# CRIME RISK IN THE VICINITY OF A SEXUALLY ORIENTED BUSINESS: A REPORT TO THE CENTRALIA CITY ATTORNEY'S OFFICE

**REVISED REPORT**

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Analyzing a small subset of calls-for-service to the Centralia Police Department (CPD), R. Bruce McLaughlin concludes that crime risk in the vicinity of a sexually-oriented business at 1011 South Gold Street is no higher than in comparable areas of Centralia. Based on these data and on his interpretation of the crime-related secondary effects literature, McLaughlin concludes that the City has no legitimate public safety rationale for regulating sexually-oriented businesses. Analyses of actual crime data (*vs.* calls-for-service) refute McLaughlin's conclusion.

A sexually-oriented business opened at 1011 South Gold Street in Centralia during the second week of December, 2001. Compared to the preceding period, serious crime rises significantly in the vicinity of this address. Serious crime in the rest of Centralia falls during the same period, demonstrating that the large, significant adverse secondary effect is not part of a general secular trend in crime. In sum, the data show that the City has a legitimate public safety rationale for regulating sexually-oriented businesses.

**Crime Data**

Crime risk, defined loosely as the probability of criminal victimization, must be estimated from crimes, not *CFS*s. The vast criminology literature has not even one precedent for using raw *CFS*s to measure crime risk. Criminologists invariably measure crime with Uniform Crime Reports (UCRs) or sample surveys of victims.[1] The smaller, unpublished secondary effects literature has also typically used UCRs or analogous crime statistics.[2] This is not to say that

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[1] See, e.g., *Measuring Crime* (D.L. MacKenzie, P.J. Baunach, and R.R. Roberg, State University of New York Press, 1990). The criminological literature is consistent on this point. A search of four national criminology journals (*Justice Quarterly*, *Criminology*, *Criminal Law and Criminology*, and *Journal of Quantitative Criminology*) for the last three years found not one study that used *CFS*s to measure crime or crime risk.

[2] "Reports" that list *CFS*s to liquor license addresses are an apparent exception (*e.g.*, *A Study of CFSs to Adult Entertainment Establishments which Serve Alcoholic Beverages* by Capt. Ron Fuller and Lt. Sue Miller, Fulton County, GA Police Dept., June 13th, 1997). Such "reports"

*CFS*s have no valid uses. On the contrary, all urban police departments, including the CPD, collect these data for use in scheduling and budgeting.[3] But no police department uses *CFS*s to measure crime or public safety. Criminologists and police departments alike use *crime* to measure *crime*.

Given the nominal purpose of my analyses, I requested UCR data from the CPD. I requested Part I (or "Serious") crimes only. The eight Serious UCRs are homicide, rape, assault, robbery, burglary, theft, auto theft, and arson. The data were sent to me in rectangular formats with five columns corresponding to variables:[4]

- Type of crime (homicide, rape, assault, *etc.*);
- Date that the crime was committed;
- Time of day that the crime was committed;
- Address where the crime was committed;
- City council district where the crime was committed.

Each row of data in the files corresponded to a specific crime incident. The first incident in the files occurred on January 1st, 1996; the last occurred on October 17th, 2003.

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are often nothing more than computer print-outs, however. Although *CFS*s are used traditionally in liquor license reviews, they have little validity as measures of risk. Accordingly, secondary effects studies use crimes, particularly UCRs, and crime risk insurers use past victimizations, not past *CFS*s.

[3] These valid uses of *CFS*s are discussed in undergraduate policing texts. See, e.g., *Police Administration* by O.W. Wilson and R. McLaren (McGraw-Hill, 1978); *Police and Society* by R.R. Roberg, J. Crank and J. Kuykendall, (Wadsworth, 1999) or *Police Administration* by C. Swanson, L. Territo, and R. Taylor (Macmillan, 1993). All of these texts make the same points that I make about *CFS*s.

[4] The data were sent in ten spreadsheet files on two 3.5 inch diskettes: the files were named arbitrarily mccleary.xls, mccleary1.xls, mccleary2.xls, mccleary3.xls, theft0203.xls; theft0001.xls; theft9699.xls; aslt0002.xls; aslt9697.xls; aslt9899.xls; butg00.xls; burg9699.xls; burg0103.xls; and mcclearyvehtheft.xls. Copies of these files were given to the plaintiffs.

## Table 1 - Centralia UCRs

| | | | Per Day Statistics | | |
|---|---|---|---|---|---|
| **Crime Category** | **N** | **%** | **Mean** | **Var** | **Max** |
| Homicide | 5 | .0% | .0014 | .001 | 1 |
| Rape | 104 | .7% | .0346 | .037 | 2 |
| Assault | 3,428 | 22.4% | 1.1379 | 1.556 | 8 |
| Robbery | 292 | 1.9% | .0941 | .193 | 6 |
| Theft | 4,948 | 32.3% | 1.6543 | 2.630 | 11 |
| Burglary, General | 1,610 | 10.5% | .5380 | .616 | 8 |
| Burglary, Trespass | 1,997 | 13.0% | .6591 | .800 | 5 |
| Burglary, Vehicle | 2,220 | 14.5% | .7423 | 1.104 | 8 |
| Auto Theft | 723 | 4.7% | .2392 | .257 | 3 |
| Total UCR Personal | 3,829 | 25.0% | 1.2680 | 1.811 | 8 |
| Total UCR Property | 11498 | 75.0% | 3.8330 | 5.707 | 15 |
| Total UCR Serious | 15,327 | 100.0% | 5.1010 | 8.154 | 17 |

Table 1 reports the distributions of UCRs for Centralia. Like most police departments, the CPD uses an extensive set of categories for routine crime reporting. The categorical breakdowns in Table 1 are intended for broad descriptive purposes and to demonstrate an important mathematical property of crime in Centralia. During the 2,922 days between January 1st, 1996 and October 17th, 2003, more than 15,000 serious crimes were reported to the CPD. Approximately 75 percent of these crimes were property crimes, approximately 25 percent were personal crimes. The per-day statistics in the last three columns of Table 1 demonstrate that the daily UCR time series are "not different than" Poisson process outcomes. Technical details of Poisson variables are found elsewhere.[5] For purposes of this report, the Poisson distribution

[5] See, *e.g.*, A.C. Cameron and P.K. Trivedi, *Regression Analysis of Count Data*, Cambridge University Press, 1998. See "Confirmatory spatial analysis by regressions of a Poisson variable" (M. Stiger and R. McCleary, *Journal of Quantitative Anthropology*, 1989,

allows for a simple analysis and interpretation of the hypothetical crime risks associated with the sexually-oriented business in Centralia.

**Quasi-Experimental Design**

"Design" refers generally to the set of methods, or methodology, used to collect, analyze, and interpret data. Crime-related secondary effects are always analyzed in the context of a "quasi-experimental" design. Using the conventional notation of Campbell and Stanley[6], the strongest quasi-experimental design can be diagramed as

| | | | |
|---|---|---|---|
| Impacted Area | O | X | O |
| Control Area | O | . | O |

where "O" denotes an observation of the ambient crime risk and "X" denotes a variable that distinguishes the experimental and control units. In this case, "X" represents the presence of a sexually-oriented business in the (hypothetically) impacted area; the "O"s measure the total number of crimes recorded in the impacted and control areas during fixed periods of time before and after the sexually-oriented business opens.

Applications of this quasi-experimental design to the evaluation of crime- related secondary effects can differ in three ways:

- The size of the areas to be measured;

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2:13-38) for a spatial application. A simple test of the Poisson property relies on the fact that the Poisson mean and variance are equal. If the mean/variance ratio of the variable is smaller than the 95th percentile of a df=1 $\chi 2$ distribution (*i.e.*, smaller than 3.58), the variable is not different than Poisson.

[6] The design authority cited here is *Experimental and Quasi-Experimental Designs for Research* by D.T. Campbell and J.C. Stanley (Skokie, IL: Rand-McNally, 1966). A more recent authority by the same authors is *Quasi-experimentation: Design and Analysis Issues for Field Settings* by T.D. Cook and D.T. Campbell (Chicago: Rand-McNally, 1979).

- The control area or areas used; and
- The length of time that the impacted and control areas are observed.

In this present instance, each of these three factors is decided by characteristics of the phenomena as it was found in Centralia. Specifically,

- Given the geographical idiosyncracies of the neighborhood around 1011 South Gold Street, and the precision of the CPD data, the impacted area was defined as 250-foot radius around the address.
- Given that the major threat to internal validity is a general secular trend, the most reasonable control is the remaining area of Centralia. If a before-after change in the impacted area is due to a secular trend – *i.e.*, not to the operation of the sexually-oriented business – a similar before-after difference will be observed in other areas of Centralia. If not, the change observed in the impacted area must be due to the sexually-oriented business.
- Given the start-up date of the sexually-oriented business – December 10th, 2001 – and end of the CPD dataset – October 17th, 2003 – the post-intervention period lasts 677 days. To achieve a balanced design, the pre-intervention period was defined as the preceding 677 days.

The analytic results presented below are robust to routine variations of these three factors. If the post-intervention period is made longer, *e.g.*, or if the control area is defined as a random sample of 250-foot circles, the results are unchanged.

## Table 2a- Quasi-Experimental Results[7]

| | Impacted Area | | | Other Centralia | | |
|---|---|---|---|---|---|---|
| | **Post** | **Pre** | **$\nabla_{Impact}$** | **Post** | **Pre** | **$\nabla_{Other}$** |
| **Homicide** | 0 | 0 | **- 0 -** | 1 | 1 | **- 0 -** |
| **Rape** | 0 | 0 | **- 0 -** | 29 | 19 | **51%** |
| **Assault** | 3 | 2 | **40%** | 583 | 677 | **15%** |
| **Robbery** | 0 | 1 | **67%** | 72 | 60 | **20%** |
| **Theft** | 5 | 3 | **57%** | 1046 | 1148 | **9%** |
| **Burglary, General** | 7 | 1 | **500%** | 339 | 333 | **2%** |
| **Burglary, Trespass** | 0 | 0 | **- 0 -** | 425 | 430 | **1%** |
| **Burglary, Vehicle** | 2 | 1 | **67%** | 558 | 554 | **1%** |
| **Auto Theft** | 0 | 1 | **33%** | 190 | 136 | **40%** |
| **Part I UCR Person** | 3 | 3 | **- 0 -** | 685 | 757 | **10%** |
| **Part I UCR Property** | 14 | 6 | **223%** | 2558 | 2601 | **2%** |
| **Total Part I UCR** | 17 | 9 | **84%** | 3243 | 3358 | **3%** |

**$\nabla$: Increase; $\nabla$: Decrease**

### Quasi-Experimental Results

As reported in Table 2a, after the sexually-oriented business opened, total Part I UCR crime in the impacted area rose by 84 percent.[8] Over the same period, total serious crime dropped by three percent in the rest of Centralia. The difference between rise in the impacted

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[7] A preliminary report of this research used slightly different totals. This preliminary report was written before a site visit to the CPD. In the site visit, on December 12th through 14th, I audited the constituent crime reports underlying the raw data and, also, the CPD's reporting process. I discovered that one of the robbery incidents reported preliminarily had been double-counted; and that some of the crime incidents found in other non-robbery categories were better described as robberies. In my experience, most police department have idiosyncratic coding rules that make category-specific comparisons difficult.

[8] To avoid division by zero, a constant 0.5 was added to numerators and denominators of the $\nabla_{Impact}$ and $\nabla_{Other}$ percentages in Table 2. This "continuity correction" has a large effect on the smallest numbers. Significance tests were performed without the constant.

area and the decline in other areas is substantively large and statistically significant. Although the substantive and statistical significance can be reported in any number of ways, the conventional way involves the odds ratio statistic.

**Table 2b - Before/After Contrasts**

| | After | Before | Odds |
|---|---|---|---|
| **Impacted Area** | 17 | 9 | 1.8889 |
| **Other Centralia** | 3243 | 3358 | 0.9658 |
| **Odds Ratio** | | | 1.9559 |

As reported in Table 2b, the odds ratio for total Part I UCR crime is approximately 1.96. In effect, crime risk in the impacted area is 1.96 times greater than crime risks in other areas of Centralia. Under the null hypothesis, assuming that crime incidents are Poisson-distributed, the standard error for this odds ratio is .8076, indicating that an odds ratio larger than 1.96 would occur by chance alone less than one time in one-hundred trials or samples.[9]

The finding of a significant before-after effect in Centralia is consistent with the secondary effects literature in one important respect. When UCRs (*vs.* calls-for-service) are used to measure crime risk, and when the secondary effect is estimated in the context of a before-after quasi-experimental design, one finds an adverse secondary effect.

**Afternote on Software**

The CPD data were analyzed with ARCView and SPSS. On our part, the choice of

[9] Derivations of this standard error are found in most graduate level statistics texts. See, *e.g.*, p. 345 of Steve Selvin's *Statistical Analysis of Epidemiological Data* (New York: Oxford University Press, 1991).

software was a matter of convenience. ARCView was generally used for mapping and geo-coding while SPSS was used for Poisson analyses. Geo-coding in ARCView resulted in positive matches for 97.2 percent of the 15,327 incidents in the files; the 2.8 percent of the incidents that could not be geo-coded were discarded.