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Do Public Libraries Help Mitigate Crime? Evidence from Kansas City, MO

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Abstract

We examine the relationship between public libraries and local crime rates. Previous studies have looked at different factors that could account for changes in crime, but few have focused on cultural institutions as a primary factor. Using crime data from the Crime Open Database and library data from the Public Library Survey, we leverage the geolocation of crimes and libraries and explore opening a new public library branch in Kansas City, MO. We use a difference-in-difference strategy. Our results show that public library may reduce crime within its nearby proximity. In particular, we find within the nearby proximity of the library a substantial reduction of burglary, vandalism, robbery, fraud, and assault. However, such effects vanish in the distant proximity of the library.

Keywords: crime, public library, geolocation, cultural institutions, kansas city
JEL codes: R12, Z19

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1 Introduction

Crime rates and their associated expenses, including investigations, prosecutions, and incarcerations, cost the United States over $2.6 trillion in 2017 alone (Miller et al., 2021). From a Beckerian perspective, criminal behavior is influenced by rational incentives associated with the costs and benefits of the criminal enterprise (Becker, 1974). In this research, we examine to what extent criminal offenses are affected by urban amenities like public libraries.

Chalfin and McCrary (2017) provide an extensive review of the three main mechanisms to criminal activity deterrence: police, post-adjudication sentences, and the local labor market. In addition, the regional and urban literature provide insights on other features that may be important to explain local criminal activity such as gated communities (Helsley and Strange, 1999), private security measures (Hui-Wen and Png, 1994), neighborhood spatial concentration (Freeman et al., 1996), revitalization projects (Spader et al., 2016; Sandler, 2017), and public buildings (Phillips and Sandler, 2015).

Public libraries offer several programs to both children and adults by assisting with literacy and labor market outcomes, plus they provide a physical presence of local government in a community. Hence, public libraries can potentially affect the costs associated with criminal activity and act as a crime deterrent.

On the one hand, public libraries can be a focal point in the neighborhood by inducing an agglomeration of activity. The increased number of people in the area can make criminal activity more profitable due to more potential targets and an easier ability to evade deception. On the other hand, the public library building may be seen as another police presence in the neighborhood while also providing programs to children and adults, which will affect current and future labor market outcomes. The additional police presence should increase the costs associated with criminal activity by raising the probability of being caught. Public library programs should improve the non-criminal expected outcomes, thus reducing expected benefits from criminal activity.

Therefore, the potential effect of public libraries on criminal activity is primarily an empirical question. So far, very few studies have focused on the impact of the public library on crime rates. To the best of our knowledge, only one paper explicitly focuses on the relationship between public libraries and their effect on local crime rates. Porter (2014) utilizes administrative crime data from the Los Angeles Police Department and explores the changes in operating hours of public libraries. Porter (2014) finds that increases in operating hours negatively affect aggravated assault rates and car burglary, alongside burglary substitution effects as criminals move to farther areas.

From a more descriptive perspective, a Every Library Institute study found that national funding rates on libraries (per capita) increased from 1995 to 2016. They were accompanied by a nearly equivalent percentage drop in national crime rates (Woodworth and Sweeney, 2019). This trend, however, may be unique to libraries and not all publicly-funded cultural institutions. More broadly, Floyd (2016) found negligible effects of public centers on crime statistics, including homicide, assault, robbery, and burglary, but poorly developed or undeveloped public spaces were associated with increased crime. In addition, Zickuhr et al. (2013) report that people vulnerable to becoming involved in crime, whether as victims or witnesses, are also more likely to be economically disadvantaged. This at-risk population is also more likely to utilize freely available institutions to access internet services, such as public libraries.

Although there has been little attention paid to the effect of public libraries on criminal activity, there has been a development of recent literature examining the impact of public libraries on several outcomes, such as education, innovation, and labor market outcomes. Bhatt (2010) uses distance to the closest public library as an instrumental variable and finds positive effects on children reading and completing their homework and adverse impact on children watching television. In contrast, Rodríguez-Lesmes et al. (2014) find no impact of new public libraries in Bogota, Colombia on student performance. Gilpin et al. (2021) find that greater public library capital investment increases children's usage of library resources, which translates into better reading scores for nearby school districts.

Public libraries may flourish local innovation. Berkes and Nencka (2021) use a difference-in-differences approach to show that patenting rates rises for cities that received Carnegie funding to construct public libraries compared to cities that applied and qualified for the library grant but ultimately did not build their public libraries. Furthermore, Karger (2021) finds a positive effect of public library access during childhood on educational attainment and labor market outcomes. Lastly, using spatial econometric models, Ferreira Neto (2019) finds evidence of both direct and indirect effects of some public library programs on local labor market outcomes.

To investigate the effect of public libraries on criminal offenses, we focus on Kansas City, MO, and the opening of the Woodneath Public Library Branch. For over 20 years, Kansas City Public Library System only contained 12 public library branches, and in June 2013, the Woodneath Public Library Branch was inaugurated. We exploit the Woodneath Public Library opening as a unique quasi-natural experiment to examine how its presence affects the frequency of criminal offenses within its proximity.

Using data from the Crime OpenDatabase and the Public Library Survey, we leverage the geolocation of criminal offenses and public library branches and explore the local effect of the public library on criminal offenses incidents using a standard difference-in-differences strategy. Our results suggest public libraries may reduce criminal offenses within its nearby proximity. In particular, we find a reduction of burglary, vandalism, robbery, fraud, and assault within the nearby proximity of the public library building. However, such effects vanish in the distant proximity of the library. Along with the difference-in-differences framework, we also implement two robustness tests: (i) we study the impact of the library on criminal offenses on varying degrees of proximity, and (ii) we develop a placebo effect distribution to analyze the sensitivity of our results by randomly permuting library location for 1000 iterations.

We argue that understanding how different factors influence crime benefits and costs, particularly the opening of cultural and educational centers such as public libraries, becomes essential from both an individual and public finance perspective. Recent budget

cuts to public libraries and other institutions, which were aggravated by the Covid-19 pandemic have negatively impacted public libraries' services, staffing, and hours of operation, including temporary closures (Foote, 2020; Hunt Institute, 2021). Hence, given the positive spillovers generated by public libraries the individual and social benefits and costs are currently being underestimated.

The remainder of the paper is as follows. Section 2 describes the data and empirical strategy, and section 3 presents and interprets the results. Section 4 discusses our results by exploring crime and its relationship with public libraries and concludes our study.

2 Data and Empirical Strategy

2.1 Data

Our primary dataset is the Crime Open Database (CODE), which provides incident-level criminal offenses for 16 out of the 50 largest cities in the United States. The core data from CODE offers the exact location of each criminal offense (longitude and latitude), the type of criminal offense, and precisely when it occurred. We combine information from CODE with data from the Public Library Survey (PLS), which provides the census of public libraries in the US. The PLS data contains detailed information on each public library system, such as materials, programs, and usage by the public, including the location of each public library branch.

We subset only the criminal offenses incidents in Kansas City, MO, using CODE and PLS datasets from 2010 to 2019. Kansas City, MO, provides a fascinating study case because, for over 20 years, the public library system in the city only had 12 public library branches. In June 2013, the Woodneath Public Library Branch was inaugurated for the community. This particular case creates a quasi-experiment, as the new building, along with its new programs and resources available to residents, can be perceived as an exogenous shock.

Furthermore, we divide the different criminal offenses categories available in the

CODE dataset into four groups of offenses: offenses against property, people, society, and others. We expect that the opening of the Woodneath Public Library Branch affects crimes of opportunity rather than crimes of passion since the motivations behind crimes of passion are unlikely to be deterred by anything other than direct psychological interference (Schmideberg, 1946). Table 1 exhibits total offenses from 2010 to 2019 in the core of Kansas City, MO by each category.

Table 1: Total incidents of criminal offenses (Kansas City, MO, 2010-2019)

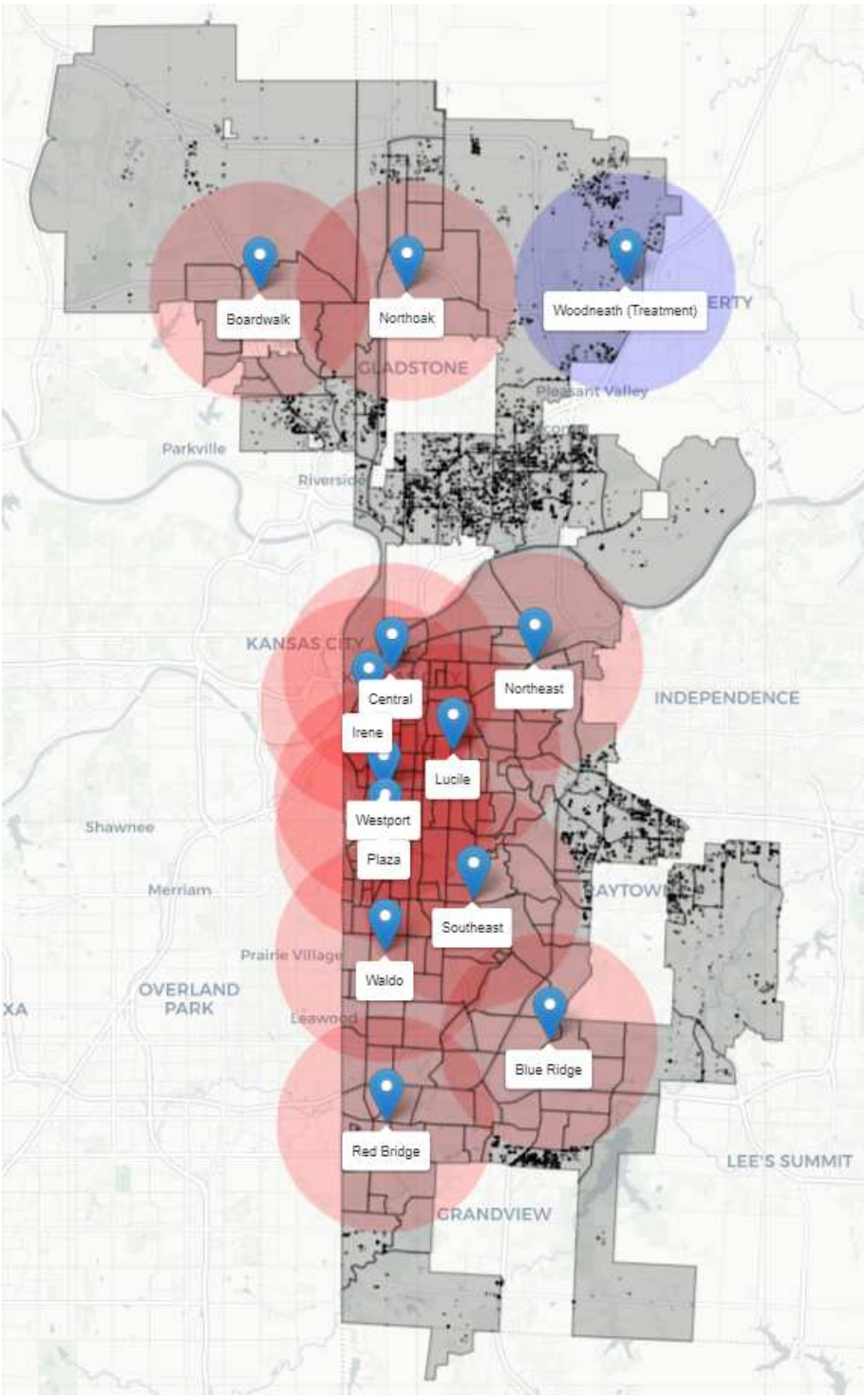
Offense	Count	Offense	Count
Offense against property:		**Offense against society:**	
larceny/theft offenses	282871	drug/narcotic offenses	55684
burglary/breaking & entering	116706	trespass of real property	30465
destruction/damage/vandalism of property (except arson)	102111	disorderly conduct	16483
motor vehicle theft	76320	driving under the influence	9653
robbery	52021	weapon law violations	9513
fraud offenses (except counterfeiting/forgery and bad checks)	36853	family offenses, nonviolent	6186
counterfeiting/forgery	10109	prostitution offenses	3178
stolen property offenses	5194	liquor law violations (except driving under the influence and drunkenness)	2408
arson	5015	drunkenness (except driving under the influence)	843
embezzlement	3817	curfew/loitering/vagrancy violations	764
bad checks (except counterfeit checks or forged checks)	290	pornography/obscene material	299
extortion/blackmail	107	peeping tom	47
bribery	4	gambling offenses	6
Offense against persons:		**Offense against other:**	
assault offenses	233870	all other offenses	84536
sex offenses	11550		
homicide offenses	2184		
kidnapping/abduction	1227		
sex offenses, nonforcible	734		
human trafficking	22		

2.2 Empirical Strategy

Figure 1 exhibits the identification strategy to partial out the plausible causal effect of the Woodneath Public Library Branch opening on various types of criminal offenses. In Figure 1, we label the 12 different pre-existing libraries in Kansas core and Woodneath branch, which opened in June 2013, as treatment.

The nearest public library from the Woodneath branch is the Northoak library, which is 5.92 miles apart. Therefore, to avoid the potential spillover of effect from the pre-existing library, we set the bound of the maximum distance for analysis as $\frac{5.92}{2} = 2.96$ miles in radius. In other words, our unique setting will only allow us to capture the plausible causal effect of the opening of the Woodneath branch up to 2.96 miles radius

Figure 1: Identification strategy utilizing difference-in-difference framework



Notes: Criminal offenses within the 2.96 miles in radius of pre-existing public library branches are not shown as they are excluded from our analysis. The black dots represent the location of criminal offenses. For the graphical illustration purpose, we only consider assault offenses.

proximity, which is colored in blue in Figure 1. Furthermore, to avoid potential spillover effects from the pre-existing public libraries on various criminal offenses, we exclude the vicinity of 2.96 miles radius of the pre-existing public libraries, colored in red.

Finally, any area that excludes the 2.96 miles proximity of Woodneath and the remaining pre-existing library can provide controls or comparison groups ($treat = 0$). We define the proximity of the Woodneath branch as the treatment group ($treat = 1$). We define our treatment time according to the month-year of the Woodneath branch opening. Thus we define pre-2013 as $post = 0$ and post-2013 as $post = 1$. We average criminal offenses incidents in treatment and comparison location proximity over time and define our outcome variable as an average annual criminal offense as Y. With these settings, we implement a standard difference-in-differences framework.

$$Y_{it} = \alpha + \beta treat_i + \gamma post_t + \delta(treat_i \times post_t) + \varepsilon_{it} \tag{1}$$

Y_{it} is the annual average criminal offenses incidents, where i is observation, and t represents year index. $treat_i$ is a binary indicator that takes a value of 1 for the location where the Woodneath Public Library Branch opens and 0 for the exclusion zone of greater than the 2.96 miles radius outside of Woodneath to avoid the spillover effects of pre-existing libraries. $post_t$ takes a value of 1 after the June 2013 opening of the Woodneath branch, and 0 otherwise. The interaction $treat_i \times post_t$ is the binary treatment indicator, which takes a value of 1 for the Woodneath branch after the June 2013 opening, and 0 otherwise. The coefficient α, β, γ, and δ are expressed as:

$$
\begin{aligned}
\alpha =& E[Y|treat = 0, post = 0] \\
\beta =& \left(E\left[Y|treat = 1, post = 0\right] - E\left[Y|treat = 0, post = 0\right]\right) \\
\gamma =& \left(E\left[Y|treat = 0, post = 1\right] - E\left[Y|treat = 0, post = 0\right]\right) \\
\delta =& \left(E\left[Y|treat = 1, post = 1\right] - E\left[Y|treat = 1, post = 0\right]\right) \\
& - \left(E\left[Y|treat = 0, post = 1\right] - E\left[Y|treat = 0, post = 0\right]\right)
\end{aligned}
$$

The coefficient α is an *intercept* term that gives the pre-Woodneath opening period, i.e., before June 2013, average criminal offenses within its vicinity. The coefficient of *treat* or β provides the difference in average criminal offenses before the June 2013 period between the proposed Woodneath location and existing public libraries. The coefficient of *post*, or γ, shows the difference in average criminal offenses before and after June 2013. Finally, δ is the parameter of interest that quantifies the change in criminal offenses incidents in the proximity of the Woodneath branch location, which may indicate a plausibly causal effect of Woodneath on the local criminal offenses.

3 Results

We report the estimates from difference-in-differences in Tables 2 to 4. Table 2 shows the effect of the Woodneath branch on the various property-related criminal offenses. Table 3 shows the impact of the Woodneath branch on the different society and person-related criminal offenses. Table 4 shows the implications of the Woodneath branch on total offenses against property, society, persons, all other offenses, and total offenses. In all these tables, the coefficient of interest is δ which is the interaction between $treat \times post$ and provides a plausibly causal effect of the opening of the Woodneath library branch on several classifications of criminal offenses.

The results in Table 2 show that several types of criminal offenses decrease post-

Table 2: Impacts of opening of Woodneath library on various property criminal offenses

	Criminal offenses counts						
	Lacerny	Burglary	Vandalism	Motor	Robbery	Fraud	Forgery
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
α : *intercept*	401.697***	171.800***	130.444***	82.926***	27.266***	61.957***	14.916***
	(16.428)	(6.365)	(6.328)	(4.342)	(2.397)	(3.407)	(1.255)
β : *treat*	−339.166***	−163.602***	−116.955***	−79.217***	−26.580***	−52.230***	−12.306***
	(16.847)	(6.421)	(6.413)	(4.388)	(2.429)	(3.552)	(1.355)
γ : *post*	20.273	33.721***	47.411***	13.633	11.061**	38.324***	6.826**
	(28.016)	(12.802)	(12.448)	(8.344)	(4.715)	(7.688)	(2.745)
δ : *treat* × *post*	−22.516	−31.380**	−41.747***	−15.733*	−11.475**	−30.921***	−3.751
	(28.740)	(12.933)	(12.618)	(8.434)	(4.786)	(8.021)	(2.962)
Observations	240	240	240	240	240	240	240
R^2	0.840	0.869	0.821	0.853	0.693	0.744	0.526
Adjusted R^2	0.837	0.866	0.817	0.850	0.687	0.739	0.516

Notes: Enclosed in the parenthesis we report robust-to-heteroskedasticity standard errors. The 1%, 5%, and 10% levels of significance are given as ***, **, and *, respectively.

opening of Woodneath library, particularly opportunity-based crimes such as vandalism, burglaries, robberies, and fraud. These criminal offenses are more likely to be responsive to some attributes associated with libraries, such as increased security (Chalfin and McCrary, 2017). In addition, motor-based criminal offenses, which are situationally dependent on various location features such as surveillance cameras and parking lot lighting (Clarke and Harris, 1992; Chalfin and McCrary, 2017), also decrease in frequency.

Table 3 demonstrates that criminal offenses not thought to be situationally dependent, such as sexual assault, DUIs, and weapons-based criminal offenses, are not impacted by the opening of the Woodneath library. This result is to be expected as crimes of opportunity are more responsive to situational factors than crimes of passion, such as murder and sexual assault (Becker, 1974); most sexual assaults are perpetrated by an assailant known to the victim, as are the majority of murders. Thus, crimes of passion are essentially not classified as opportunity-based crimes. Similarly, weapons-based crimes require a prior intention to carry a weapon. Therefore, these crimes are less apt to be subjected to opportunity factors that might create a transient increase or decrease in frequency.

Table 3: Impacts of opening of Woodneath library on society and person-related criminal offenses

	Criminal offenses counts					
	Trespass	Disorderly	DUI	Weapon	Assault	Sex
	(1)	(2)	(3)	(4)	(5)	(6)
α : *intercept*	7.404***	9.119***	6.150***	3.493***	184.479***	12.791***
β : *treat*	−6.591***	−8.389***	−5.597***	−3.295***	−169.743***	−11.278***
	(2.061)	(1.234)	(0.629)	(0.612)	(9.327)	(1.313)
γ : *post*	−7.692*	4.800*	0.079	−0.533	37.474**	2.296
	(4.193)	(2.469)	(1.111)	(0.997)	(19.044)	(2.216)
δ : *treat* × *post*	6.795	−4.590*	0.307	0.512	−41.097**	−1.422
	(4.281)	(2.573)	(1.150)	(1.011)	(19.185)	(2.285)
Observations	240	240	240	240	240	240
R^2	0.614	0.496	0.499	0.495	0.861	0.591
Adjusted R^2	0.606	0.486	0.489	0.484	0.858	0.582

Notes: Enclosed in the parenthesis we report robust-to-heteroskedasticity standard errors. The 1%, 5%, and 10% levels of significance are given as ***, **, and *, respectively.

Table 4 shows the effects of the opening of the Woodneath branch on total offenses against property, society, persons, all other criminal offenses, and total offenses. The only statistically significant impacts of criminal offenses are those against property and persons. The effect on criminal offenses against society and other criminal offenses is not different from zero. Their broader scope could explain these and reduce the likelihood to be based on situationally-specific factors.

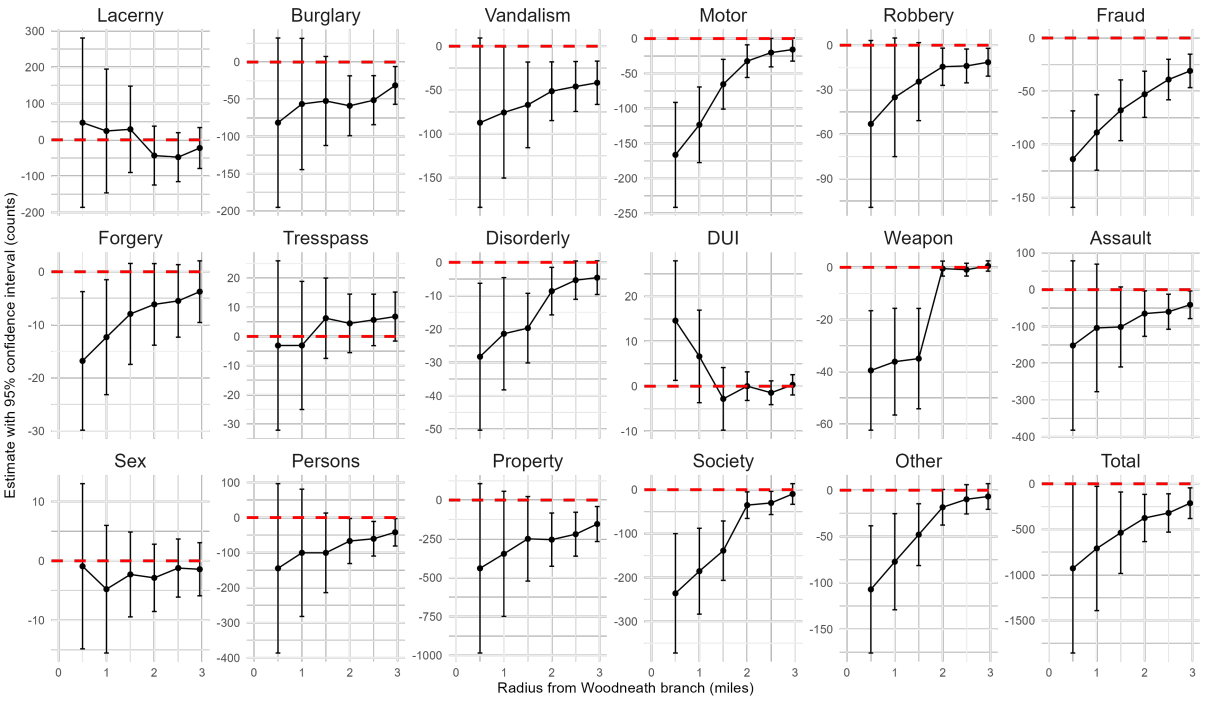
We can identify the causal effect of the opening of the Woodneath branch on various criminal offenses up to 2.96 miles without concerning the effect of spillover from other pre-existing libraries. We expand our analysis to explore different distances as treatment and perform our analysis for 0.5, 1, 1.5, 2, 2.5, and 2.95 miles of radius. The average treatment effect estimation based on standard difference-in-difference method is exhibited in Figure 2. The x-axis represents the radius from the Woodneath branch. The y-axis is the average treatment effect estimation based on the standard difference-in-differences method with 95% confidence interval based on robust heteroskedasticity standard errors.

Table 4: Impacts of opening of Woodneath library on total offenses

	Offenses against counts				
	Persons	Property	Society	Other	Total
	(1)	(2)	(3)	(4)	(5)
$\alpha : intercept$	199.176***	899.829***	88.499***	83.631***	1,271.134***
	(9.749)	(31.205)	(5.665)	(4.149)	(44.624)
$\beta : treat$	−182.754***	−797.438***	−79.459***	−74.941***	−1,134.592***
	(9.848)	(31.625)	(5.753)	(4.226)	(45.041)
$\gamma : post$	38.931**	168.668***	12.453	8.184	228.235***
	(19.788)	(56.830)	(11.856)	(6.946)	(85.128)
$\delta : treat \times post$	−41.974**	−154.473***	−9.779	−6.772	−212.998**
	(19.941)	(57.493)	(11.991)	(7.072)	(85.731)
Observations	240	240	240	240	240
R^2	0.867	0.886	0.782	0.823	0.890
Adjusted R^2	0.864	0.883	0.778	0.819	0.888

Notes: Enclosed in the parenthesis we report robust-to-heteroskedasticity standard errors. The 1%, 5%, and 10% levels of significance are given as ***, **, and *, respectively.

Figure 2: Impacts of opening of Woodneath library on various criminal offenses within its proximity



Notes: The dotted line horizontal line shows a null effect, bold dot shows the average impact of Woodneath branch, and vertical whiskers shows 95% confidence interval. This plot shows the distance based effects of Woodneath branch on various criminal offenses along with 95% confidence interval. The confidence intervals are based on robust-to-heteroskedasticity standard errors.

The results in Figure 2, are similar to the patterns observed in Tables 2 to 4. Crimes of opportunity, including vandalism and fraud, negatively correlate with increased proximity to the Woodneath branch. In contrast, crimes largely unaffected by opportunity (sex crimes, DUIs) are also unaffected by proximity to the library.

Our results in Table 2, 3, and 4 along with Figure 2 show the impacts of the Woodneath branch on various criminal offense-related variables. However, an obvious question is if such effects are plausibly causal or merely due to statistical chances. To answer this question, we randomly permute the treatment location. For this, we develop the placebo effect distribution, then custom test how unusual the actual treatment effect is against the mean of the placebo effect distribution.

We randomly permute treatment and run the standard difference-in-differences for 1000 iterations. From each iteration, we collect and store the value of the randomly

permuted treatment effect. Because we randomize the treatment assignment, we call these estimates the placebo effect. The distributions of placebo effects are exhibited in Figure 3. Then we custom test how many standard deviations the mean of placebo effect distribution is far from the actual treatment effect. Actual treatment effects is presented in Tables 2, 3, and 4. Hence,

$$Z = \frac{\overline{\delta}_{placebo} - \delta}{\sigma_{\delta_{placebo}}}$$

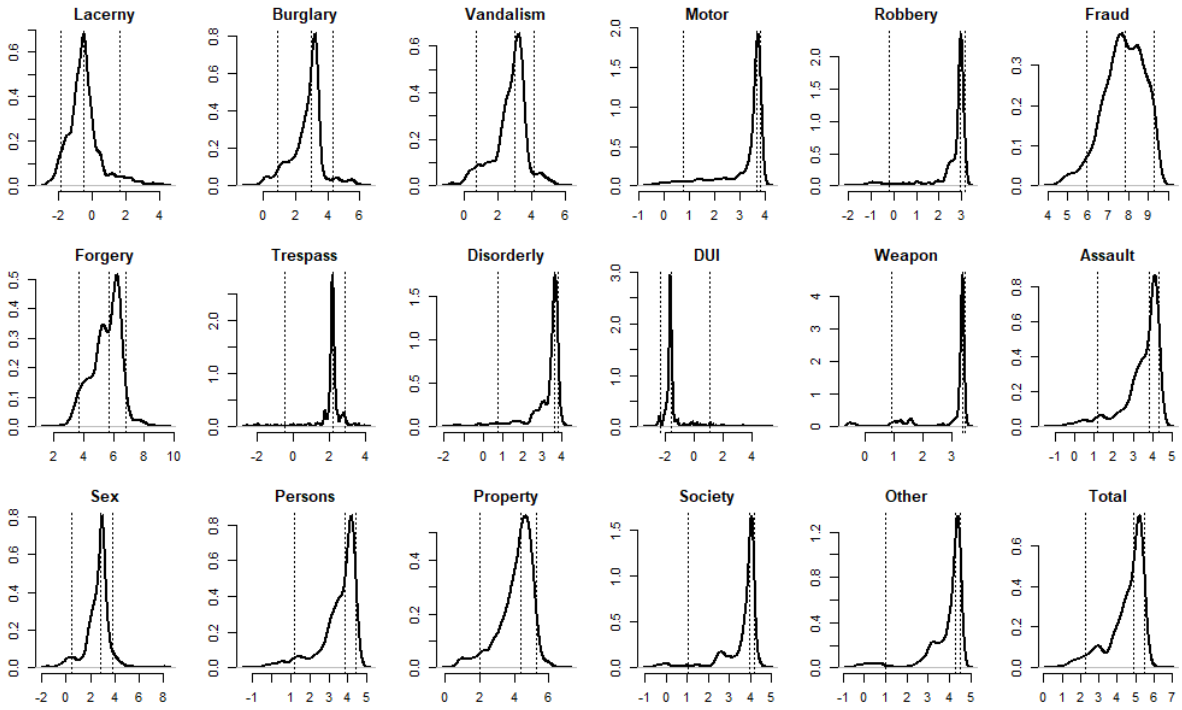
where, $\overline{\delta}_{placebo}$ is the vector which comprise 1000 values of randomized treatment effect, its respective standard deviation is $\sigma_{\delta_{placebo}}$. The Z-score distribution, presented in Figure 3, exhibits the placebo distribution compared to the actual treatment effect. The distribution should center around zero if the mean placebo effect is the same as the actual treatment effect. If zero is not included within the 2.5% quantile and 97.5% quantile of Z-score distribution, it corroborates that the mean placebo treatment effect is statistically significantly far from the actual treatment effect. Such results suggest that the actual treatment effects are plausibly causal and not statistical chance.

4 Discussion and Conclusion

Our paper sets out to understand the effect of public libraries on criminal offense incidents. We focus on Kansas City, MO, and explore the opening of the Woodneath public library branch, the first branch in the city in over 20 years. Using crime-incident level data from the Crime Open Database, we use the distance to a public library to determine treatment and comparison location areas and employ a classic difference-in-differences strategy. Our results suggest that public libraries can help reduce crimes of opportunity, thus acting as crime deterrent.

We discuss several reasons that might refer to why public libraries reduce criminal offenses. Chalfin and McCrary (2017) provide an extensive review of crime deterrence literature. A key concept explored by the authors is crime risk perception, i.e., how the

Figure 3: Treatment randomization placebo effect distribution



Notes: The Z-score distribution exhibits the distance of the placebo distribution compared to the actual treatment effect. If the mean placebo effect is same as actual treatment effect, the distribution should center around zero.

individual perceives risk and how this perception leads to a change in resulting criminal behavior. For example, a public library on its own would not pose much of a deterrence, but the additional components of a new piece of infrastructure, including increased numbers of pedestrians, security cameras, lighting fixtures, and new law enforcement patrol routes, may create the perception that crime is either easier or more challenging to commit; street lights, for instance, are widely perceived to be an environmental design that effectively reduces crime (Welsh and Farrington, 2002; Chalfin et al., 2021).

Libraries can act as a safe haven from the dangers inherent in street life– they position themselves as safe places through policies and procedures designed to protect employees, the public, and the building itself in instances such as natural disasters, emergencies, or civil unrest (Graham, 2013; Halsted et al., 2014). Most Americans believe that libraries are a safe place, with 69% agreeing that libraries are safe to hang out in (Horrigan, 2016). The fact that libraries have a widespread reputation as safe places could make

them an attractive target for vulnerable individuals to spend time in, thereby reducing their exposure to potentially dangerous street-level activities.

Multiple barriers can prevent vulnerable individuals from fully benefiting from public library resources. For example, access to materials that can boost education and literacy tends to be unequally distributed; Neuman and Celano (2001) report that those middle-class neighborhoods enjoyed a 13:1 ratio of books to children, but in areas with elevated poverty rates, this ratio rises to 1:300. Other obstacles include lack of public transportation to libraries located far away from economically depressed neighborhoods, the amount of time needed to travel to non-local public libraries, and low-income families' fear of library fines and late fees (DePrist, 2017).

Although our results show that public libraries reduce crimes of opportunity, our study is not without limitations. In previous paragraphs, we discuss some potential mechanisms for crime deterrence. However, we cannot disentangle nor quantify how these mechanisms are at work in our setting. In addition, there are other limitations to consider that might relate to selection bias. First, there is a lack of other local statistics to control for the possible time-varying feature of these communities. Second, all of the city regions have been treated to some extent. Third, the community has access to all public library branches, and the distance may be critical to explain its intensity. Lastly, the Woodneath public library building was under construction for four years before its inauguration, breaking ground in the Fall 2010, which could have induced different criminal offenses trends within this area during that time. For example, the introduction of expensive construction equipment and the influx of laborers in the area could have introduced new targets for crime proliferation between the Fall 2010 and Summer 2013, thus temporarily increasing crime statistics during that time and possibly biasing our estimates.

Future work will focus on addressing some of the concerns raised. Three possible extensions deserve special attention: the first would be using different identification strategies for extra robustness evaluation, such as synthetic control or different spatial defini-

tion of treatment and comparison groups. The second would explore potential differences across library programs, use, and materials to understand other mechanisms through which libraries may impact local crime. Lastly, since all city areas are somewhat affected by all public library branches in different intensities, spatial spillovers may be essential to explain some of these phenomena.

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