Do Schools Cause Crime in Neighborhoods?
Quasi-experimental Evidence from the Growth of Charter Schools in Philadelphia

JOHN M. MACDONALD, UNIVERSITY OF PENNSYLVANIA

NANCY NICOSIA, RAND CORPORATION

Working Paper Draft: October 21, 2013

This paper examines the impact of schools on crime in urban neighborhoods. The change in the public educational landscape with the rise of charter schools in Philadelphia provides a natural experiment to examine the effects that school locations have on crime rates. In this paper, we use data on the location and opening of charter and public schools to estimate the effect that school openings had on neighborhood crime patterns between 1998 and 2010. We estimate the change in crime counts in areas surrounding schools before and after their opening compared to areas where schools are always open. We find that crime in general goes down when schools open. The findings suggest that school locations play a minimal role in neighborhood crime production in Philadelphia.

MacDonald: 3718 McNeil, Suite 483, University of Pennsylvania, Philadelphia, PA 19104 (e-mail: johnmm@sas.upenn.edu). Nicosia: RAND Corporation, 20 Park Plaza, Suite 920, Boston, MA 02116 (e-mail: nicosia@rand.org). Support for this research was provided by the Centers for Disease and Control (U501CE00165). We are grateful to Jennifer Matjasko, Kristin Holland, and Tony Fabio for helpful comments and suggestions on an earlier draft of the paper. Points of view are those of the authors only.

Introduction

Do schools cause crime in neighborhoods? The location of schools often involves publicly-spirited debates about their influence on surrounding neighborhoods. Crime is among many concerns the public may raise in deciding where a school should locate. This isn't unreasonable. After all, any place that gathers hundreds of teenagers has the potential to generate problem

behaviors. Middle and high schools congregate youths during the peak of their crime-prone years. Victimization rates appear to be similar for youth on school grounds and away from school (Cook et al. 2010). It is reasonable to suspect that a share of away-from-school crime occurs while youth are en route to or from schools. On the other hand, schools also represent important neighborhood institutions. Families often choose specific housing because of both the quality and proximity to local schools (Black 1999). Schools are an important part of the social fabric of neighborhoods. Schools provide both the education amenity for children and a gathering place for neighborhood civic groups (Schneider et al. 1997; Warren 2005). Despite the importance of the question of whether schools cause crime in neighborhoods, the empirical literature examining this topic suffers from generally weak identification strategies. Cross-sectional research has dominated this literature, despite clear problems that selection imposes in trying to unpack the relationship between where schools locate and crime patterns. School locations in many urban cities were made decades before address-level data on crime were readily available, making longitudinal studies hard to come by. Moreover, the lack of any independent (or exogenous) source of variation in school locations in most cities has made identifying causal connections between schools and crime difficult.

Understanding the connection between school locations and crime has become ever more important as public school options have expanded to the private market, and increasingly cities are allowing students to attend privately run publicly-subsidized charter schools in urban cities (Hanushek et al. 2007; Zimmer et al. 2009). Local residents may resist the opening of charter schools and other publicly subsidized school options if schools cause crime levels to rise in neighborhoods. On the other hand, if schools have no causal connection to crime, this undermines the concerns that may be raised about public safety when a school proposes opening in an area. This paper uses a quasi-experimental design to examine crime changes in areas around schools after they open relative to areas where schools are always present.

The Pennsylvania Charter School Law of 1997 allowed the creation and expansion of charter schools in Philadelphia.[1] The city allowed four charter schools to open that first academic year (1997-1998), but has since expanded its charter schools to reach a total 63 by 2009. Research on Philadelphia charter schools suggests that the demographics of students in charter

[1] Details of act are outlined in the Philadelphia School District website at: http://webgui.phila.k12.pa.us/offices/c/charter_schools/ (accessed last: October 15, 2013)

schools were similar to those in the traditional public schools they left in terms of race, socioeconomic indicators, and prior education achievement (Zimmer et al. 2009). Many charter school students in Philadelphia come from economically-disadvantaged families and neighborhoods. Between the 2000-01 and 2007-08 school years, 57% of the students attending charter schools in Philadelphia switched out of a traditional public school (Zimmer et al. 2009). By 2009, nearly 1 out of every 5 public students had enrolled in charter schools. Many charter schools opened in disadvantaged neighborhoods, such that if schools themselves generate crime one might expect crime to increase in an area after they opened. We capitalize on this large shift in the location of schools in Philadelphia to estimate the link between school locations and crime. We improve on previous efforts to examine this issue by relying on a difference-in-differences design. Our design is similar to recent research in economics of education (Billing, Deming, and Rockoff 2012) in that we seek to capitalize on exogenous sources of variation in school locations to examine the consequences on crime in areas surrounding schools.

Background

In criminology, the type of land use has long been recognized as a correlate of differences in neighborhood crime rates (see Anderson et al. 2013). Among land use types, public schools have long been considered a source of variation in neighborhood crime (Roncek and Lobosco 1983). These studies generally find that middle schools and high schools are correlated with higher crime rates in neighborhoods (Gouvis-Roman 2004; Roncek and Faggiani 1985; Roncek and Lobosco 1983; Murray and Swatt 2010; Wilcox et al. 2005; Willits et al. 2013). A classic example in this literature are two studies by Roncek and colleagues that find residential areas within the adjacent blocks of public high schools have higher crime rates than residential areas further away from schools, even after controlling for other forms of land use, housing characteristics, and the population composition of residents (Roncek and Lobosco 1983; Roncek and Faggiani 1985). The correlation between elementary school locations and crime is less clear (Murray and Swatt 2010; Kautt and Roncek 2007). Research suggesting that elementary schools are correlated with less crime (Murray and Swatt 2010) may be simply describing crime as a function of population composition, as elementary school aged-children rarely commit crimes and are rarely arrested (Farrington 1986). Previous cross-sectional research has found that crime is lower around private compared to public schools (Roncek and Lobosco 1983). To summarize,

the substantial body of research examining the connection between school locations and neighborhood crime seems to provide consistent evidence of a link between schools and crime, but an important concern is that much of this literature has relied almost exclusively on cross-sectional designs that cannot address substantial the selection concerns likely to undermine causal inference.

There are only a few studies with longitudinal designs that have examined the effects of school closings on neighborhood crime rates. For example, a series of studies examine the consequences of Catholic elementary school closings on crime rates in Chicago neighborhoods (Brinig and Garnett 2010; 2011; 2012). These studies suggest that crime declines more slowly (i.e. relative increase) in neighborhoods when Catholic schools close compared to other neighborhoods in Chicago. The authors argue that the selection of Catholic schools to be closed is driven largely by the preference of parish priests and is not related to observable neighborhood differences in demographics, suggesting that school closings may be part of the causal process in neighborhood crime changes. The presence of a charter school replacing a closed Catholic school also appears to have no material effect on crime rates, suggesting that the Catholic school institution itself may have crime prevention benefits (Brinig and Garnett 2012). However, it is not possible to determine from these studies whether crime shift is due to school closing in general or some specific aspect of Catholic school closings signals declining neighborhood institutions.

Without an exogenous source of variation in school locations, identifying the causal effect of schools on crime remains difficult. We don't know if schools are more likely to open or close in high-crime areas or if the simple shift of school-age youth into an area causes more crime. The selection of school settings also undermines the standard regression approach seen in this literature, even for studies that employ more sophisticated spatial models (Willits et al. 2013). Communities with more resources, for example, may have greater voice in determining school locations. Similarly, residential sorting may also affect the type of school that opens in an area, as wealthy areas may welcome elementary schools more than middle or high schools. The decisions to close schools may also be related to differences in neighborhood social conditions. Even with longitudinal designs, standard fixed effects models may also be insufficient if "changes" over time are endogenous to these sorting mechanisms.

Schools sort more children into a location which creates more opportunities for crime by shifting the number of kids in a given neighborhood. Basic criminal opportunity theory would

expect crime to increase by increasing the supply of would-be perpetrators and victims in a given area (Cook 1986). Quasi-experimental research in economics confirms that the presence of students in schools impacts crime. Jacob and Lefgren (2003), for example, use teacher in-service days as a source of exogenous variation in the days when students do not attend school. They find that property crimes decrease by 14% on days when students are not in school, but violent crimes increase by 28% on days when students are in school. Relying on the variation in student attendance due to teacher strikes, Luallen (2006) also finds that violence increases and property crimes decrease during days when students are attending school compared to days when they are not due to teacher strikes. These studies suggest that schools may be a source of violent crime (largely due to student-on-student assaults), but that property crimes also decline as students are taken off the streets (i.e. incapacitated) to attend school.

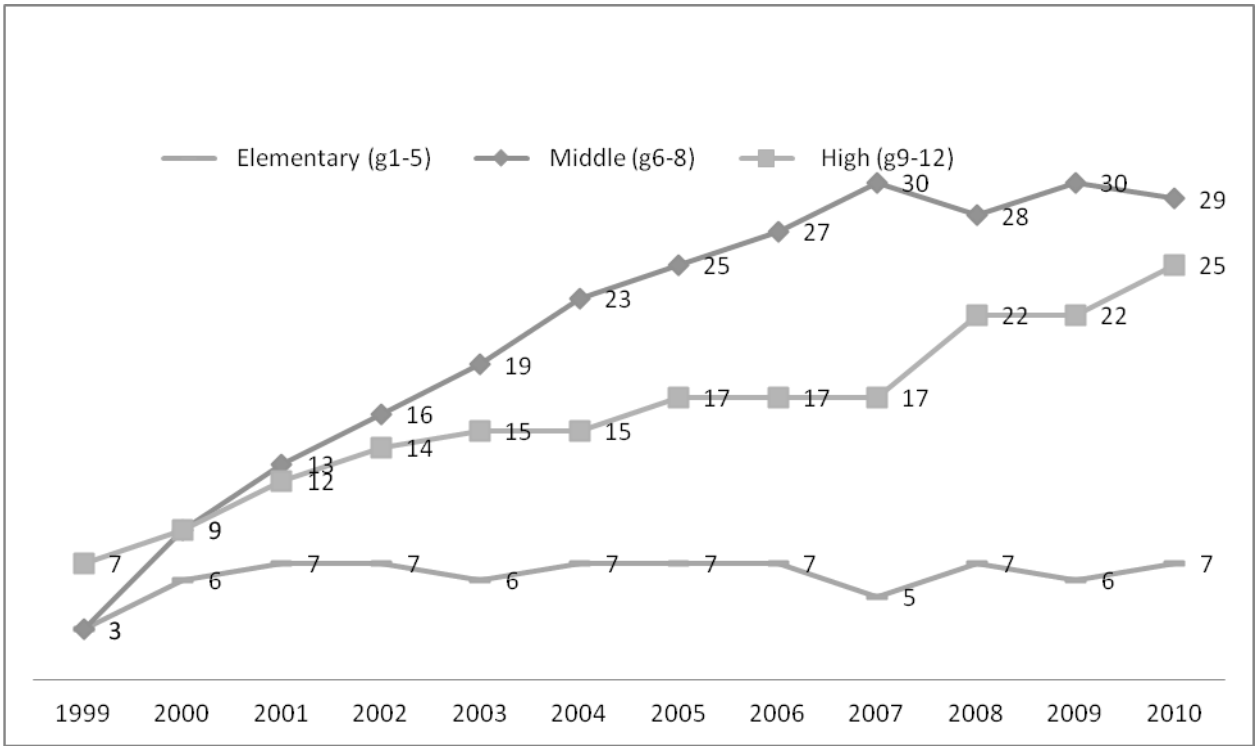
While these studies are instructive to the crime suppressing and generating effects of schools, they rely on variation in attendance with the school location as fixed and so do not directly address whether school locations cause crimes in neighborhoods. It is possible that schools may reduce crime overall in a city by providing social control of children during the day, but the location of schools still has an impact on crime in an area by congregating more crime-prone individuals in an area. The location of schools, for example, may generate thefts and burglaries in adjacent neighborhoods as students travel to and from school locations, as theories of criminal opportunities suggests (Cohen and Felson 1979; Cook 1986). In the current study, we seek to identify the connection between school locations and crime by capitalizing on the changes in school locations ushered in by legislation that enabled the establishment of charter schools in Philadelphia.

Philadelphia Charter Schools

Legislative reforms in Pennsylvania in 1997 allowed for publicly-funded charter schools to open. The legislation was passed with underperforming school districts like Philadelphia in mind. In an effort to promote access to private school markets for economically-disadvantaged students this legislation allowed for the creation of charter schools. The number of children affected by charter schools is no longer marginal. The School District of Philadelphia (SDP) is the 5th largest school district in the United States. In 1999, only 7,508 students were enrolled in

charter schools compared to 179,388 in public schools. By 2009, charter schools in Philadelphia enrolled nearly 1 in every 5 students: 31,704 students compared to 139,598 in public schools (NCES Common Core Data). The expanded locations throughout Philadelphia permitted increased access to charter schools in many disadvantaged areas (Zimmer et al. 2009). Figure 1 shows that the growth of charter schools was concentrated among middle and high schools students – schools that serve the age groups that are most crime prone.

FIGURE 1 - CHARTER SCHOOL GROWTH CONCENTRATED AMONG OLDER CHILDREN



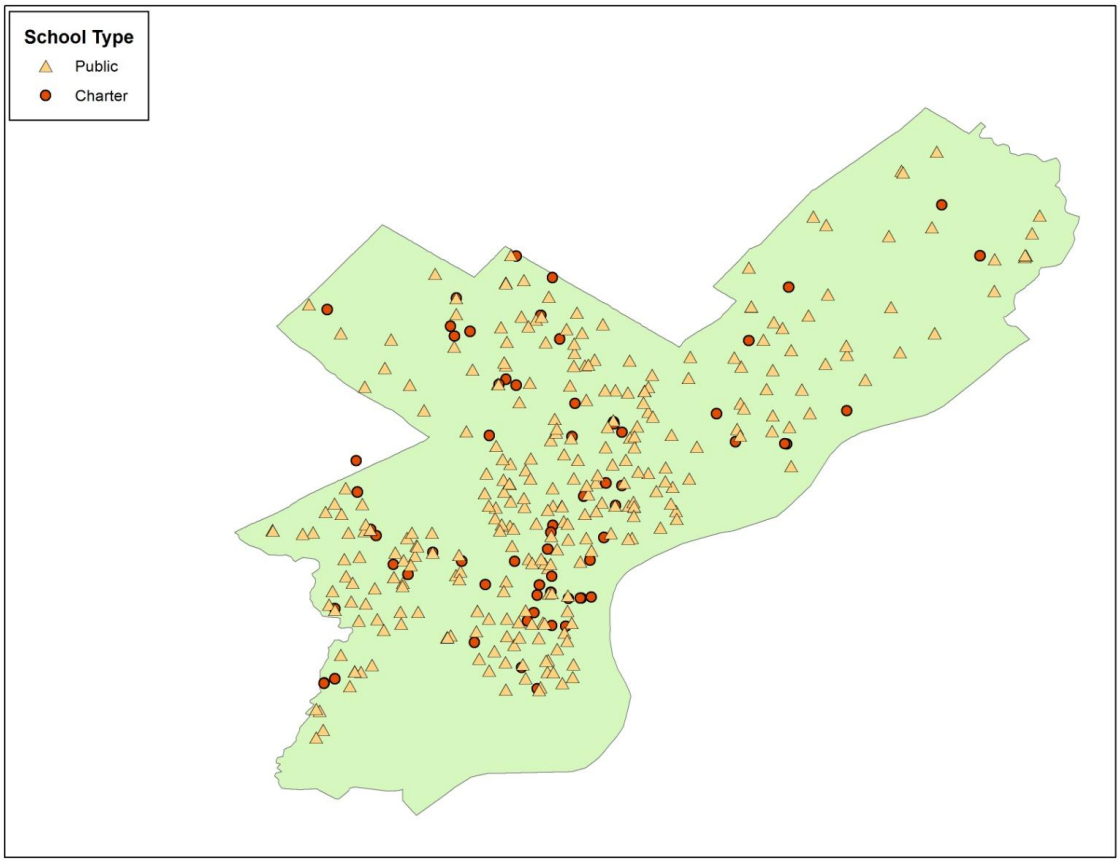
Source: NCES Common Core data from 1999 to 2010 compiled by Brian McInnis.

Philadelphia neither has a shortage of open land nor does it have restrictions on commercial land uses that would limit where charter schools can locate.[2] As a result, charter schools were able to locate throughout the city's commercially-zoned building spaces. Figure 2 maps the locations of public and charter schools for in Philadelphia in 2010. The key to our methodology

[2] Imberman (2011), for example, uses the physical property available to facilitate charter school openings to identify the impact of charter schools on academic and behavioral outcomes of non-charter students.

is that the location patterns change over time as the number of charter schools grows from 4 new school locations in 1998 to 63 in 2010.[3]

FIGURE 2 – LOCATION OF PUBLIC AND CHARTER SCHOOLS IN 2010



Note: Map produced from NCES Common Core data by Aaron Kofner, RAND Corporation.

Design and Empirical Methods

In this study, we leverage charter school openings in Philadelphia between 1998 and 2010 to examine the effect of schools on neighborhood crime rates. To estimate the impact of school openings on neighborhood crime patterns, we employ a differences-in-differences design. This approach compares changes in crime before-and-after schools open to changes in areas where schools are always present. We further refine our comparisons by adjusting for the day-of-week

[3] http://webgui.phila.k12.pa.us/uploads/I_/sB/I_sBf-RqPrh5OAqkz-oldA/Charters-opening-year-by-year-October-2010-1-Sheet3.pdf

on which the crime occurred, the quarter, and the year of occurrence according to the following model:

(1) $Crime_{s,d,q,y} = \mu + \varphi_s + \lambda_d + \phi_q + \theta_y + \beta_1 Open*Public_{s,d,q,y} + \beta_2 pen*Charter_{s,d,q,y} + \varepsilon_{s,d,q,y}$

We estimate changes in overall reported crime, violent, property, and by individual types that are most prevalent (assault, theft, and burglary)[4] around schools before and after they open. We construct counts of crimes overall and by type based on distances[5] of one-tenth and one-quarter of a mile around each school location. We estimate two specifications: one for the count of crime on any day and one for the count of crimes in a given quarter. The daily count model includes fixed effects for day of the week to account for weekdays when schools are likely in session. And it includes fixed effects for the year and quarter that the crimes are reported to account for the general secular trends and seasonality in crime. The quarterly count model just identifies off of the changes in crime before and after openings adjusting for quarter and year fixed effects. We separately estimate the effects of charter versus public school openings in comparison to areas that always have public schools. Charter school openings are more frequent, representing roughly 71% of openings during this time period (n=59 charter opened v. n=24 public schools opened, NCES Common Core data) and likely have a more exogenous source of variation compared to public schools. The strength of this design is that our estimate of how schools affect crime is identified from comparing within-school location changes in crime before and after schools open compared to those always open, and therefore controls for time stable differences in poverty and other factors between schools as well as factors that are common to all areas where schools are located. The primary limitation is that we cannot estimate what would happen to crime in neighborhoods that never have schools.

[4] Crime overall is measured by the sum of the count of the following eight offenses: assault, theft, burglary, disorder (arrests), public drinking, illegal dumping, homicide, and robbery. Violence is measured by the sum of the count of assault, homicide, and robbery. Property is measured by the sum of the count of theft and burglary.

[5] We use the Euclidean distance given the short distances around schools from which we are calculated changes in crime. We could have used network distance based on roadways, but such a calculation would require one to assume that distances on the road only matter, when in fact students can easily walk through alleys and vacant lots. We also attempted greater distances but found that there was significant overlap between schools when we did so. As a result, our analyses focus on 1/10 and 1/4 mile

Data

We construct counts of crimes that occurred around each of 365 school locations in Philadelphia as indicated in the National Center for Education Statistics Common Core of Data for school years 1998 to 2010.[6] We first create a list of all school locations in Philadelphia from these data. We then match de-identified crime data provided to the University of Pennsylvania Cartography Lab by the Philadelphia Police Department for the years 1998 to 2010. These data had the exact geographic (x-y) coordinates of each crime and the date that the crime event occurred. We then calculated the count of crimes that occurred each date within a 1/10 and 1/4 of a mile buffer (Euclidean distance) around the location of each school that existed any time between 1998 and 2010. This strategy allowed us to count crimes before and after schools opened as well as around schools that always were open for each day that a crime occurred. Table 1 provides a descriptive summary of the average counts of crime overall and by public and charter school type.

TABLE 1: SUMMARY STATISTICS OF COUNTS OF CRIME BY DAY AND QUARTER

	1/10 mile	*All*	*Property*	*Violent*	*Assaults*	*All theft*	*Burglary*
Daily	Open Public	.107	.072	.026	.016	.075	.019
	Min-Max	(0-16)	(0-13)	(0-10)	(0-10)	(0-13)	(0-7)
	Observations	1,421,462	1,421,462	1,421,462	1,089,041	1,089,041	1,089,041
	Open Charter	.062	.048	.009	.005	.056	.069
	Min-Max	(0-16)	(0-13)	(0-5)	(0-4)	(0-13)	(0-10)
	Observations	342,821	342,821	342,821	261,139	261,139	261,139
Quarterly	Open Public	10.30	6.96	2.54	1.23	5.50	1.46
	Observations	14,848	14,848	14,848	14,848	14,848	14,848
	Open Charter	5.87	4.56	.916	.376	4.05	.507
	Min-Max	(0-562)	(0-472)	(0-99)	(0-53)	(0-454)	(0-67)
	Observations	3636	3636	3636	3636	3636	3636
	1/4 mile	*All*	*Property*	*Violent*	*Assaults*	*All theft*	*Burglary*
Daily	Public	.459	.297	.126	.080	.299	.088
	Min-Max	(0-23)	(0-22)	(0-19)	(0-19)	(0-15)	(0-22)
	Observations	1,421,462	1,421,462	1,421,462	1,089,041	1,089,041	1,089,041

[6] http://nces.ed.gov/ccd/

	Charter	.432 (0-28)	.30 (0-16)	.092 (0-7)	.056 (0-7)	.326 (0-16)	.007 (0-8)
Quarterly	Open Public	44.01	28.46	8.76	4.06	23.47	4.97
	Min-Max	(0-674)	(0-548)	(0-124)	(0-70)	(0-521)	(0-85)
	Observations	3636	3636	3636	3636	3636	3636
	Open Charter	40.76	28.45	8.76	4.06	23.47	4.97
	Min-Max	(0-674)	(0-548)	(0-124)	(0-70)	(0-521)	(0-85)
	Observations	3636	3636	3636	3636	3636	3636

Note: Minimum and maximum values list in parentheses.

Figure 3 displays of the average count in each quarter of all crimes at .25 a mile around each school location between 1998 and 2010. The graph implies that crime was going down on average over this time period. There is a slight appearance of a greater decline around the areas that charter schools opened. But, this graph is only an illustration of trends and does not provide any strong identification.

FIGURE 3 – AVERAGE QUARTERLY COUNTS OF CRIME ¼ MILE SURROUNDING ALL SCHOOLS, 1998-2010

Results

The results from the estimated Model 1 are displayed in Table 2. Contrary to expectations from the schools as places of crime literature, we find that school openings are associated with fewer crimes at the 1/10 of a mile radius. The point estimates for all crimes, property, and violence provide a consistent picture. Schools opening in an area appear to reduce its crime rate relative to that which existed before. And, it is important to underscore that these results are in comparison to other areas that schools are always present. The estimates for the most common crimes of assault, theft, and burglary are also consistently negatively associated with the opening of schools. The relationship for violent crimes appears stronger for charter school openings while that for property crimes appears stronger for public school openings. For crime overall, a public school opening is associated with roughly a 19% decrease in the predicted count of crime ([exp(-.20)=0.812]). For charter school openings, overall crime is predicted to drop by 12% ([exp(-0.120)=0.886]). The point estimates are nearly identical for the quarterly counts of crime around schools. Due to the large sample sizes, these estimates are fairly precise. Given that the average count of crime on any given block around a school in a day or quarter is relatively low, these point estimates should be considered in their proper context. The findings in general suggest that within a block of a school, its opening is associated with a significant reduction in crime over and above the general secular trends in crime and compared to areas where schools are always open.

TABLE 2: ESTIMATES OF SCHOOL OPENINGS ON DAILY AND QUARTERLY CRIME AT 1/10 OF A MILE

Daily	1	2	3	4	5	6
	All	Property	Violent	Assaults	All theft	Burglary
Open Public	-0.208***	-0.232***	-0.119***	-0.0848***	-0.275***	-0.0383
	(0.0084)	(0.00969)	(0.02)	(0.0294)	(0.0106)	(0.0249)
Open Charter	-0.120***	-0.0743***	-0.379***	-0.462***	0.0265	-0.635***
	(0.0178)	(0.0202)	(0.0457)	(0.0709)	(0.0217)	(0.0593)
Observations	237,698	237,698	237,698	237,698	237,698	237,698
Quarterly	1	2	3	4	5	6
	All	Property	Violent	Assaults	All theft	Burglary
Open Public	-0.199***	-0.224***	-0.107***	-0.0724**	-0.268***	-0.0253
	(0.00839)	(0.00968)	(0.0199)	(0.0294)	(0.0106)	(0.0248)
Open Charter	-0.132***	-0.0806***	-0.420***	-0.517***	0.0236	-0.674***

	(0.0178)	(0.0203)	(0.0461)	(0.0718)	(0.0217)	(0.0597)
Observations	3,116	3,116	3,116	3,116	3,116	3,116
Number of Schools	60	60	60	60	60	60

Notes: Standard errors in parentheses. Poisson regressions models that include fixed effects for school, quarter, year (and day of week for daily model).

*** p<0.01, ** p<0.05, * p<0.1

An important limitation of the analysis with such a small radius is that we are only examining counts of crime at very small geographic area of approximately 528 feet (or equivalent to a city block). As a result we have many areas with zero crimes that don't contribute to our estimates. We end up with estimates for only 60 schools that have crime within 1/10 of at some time point in Philadelphia between 1998 and 2010. Our estimates, therefore, provide only evidence for those areas that have crimes occurring at some point and also have a school present for more than one year of data. Additionally, it is possible that the presence of a school opening simply replaces abandoned or neglected property on a block and that its opening reduces crime simply by providing a secured facility. If this is a true explanation, we would expect to see crime patterns change as the spatial aggregation gets larger.

Table 3 presents the results from the model estimated at ¼ of a mile or about 2.5 square blocks around each school location (1320 elliptical feet). By including a larger geographic area we are able to estimate changes for 242 schools in Philadelphia, which comprises 66.3 percent of the number of schools open at any point during this time period. Here again we see evidence that both public and charter school openings are associated with relative reductions in crime compared to areas that always have schools. The point estimates, however, diminish in magnitude. For example, crime is roughly 5.3% lower after the opening of a public school and 8.5% lower after the opening of a charter school. The point estimates are also similar for the quarterly count model. This suggests that the effect of a school opening is either very localized or that the estimates are less precise to each school as the geographic boundaries start to overlap for different schools. As Figure 2 above shows, the locations are for both public and charter schools are often within close proximity. Interestingly, the results now show that the point estimate for charter schools is larger than that for public schools on overall crime. Moreover, public schools appear to significantly impact only some property crimes while charter schools

affect both property and violent crime. Of course, there are fewer public school openings which may influence significance, but the point estimates suggest a null effect on violence.

TABLE 3: ESTIMATES OF SCHOOL OPENINGS ON CRIME AT 1/4 OF A MILE

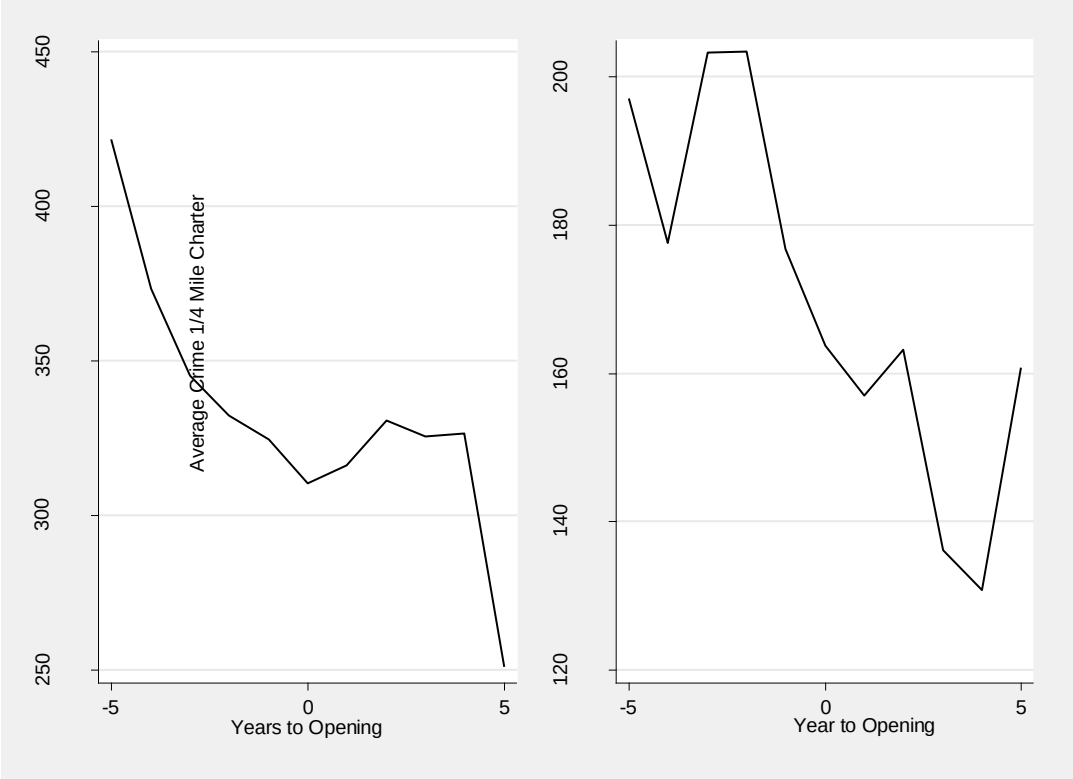
Daily	1	2	3	4	5	6
	All crime	Property	Violent	Assaults	All theft	Burglary
Open Public	-0.0538***	-0.0707***	0.000904	0.0139	-0.0922***	0.019
	(0.00541)	(0.00643)	(0.0118)	(0.0174)	(0.00707)	(0.0155)
Open Charter	-0.0886***	-0.0186*	-0.305***	-0.330***	0.0326***	-0.231***
	(0.00858)	(0.0102)	(0.0189)	(0.028)	(0.0113)	(0.0244)
Observations	939,079	939,079	939,079	939,079	939,079	939,079
Quarterly	1	2	3	4	5	6
	All crime	Property	Violent	Assaults	All theft	Burglary
Open Public	-0.0529***	-0.0699***	0.00212	0.0152	-0.0920***	0.0224
	(0.00541)	(0.00643)	(0.0118)	(0.0174)	(0.00707)	(0.0155)
Open Charter	-0.0689***	0.00049	-0.282***	-0.305***	0.0515***	-0.213***
	(0.00857)	(0.0102)	(0.0189)	(0.028)	(0.0113)	(0.0243)
Observations	12,568	12,568	12,568	12,568	12,568	12,568
Number of Schools	242	242	242	242	242	242

Notes: Standard errors in parentheses. Poisson regressions with fixed effects for school, quarter, year (and day of week for daily model).

*** p<0.01, ** p<0.05, * p<0.1

Figure 4 shows the trends in average total crime counts at ¼ of a mile after data for each opened school is re-centered around its opening date. Limiting the graph to the five year before and after each opening produces the most balanced panel of schools. What is apparent from this graph is that there is a downward trend in the average total count of crime in the years leading up to and after the opening of either public or privately run charter schools. The yearly slope is 6 fewer crimes around charter schools (b=-6.09) and 10 fewer around public schools (b=-10.11). These slopes are equivalent in magnitude of reduction (3.5% to 3%) when one takes into account public schools have on average more crime around ¼ of a mile. It is also worth noting that there is a general downward trend in crime across school areas over this period (Figure 3 above), suggesting that the patterns we observe are not driven by a displacement of crime moving upward in areas where schools are always open.

FIGURE 4 – AVERAGE TOTAL COUNT OF CRIME ¼ MILE AROUND SCHOOLS PRE-POST OPENING



Alternative Specifications

It is possible that some of the effects we have observed for reduced crime around areas after schools open may be a result of common trends to specific areas that schools are opening. To assess this possibility, we estimated the quarterly count model to include interactions terms for years with each school of the 17 Philadelphia Planning Districts that represent larger geographic areas surrounding each of the schools. The results are displayed in Table 4. While the point estimates are slightly smaller than our primary specification, the story remains qualitatively similar. Crime is lower at both the 1/10 and 1/4 mile distances around schools after they open compared to areas that always have schools. Because this specification controls for planning district and year interactions, it suggests that the findings are not driven by specific region of the city of Philadelphia effects.

TABLE 4: ESTIMATES OF SCHOOL OPENINGS ON CRIME AT 1/10 AND 1/4 OF A MILE CONTROLLING FOR AREA*YEAR

Quarterly 1/10 mile	1	2	3	4	5	6
	All crime	Property	Violent	Assaults	All theft	Burglary
Open Public	-0.182***	-0.212***	-0.0745***	-0.0438	-0.257***	0.00396
	(0.00849)	(0.00983)	(0.02)	(0.0295)	(0.0107)	(0.0249)
Open Charter	-0.137***	-0.0833***	-0.423***	-0.529***	-0.00393	-0.602***
	(0.0186)	(0.0212)	(0.0472)	(0.0728)	(0.0228)	(0.061)
Observations	3,116	3,116	3,116	3,116	3,116	3,116
Number of Schools	60	60	60	60	60	60
Quarterly 1/4 mile	1	2	3	4	5	6
	All crime	Property	Violent	Assaults	All theft	Burglary
Open Public	-0.0489***	-0.0650***	0.00484	0.0154	-0.0845***	0.0243
	(0.00543)	(0.00645)	(0.0118)	(0.0174)	(0.00709)	(0.0156)
Open Charter	-0.0725***	-0.0113	-0.266***	-0.284***	0.0262**	-0.191***
	(0.00863)	(0.0103)	(0.0189)	(0.0281)	(0.0114)	(0.0244)
Observations	12,568	12,568	12,568	12,568	12,568	12,568
Number of Schools	242	242	242	242	242	242

Notes: Standard errors in parentheses. Poisson regressions with fixed effects for school, day, quarter, and year.

*** p<0.01, ** p<0.05, * p<0.1

We further extend the model to include controls for the three years prior to and after the opening of a school by introducing 7 dummy variables (T=-3, -2, -1, 0, +1, +2, +3) which indicate when a school will open. If the timing of school openings is influenced by short-term yearly movements in crime, then the pre-year trends should control for this form of endogeneity. The results are presented in Table 5. The results tell a similar story and show that schools openings are correlated with significant reductions in crime compared to areas where schools are always open.

TABLE 5: ESTIMATES OF SCHOOL OPENINGS ON CRIME AT 1/10 AND 1/4 OF A MILE CONTROLLING FOR AREA*YEAR AND YEARLY LAGS

Quarterly 1/10 mile	1	2	3	4	5	6
	All crime	Property	Violent	Assaults	All theft	Burglary
Open Public	-0.315***	-0.363***	-0.119***	-0.0785*	-0.431***	0.0309
	(0.0118)	(0.0136)	(0.0292)	(0.0439)	(0.0148)	(0.0373)
Open Charter	-0.186***	-0.141***	-0.459***	-0.595***	-0.0754***	-0.648***
	(0.0189)	(0.0216)	(0.048)	(0.075)	(0.0233)	(0.0624)

Observations	3,116	3,116	3,116	3,116	3,116	3,116
Number of Schools	60	60	60	60	60	60
Quarterly 1/4 mile	1	2	3	4	5	6
	All crime	Property	Violent	Assaults	All theft	Burglary
Open Public	-0.0616***	-0.109***	0.0494***	0.0679***	-0.134***	0.0134
	(0.00688)	(0.0081)	(0.0152)	(0.0225)	(0.0088)	(0.0203)
Open Charter	-0.0877***	-0.0483***	-0.235***	-0.245***	-0.0169	-0.200***
	(0.00903)	(0.0107)	(0.0199)	(0.0297)	(0.0119)	(0.0255)
Observations	12,568	12,568	12,568	12,568	12,568	12,568
Number of Schools	242	242	242	242	242	242

Notes: Standard errors in parentheses. Poisson regressions with fixed effects for school, day, quarter, and year.

*** p<0.01, ** p<0.05, * p<0.1

Finally, it is worth noting that despite the apparent robustness of the results to different specifications, one may be concerned that the models assume homogenous errors across schools. If we relax this assumption by clustering standard errors at the school level, we do find that most of the statistical significance dissipates. In fact, at the 1/10 of a mile radius open public schools are the only parameter where we see a significant reduction in all offenses, property crimes, and theft related offenses. There is no longer a statistically significant correlation with the timing of opening of charter schools. At the 1/4 mile radius neither the opening of public nor charter schools exhibit a significant association. If we were to rely on the clustered standard errors at the school level as our preferable specification, we have to assume that this is the appropriate standard error correction. Given that the residuals vary significantly between schools, this suggests that bias could be introduced in our primary estimates and that correcting the standard errors is likely prudent with such a large sample of observations. In any event, the results suggest that school openings either reduce crime relative to areas where schools always are open or, in our most conservative specifications, they have no impact on crime at all. Either conclusion is at substantial odds with the conventional literature that schools cause crime.

Limitations

This study has the advantage of estimating relationships based on the changes around schools before and after they open and then comparing to schools that are always open, rather

than the traditional approach of assessing cross-sectional variation. The opening of charter schools offers an advantage because the openings were made possible by state legislation that is outside of the individual differences in the students, families, and neighborhoods selecting schools. Also, charter schools are located in commercial buildings, but have few restrictions on where they can locate. The ability of charter schools to offer smaller size enrollments also means that they are less restricted in locations compared to large public schools. The fact that they provide access to all students is important, as we are not comparing changes in crime around very selective private schools to that of open-access public schools. However, this design also has several limitations. First, the location of charter schools is clearly not random. Charter schools locate strategically in commercial property areas near where students can access them. They also tend to locate within proximity to public school settings. As a result, we can only estimate crime effects at very small geographic levels. Beyond a quarter of a mile, the crime rates will crossover with those of existing public schools. As a result, we cannot say much about the effects of school openings on larger neighborhood areas. This study also cannot identify anything specific about the management of these schools that might matter in influencing crime (i.e. mechanisms). Charter schools often have very strict disciplinary standards and can expel students more easily than public schools. As a result, it is possible that the charter school openings may say something more about the effects of schools that can more easily expel students for disciplinary problems on nearby crime. On the other hand, some effects that we observe for the opening of charter schools also appear for public school openings. This suggests that, in part, we are observing a land-use effect. For example, these schools may be likely open in formerly neglected or abandoned property areas, such that their opening provides a more permanent and guarded structure that is less prone to crime generating activities. In essence we may be observing a vacancy effect. However, under the current design this is largely a speculation. When we allow for standard errors to vary by school location we see largely null effects. Null effects are nevertheless a startling contrast to the large literature citing a positive relationship between crime and school location. Finally, for four charter schools that were formed in 1997-98 we have no observations of crime before they opened.

CONCLUSIONS

We set out to study whether, in fact, schools cause crime in neighborhoods. The prior literature on this topic has generally found that schools are correlated with more crime. But this literature is built largely on cross-sectional designs that have fundamental problems with identification. We are able to address this limitation by relying on a panel design in which we compare changes in crime in areas around schools before and after they open compared to areas where schools are always open. Our findings paint a different picture. We see that school openings are associated with either less crime or no change in crime. This is an important finding, but with our data, we cannot explain the mechanisms for the relatively larger drop in crime in areas where schools open. It is possible that we are simply observing a building occupancy effect, the presence of more adulthood supervision in an area, or an improvement due to land use. When we allow for heterogeneous effects across schools we see null effects on crime. Regardless, contrary to prior evidence, this study suggests that the opening of schools, even ones that are largely comprised of middle and high schools, in neighborhoods may either reduce criminal opportunities in an area or produce no effect whatsoever on crime. Our findings suggest that policy discussions regarding crime as a byproduct of school openings in urban areas are likely overstated.

REFERENCES

Anderson, James, John MacDonald, Ricky Bluthenthal, and Scott Ashwood. 2013. "Reducing Crime by Shaping the Built Environment with Zoning: An Empirical Study of Los Angeles." *University of Pennsylvania Law Review* 161: 699-756.

Black, Sandra. 1999. "Do Better Schools Matter? Parental Valuation of Elementary Education." *The Quarterly Journal of Economics114*: 577-599

Billings, Stephen B., David J. Deming, Jonah E. Rockoff. 2012. "School Segregation, Educational Attainment and Crime: Evidence from the End of Busing in Charlotte-Mecklenburg." *NBER Working Paper* No. 18487.

Brinig, Margaret F., and Nicole S. Garnett. 2012. "Catholic Schools and Broken Windows." *Journal of Empirical Legal Studies* 9: 347-367.

Brinig, Margaret F. and Nicole S. Garnett. 2012. "Catholic Schools, Charter Schools, and Urban Neighborhoods." *The University of Chicago Law Review* 79:31-59.

Brinig, Margaret F., and Nicole S. Garnett. 2010. "Catholic Schools, Urban Neighborhoods, and Education Reform." *Notre Dame Law Review* 85(3).

Cohen, Lawrence E., and Marcus Felson. 1979. "Social Change and Crime Rate Trends: A Routine Activity Approach." *American Sociological Review* 44: 588-609.

Cook, Philip. J. 1986. "The Demand and Supply of Criminal Opportunities." *Crime and Justice: A Review of Research*, Vol. 7, pp. 1-27. Chicago: University of Chicago Press.

Cook, Philip J., Denise C. Gottfredson, and Na Chongmin. 2010. School crime control and prevention. In M. Tonry (Ed.), *Crime and Justice: A Review of Research*, Vol. 39, pp. 313-440. Chicago, IL: University of Chicago Press.

Farrington, David. P. 1986. "Age and Crime." *Crime and Justice: A Review of Research*, Vol. 7, pp. 189-250. Chicago: University of Chicago Press.

Gouvis Roman, Caterina. 2002. "Schools as Generators of Crime: Routine Activities and the Sociology of Place.

Hanushek, Eric A., John F. Kain, Steven G. Rivkin, Gregory F. Branch. 2007. "Charter School Quality and Parental Decision Making with School Choice." *Journal of Public Economics* 91: 823-848.

Hoxby, Caroline M. and Rockoff, Jonah E. 2004. "The Impact of Charter Schools on Student

Achievement.” Unpublished paper, Harvard University.

Imberman, Scott A. 2011. "The Effect of Charter Schools on Achievement and Behavior of Public School Students." *Journal of Public Economics* 95: 850-863

Jacob, Brian A. and Lars Lefgren. 2003. "Are Idle Hands the Devil's Workshop? Incapacitation, Concentration, and Juvenile Crime." *American Economic Review* 93 (5): 1560-1577.

Kautt, Paula M., and Dennis W. Roncek. 2007. “Schools as Criminal "Hot Spots": Primary, Secondary, and Beyond. *Criminal Justice Review* 32: 339-57.

Luallen, Jeremy. 2006. "School's Out . . . Forever: A Study of Juvenile Crime, at-Risk Youths and Teacher Strikes." *Journal of Urban Economics* 59: 75-103.

Murray, Rebecca K., and Marc L. Swatt. 2013. “Disaggregating the Relationship Between Schools and Crime: A Spatial Analysis.” *Crime and Delinquency* 59: 163-90.

Roncek, Dennis W., and Donald Faggiani. 1985. “High Schools and Crime: A Replication.” *Sociological Quarterly* 26: 491-505.

Roncek, Dennis W, and Lobosco-Antoinette. 1983. “The Effect of High Schools in Their Neighborhoods.” *Social Science Quarterly* 64: 599-613.

Schneider, Mark, Paul Teske, Melissa Marschall, Michael Mintrom, and Christine Roch. 1997. "Institutional Arrangements and the Creation of Social Capital: The Effects of Public School Choice." *American Political Science Review* 91: 82-93.

Warren, Mark. 2005. “Communities and Schools: A New View of Urban Education Reform.” *Harvard Educational Review* 75: 133-173.

Wilcox, Pamela, Michelle Campbell Augustine, Jon Paul Bryan, and Staci D. Roberts. 2005. “The "Reality" of Middle-School Crime: Objective vs. Subjective Experiences Among a Sample of Kentucky Youth.” *Journal of School Violence* 4: 3-28.

Willits, Dale, Lisa Broidy, and Kristine Denman. 2013. “Schools, Neighborhood Risk Factors, and Crime.” *Crime and Delinquency* 59: 292-315.

Zimmer, Ron, Suzanne Blanc, Jolley Christman, and Brian Gill. 2008. “Evaluation of Philadelphia’s Charter Schools.” RAND WR-550 EDU.

Zimmer, Ron, Brian Gill, Kevin Booker, Stephane Lavertu, Tim R. Sass and John Witte. 2009. *Charter Schools in Eight States: Effects on Achievement, Attainment, Integration, and Competition*. Santa Monica, CA: RAND Corporation.