,1.076) | 1.735*** (1.510,1.993) | 2.117*** (1.703,2.631) | 1.763*** (1.281,2.426) | 2.321*** (1.764,3.054) |
| Marital status (vs. Married) | | | | | | |
| Widowed | 1.630*** (1.396,1.903) | 1.469*** (1.173,1.839) | 2.554*** (1.760,3.706) | 4.833*** (2.856,8.177) | 3.040* (1.216,7.600) | 3.583*** (1.689,7.603) |
| Divorced/Separated | 1.523*** (1.426,1.626) | 1.529*** (1.416,1.650) | 1.986*** (1.666,2.367) | 3.132*** (2.282,4.297) | 3.664*** (2.282,5.882) | 2.850*** (1.916,4.238) |
| Never married | 1.706*** (1.619,1.797) | 1.728*** (1.626,1.836) | 2.031*** (1.745,2.364) | 4.211*** (3.170,5.593) | 4.390*** (2.960,6.511) | 4.544*** (3.067,6.731) |

Note: * $p < .05$; ** $p < .01$; *** $p < .001$. Exponentiated coefficients from logistic regression displayed (binary for past year misuse/use and dependence; ordinal for frequency); 95% confidence intervals in parentheses. All models include state and year fixed-effects, cluster-corrected standard errors for county, cohort effects measured by birth year (squared), and utilize sampling weights.