

# Schools and Drug Markets: Examining the Relationship Between Schools and Neighborhood Drug Crime

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## Abstract

Research on drug markets indicates that they are not randomly distributed. Instead they are concentrated around specific types of places. Theoretical and empirical literature implicates routine activities and social disorganization processes in this distribution. In the current study, we examine whether, consistent with these theories, drug markets are particularly likely to form near schools. This research contributes to our understanding of adolescent drug use patterns by assessing some of the place and neighborhood-level mechanisms that help explain how schools facilitate access to illicit drugs. Using data from Albuquerque, New Mexico, we find that neighborhoods with middle schools and high schools experience more drug crime than neighborhoods without middle or high schools. Moreover, the relationship between school presence and drug crime is strongest during the hours directly before, during, and after school. Theoretical and policy implications are discussed.

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**Introduction**

General survey data suggest that the age of onset for drug use is during adolescence and that most high school students are confident that they could access drugs if they wanted to (Johnston, O'Malley, Bachman, & Schulenberg, 2010). Research also suggests that schools, which occupy a fundamental role in the lives of adolescents, facilitate access to drugs (Fletcher, Bonell, Sorhaindo, & Strange, 2009). The 2009 Youth Risk Behavior Surveillance System (YRBSS) highlights the availability of drugs on campus: nearly 23% of student respondents reported that they were offered, sold, or given an illegal drug on school property sometime in the 12 months prior to survey administration (Center for Disease Control and Prevention, 2010). Nonetheless, surprisingly little research focuses on the role that schools play in shaping adolescent access to drugs. Even less work extends this focus to examine whether schools might actually increase neighborhood-level drug activity, given that schools act as a drug access point for the youth. We know that schools affect neighborhood-level crime patterns more generally (Kautt & Roncek, 2007; LaGrange, 1999; Murray & Swatt, 2013; Roman, 2004; Roncek & Faggiani, 1985; Roncek & Lobosco, 1983; Willits, Broidy, & Denman, 2013), and here we examine whether they similarly influence the neighborhood drug crime activity.

Given the literature linking the availability of drugs to increased adolescent drug use (Brook et al., 2001), a better understanding of why and how schools facilitate neighborhood-level drug activity has important intervention implications. Specifically, if schools not only facilitate the youth drug access but also contribute to a broader neighborhood-level drug crime problem, it would make sense to target a range of interventions not just at those youth most at risk for drug use but at the neighborhoods most keenly affected by the related drug activity schools might generate. Unfortunately, we know little about how schools are related to broader community-level drug crime activity. As such, it is not clear whether drug crime in and around schools simply mirrors drug crime activity in the broader community, or if schools have a unique influence on drug crime activity in neighborhoods.

Rather than focusing on individual-level access and use patterns among school-aged populations, we focus on the magnitude of drug crime activity in and around schools to assess whether schools make a unique contribution to these patterns. Specifically, we assess the degree to which schools are

correlated with an increase in neighborhood-level drug crime activity. In other words, our interest is in whether and how the school context shapes local drug activity patterns. This is important because it helps us understand the specific role of schools in the broader array of contextual risk and protective factors youth navigate. We focus on drug crimes because of the notable increase in drug use behavior during adolescence and concerns about the links between adolescent drug use and related victimization and offending (Johnston et al., 2010). There is reason to believe that reducing adolescent drug use will reduce offending and victimization more generally (Ellickson & McGuigan, 2000; Lauritsen, Laub, & Sampson, 1992). Our assessment of the link between schools and neighborhood-level drug activity also helps us tease out whether it makes sense to think of schools as sites for community-level programs and policies aimed to reduce drug crime. Evidence that schools are a key nexus in neighborhood drug crime patterns would further support calls for effective, evidence-based drug prevention efforts in schools.

Using geocoded data from Albuquerque, New Mexico, we examine the relationship between the spatial distribution of schools and neighborhood drug crime incidents. We also assess drug activity patterns around schools by time of day and by season to see whether these conform to school utilization patterns, which would more directly implicate schools in the formation of drug markets. Finally, we examine the degree to which markers of neighborhood-level disorder contribute to any link between schools and drug activity. This research advances the literature both on drug markets and on the relationship between schools and crime and also has implications for intervention in the link between schools and adolescent drug access.

## **Schools and Crime**

A considerable amount of research examines the distribution of crime and victimization in and around schools. While the majority of research on schools and crime focuses on the individual-level dynamics of school-based crime and victimization (Burrow, 2008; Garofalo, Siegel, & Laub, 1987; Veenstra et al., 2005; Wilcox, Augustine, Bryan, & Roberts, 2005), a growing body of research examines the role that schools play in generating crime in the surrounding neighborhood area (Kautt & Roncek, 2007; LaGrange, 1999; Murray & Swatt, 2013; Roman, 2004; Roncek & Faggiani, 1985; Roncek & Lobosco, 1983; Willits et al., 2013). This research suggests that crime at and around schools, particularly middle and high schools, can spill over into the local neighborhood and even adjacent neighborhoods, influencing crime beyond the immediate school environment. This research, for instance, indicates that neighborhoods with high schools are likely to have higher violent

crime rates and that even the surrounding neighborhoods can see increases in crime rates associated with school presence (Roncek & Faggiani, 1985; Roncek & Lobosco, 1983), while other research notes similar findings for property crime (Kautt & Roncek, 2007).

Much of the research on schools and neighborhood crime adopts a routine activities perspective, focusing on schools as places where motivated offenders, suitable targets, and the absence of capable guardians converge. Rooted in the social and physical ecology perspective, routine activities theory argues that “crime rates are affected not only by the absolute size of the supply of offenders, targets, or guardianship, but also by the factors affecting the frequency of their convergence in space and time” (Sherman, Gartin, & Buerger, 1989, pp. 30-31). This implies that specific places where would-be offenders and suitable victims frequently congregate will have elevated levels of crime, especially when those places are characterized by limited guardianship (Cohen & Felson, 1979).

From the routine activities perspective, schools, particularly middle and high schools, facilitate crime for at least two reasons. First, the majority of individuals populating high schools and middle schools are juveniles. Offending typically peaks between the late teens and early 20s, making middle and high school-aged adolescents more likely to offend than the individuals in nearly any other age category (Farrington, 1986). Although high school students are more uniformly, within the age group, expected to commit crimes, the role of middle school students must also be considered. Prior research at the neighborhood level suggests that middle schools have the potential to generate violent crime in the surrounding neighborhood (Murray & Swatt, 2013; Willits et al., 2013), while individual-level research indicates nontrivial rates of criminal participation and victimization by middle school-aged children (Garofalo et al., 1987; Wilcox et al., 2005), especially nontrivial rates of drug use by middle school children (Johnston et al., 2010, for example, note that 1 in 6 eighth graders have tried marijuana). Moreover, youth are more likely than individuals in any other age group (with the possible exception of young adults) to be victims of crime (Rand & Catalano, 2007). High schools, and even middle schools, therefore, bring together individuals from age groups that are characterized by comparatively high offending and victimization rates. In that sense, schools ensure the convergence of potential offenders and victims. For these same reasons, elementary schools populated by young children who have not reached the peak offending ages are unlikely to generate crime.

Second, student-teacher ratios in most schools are such that capable guardianship may be limited or absent, a situation that is compounded in middle and high schools, which generally have greater student-to-teacher

ratios than elementary schools (Synder & Dillow, 2012). Given the convergence of motivated offenders and suitable targets in the school environment, these limitations on capable guardianship should further increase crime and victimization at or near schools.

These arguments also suggest a temporal pattern with respect to crime around schools. Specifically, schools should only influence crime during time periods in which school-related foot traffic is high because this is when offenders and victims are most likely to converge. During the summer months or weekends, for example, the routine activities perspective would predict a weaker or null relationship between schools and crime, as fewer youth converge in and around schools during these time periods. Conversely, the routine activities perspective would expect a stronger relationship between schools and crime directly before, during, and after school when it is in session. Although only a pair of studies (Murray & Swatt, 2013; Roman, 2004) has examined the relationship between schools and neighborhood crime by time, these studies find support for the routine activities temporal hypotheses. Both studies find that the relationship between schools and violent crime is strongest during the hours directly before, during, and after school.

Willits et al. (2013) argue that schools do not only influence neighborhood-level crime by expanding criminal opportunities but also increase neighborhood crime by providing a location where large groups of adolescents can gather. As noted in the social disorganization literature (Shaw & McKay, 1942), large groups of adolescents sometimes indicate decreased levels of social control. In this way, the link between schools and neighborhood crime may implicate both the social disorganization and routine activities process, as large groups of adolescents may serve to disorganize a neighborhood. Although not all youth entering a neighborhood to attend school will decrease or disrupt neighborhood collective efficacy, many of these youth may not be from the neighborhood in which the school is located, and therefore may not be worried about the condition of the neighborhood or have ties with individuals from the neighborhood. This means that even in the most socially organized areas, students attending middle and high schools may have limited investment in the school's neighborhoods, and the influx of these disinvested youth could disrupt neighborhood collective efficacy. Second, schools themselves generally reflect the broader structural conditions of their home neighborhood such that schools in disorganized areas have fewer resources and more limited ability to supervise and monitor students than the schools in more advantaged areas. Wacquant (1996), for example, shows that students in the disadvantaged neighborhoods are, in general, more likely to attend inferior schools. Similarly, research suggests that disadvantaged schools have difficulty recruiting high-quality teachers (Jencks &

Mayer, 1990) and that the teachers within disadvantaged schools are more likely to be described as unconcerned and inattentive (Wilson, 1996). Dropout rates and other indicators of student outcomes are generally worse in these areas as well (Ainsworth, 2002; Crowder & South, 2003). So, not only might schools themselves reduce social organization, but they may also exaggerate the criminal activity in areas already characterized by social disorganization. It is important, then, to assess the degree to which any relation between schools and neighborhood-level crime is reflective of a distinct “school effect” or is further evidence of the strong overlap between the neighborhood- and school-level disadvantage.

## **Schools and Drug Markets**

While research demonstrates that schools can increase neighborhood crime rates in general, limited research has examined the relationship between schools and neighborhood drug crimes specifically. Concerns regarding adolescent drug use and its links to school disengagement and a variety of high-risk behaviors (Henry, 2007) make an important line of inquiry into questions about drug availability and drug crime in and around schools. It seems likely that, like crime in general, drug markets and related drug crimes would be heightened around schools. Research suggests that drug markets, or areas where illicit drug sales are concentrated, require “business-friendly” environments to flourish (Eck, 1995; McCord & Ratcliffe, 2007; Olligschlaeger, 1997; Rengert, 1996). The characteristics of business-friendly environments for drug markets include a lack of social control organized against the drug market and access to specific types of places that attract drug users. In other words, drug markets are expected to flourish at specific places within socially disorganized areas. The illegality of drug dealing makes that activity much more difficult both to start and sustain in neighborhoods with high levels of informal social control and cohesion because these areas are able to rely on established informal and formal social control mechanisms to thwart such activity. Indeed, research suggests that drug markets are likely to be located in neighborhoods with comparatively low levels of informal control (Forsyth, Hammersley, Lavelle, & Murray, 1992; McCord & Ratcliffe, 2007; Olligschlaeger, 1997). Not only do socially disorganized areas lack the resources to disrupt drug markets but also disadvantaged populations (the unemployed, undereducated, and poor) exhibit a higher prevalence of drug use (U.S. Department of Health and Human Services, 1993), providing a potential customer base.

In addition to being more likely to occur in socially disorganized communities, research suggests that drug markets are likely to form around specific

types of places within these communities. For example, research shows that drug markets are likely to emerge near alcohol outlets, homeless shelters, drug-treatment centers, and other locations where potential drug buyers congregate in large numbers (McCord & Ratcliffe, 2007). These types of places are characterized as crime attractors because they are magnets for populations that may be at increased risk for criminality and drug use (McCord & Ratcliffe, 2007). From the routine activities perspective, these types of places are likely to promote the convergence of drug dealers and buyers in time and space, both because these locations are frequented by potential drug buyers and because these locations experience heightened levels of foot traffic. These factors establish certain types of places as “business-friendly” routine activities nodes for drug crimes (McCord & Ratcliffe, 2007).

Although most of the research on drug markets has focused on adult locations that support drug crime activity, schools, for similar reasons, are also likely to support such activity. As noted, schools, especially middle schools and high schools, bring together a large population of young people with limited guardianship, some of whom are potential drug users. In this sense, middle and high schools meet both of the criteria identified by the routine activities perspective to lead to the formation of a drug market node. Schools provide a ready supply of potential drug users (motivated offenders), as evidenced by the fact a substantial proportion of middle and high school-aged children engage in some form of drug use (Johnston et al., 2010). These same “motivated offenders” are “suitable targets” for drug dealers, which may draw drug dealers to schools. As a result, drug dealers (including adult dealers and school-aged dealers) are likely to characterize the areas near schools as prime locations for drug dealing. The establishment of drug dealers in these areas is then likely to attract other potential buyers to these areas. Together, this is expected to result in increased drug crime activity in neighborhoods with high schools and middle schools. As with crime more generally, such activity is more likely in disadvantaged and socially disorganized areas but can also trigger or exaggerate social disorganization. One important question then is whether schools influence drug crime only during specific times of the day, week, and year that correspond to school activity, or more generally contribute to a criminogenic environment that exaggerates drug crime activity beyond school hours.

The above arguments apply most readily to middle and high schools. Elementary schools have a smaller population of students than middle schools and high schools, thus minimizing the importance of sheer opportunity, a key feature of crime generator locations. In addition, the elementary school population is less likely to engage in drug use than their older counterparts, further reducing the crime-generating potential of these locations. Research on

schools and crime more broadly supports the notion that school level matters. For example, research suggests that while high schools and middle schools may generate crime, elementary schools may play a protective role against criminal activity (Murray & Swatt, 2013; Willits et al., 2013).

Building on the theoretical and empirical literature, our primary aim is to assess the effect of schools on neighborhood drug crime net of other neighborhood characteristics that might also support or discourage drug activity. To this end, we examine three specific research questions. First, we test whether, holding other factors constant, neighborhoods with high schools and middle schools exhibit higher levels of drug crime. To further assess whether there is a unique “school effect” on drug crime, we examine time disaggregated patterns of drug crime activity. Such patterns would implicate school-based traffic in the increased drug crime activity in these neighborhoods. Specifically, we test whether the effect of schools on drug crime is strongest during the hours directly before, during, and after school as well as during school months as compared with summer months. Finally, building on arguments that social disorganization processes serve to further bolster the ready pool of offenders and further restrict social control processes at crime-generating locations, we test whether the influence of schools is moderated by the neighborhood social disorganization.

## Research Design

We examine the relationship between schools and neighborhood drug crime using arrest, census, and school data from Albuquerque, New Mexico. To assess the influence of schools on neighborhood drug crime activity, our unit of analysis is Albuquerque neighborhoods. However, as with most neighborhood-level research, we run into the problem of how to define neighborhood boundaries for empirical purposes. Most neighborhood research in criminology has used census-defined jurisdictions, such as census tracts, block groups, and blocks to approximate neighborhoods and neighborhood patterns and trends (Sampson, Morenoff, & Gannon-Rowley, 2002). For the current research, we conduct our analyses with data from the block group level. Block groups are the second smallest census designation, and they comprise blocks. While utilizing blocks would make the current research more directly comparable with previous research on schools and crime (Kautt & Roncek, 2007; Roncek & Faggiani, 1985; Roncek & Lobosco, 1983), utilizing the block group makes the current research more comparable with research on drug markets (McCord & Ratcliffe, 2007) and allows us to test hypotheses regarding the combined influence of schools and neighborhood structural characteristics. The U.S. Census Bureau releases more social, economic, and



demographic information at the block group level than it does at the block level. In particular, a variety of measures of structural disadvantage (including measures of education, income, and employment) are available only at the block group and larger levels of aggregation. By utilizing the block group level of analysis, we are able to include traditional indicators of structural disadvantage in our models and make statements about the relative and combined importance of location and neighborhood dynamics for the spatial and temporal distribution of drug crimes.

### *Data*

The data for this research cover three areas: crime, social and demographic features of neighborhoods, and schools. Crime data come from the Albuquerque Police Department and the Bernalillo County Sheriff's Department. The crime data include the date, time, location, and crime type for all documented incidents in the data. The current study uses data on all drug crime incidents as coded by local police agencies, both possession and distribution offenses, occurring within the Albuquerque metropolitan area for the years 2001 to 2005. To examine neighborhood crime patterns, we geocoded and mapped all of the incidents using ArcGIS mapping software. Once mapped, incidents were matched to census block groups and aggregated, providing a count of drug crime incidents within each census block group in Albuquerque. Unfortunately, the data do not allow us to differentiate between possession and distribution incidents as these are already aggregated in the data. Our dependent variable, therefore, is the sum of both drug possession and distribution incidents, which is comparable with measures used in prior research (McCord & Ratcliffe, 2007). These counts were summed from 2001 to 2005, to account for annual fluctuations and to maximize variation (thereby improving our ability to account for variance in drug crime incidents across block groups). We specifically focus on the years 2001-2005 to establish proper temporal sequence with census measures.

Our indicators of social disorganization come from the 2000 U.S. Census. Although we do not have direct indicators of social disorganization, the Census provides data for key variables commonly used as proxies for social disorganization processes or as measures of the antecedents of social disorganization. The argument is that the type of neighborhood disadvantage captured by these indicators contributes to the declines in collective efficacy theorized to inflate crime rates at the neighborhood level (Bursik, 1988; Sampson & Groves, 1989; Sampson, Raudenbush, & Earls, 1997). Following this logic, for each block group, we have indicators of the percentage of renter occupied housing, single-parent households, unmarried individuals,

individuals who moved in the last 5 years, vacant housing, people with less than a high school education, people living under the poverty line, households receiving public assistance, and joblessness (unemployed individuals plus those not in the labor market). We combined these variables into two distinct variables using principal components analysis and the regression scoring method. These two components account for nearly 70% of the variance within the variables (for details, see Dunteman, 1989). The following variables loaded on the first component: percentage of renter occupied housing, percentage of households with a single parent, percentage of people not married, percentage of people that have moved in the last 5 years, and percentage of housing vacant. We define this component as “residential instability,” as this combination of variables suggests a neighborhood characterized by residential mobility. The variables that loaded on the second component include percentage of residents with less than a high school education, percentage in poverty, percentage of households receiving public assistance, and percentage unemployed or not in the labor market. We label this component “structural disadvantage.”

In addition to the variables described above, we also include controls for neighborhood demographic characteristics like race and age structures that empirical research links to both neighborhood crime rates and neighborhood social disorganization (Krivo & Peterson, 1996; Shaw & McKay, 1942). Specifically, we include data on the total population of block groups, the percentage of the population that is Hispanic, and the percentage of the population 18 and below from the 2000 Census. We checked for collinearity and found these variables to operate independent of the instability and structural disadvantage measures described above, so we include them as separate variables in our analyses.

The school data are from two sources. First, the City of Albuquerque maintains, and makes available for download, ESRI shapefiles that map the location of all public schools in Albuquerque. We consulted the National Center for Education Statistics (NCES) list of public schools and removed all schools that were not operating between the years 2000 and 2005 to ensure that our school presence variables matched the time frame of our crime data. We merged this school location data with the crime and census data. Using the merged, geocoded school data, we created three sets of dummy variables to indicate whether each block group contained an elementary, middle, or high school (coded 1 if present, 0 if not for each level of school). Although much of our theoretical focus here has been on the relationship between middle and high schools and drug crime, we also include elementary schools, both as a control and because it is possible that elementary schools might buffer or protect a neighborhood against drug crime (as they do with property

**Table 1.** Descriptive Statistics for Block Groups in Albuquerque, New Mexico (N = 430).

Variable	M	SD	Minimum	Maximum
Drug crime	26.91	57.29	0	952
Total population	1,294.60	646.38	31	4,355
% Hispanic	40.96	24.05	0	100
% 18 or below	24.98	8.33	3.33	71.99
Instability	0	1	-2.23	3.09
Disadvantage	0	1	-1.52	3.72
Elementary schools	0.17	0.38	0	1
Middle schools	0.06	0.22	0	1
High schools	0.03	0.17	0	1

crimes, see Murray & Swatt, 2013; Willits et al., 2013). Table 1 presents the descriptive statistics for the independent variables included in this study. Two block groups within the sample area have no residents and were excluded from our analyses, leaving us with a final sample of 430 block groups. In total, there were 75 elementary schools, 25 middle schools, and 13 high schools spread out over these 430 block groups. The distribution of schools across neighborhoods with varying levels of social disadvantage, racial/ethnic diversity, and age structure makes Albuquerque a prime location for testing theoretical arguments that link drug crime activity to the distribution of schools across the geographic landscape.

### *Analytic Approach*

Criminal incidents are discrete events and, like most crime types, the drug crimes we examine in this analysis are heavily skewed. Thus, traditional ordinary least squares regression techniques are inappropriate and may lead to issues of heterogeneity and skewed error distributions (Osgood, 2000). Poisson regression, a variant of the generalized linear model, is typically preferred to ordinary least squares when dealing with count data (Osgood, 2000). This regression model describes the relationship between a set of independent variables and the expected count of a dependent variable. A preliminary analysis suggested that our dependent variable is overdispersed during each time period. When this occurs, it is common to utilize negative binomial regression. Negative binomial regression includes an extra term to model overdispersion and maintains the same style of interpretation as Poisson regression coefficients, where a unit increase in an independent variable

**Table 2.** Days and Hours Associated With Each Time Period.

Time period	Days	Hours	Mean drug crimes (SD)
Morning commute hours	Monday-Friday	06:00-08:29	0.68 (1.89)
School hours	Monday-Friday	08:30-14:59	5.28 (15.25)
Afternoon commute hours	Monday-Friday	15:00-17:59	2.61 (6.37)
Evening hours	Monday-Thursday	18:00-05:59	6.38 (12.56)
Weekend hours	Friday-Monday	18:00-05:59	8.75 (13.84)

corresponds to multiplying the dependent variable by  $e^{b_i}$ , where  $b_i$  is the regression coefficient for the  $i$ th variable. To account for population differences across block groups, we included population size (the number of residents per block group) as an exposure variable (Osgood, 2000). Exposure variables allow count-based regression models to control for differences in opportunity for some event to occur. In the current research, it seems likely that there are more opportunities for drug crimes in block groups with larger populations; therefore, we include population as an exposure. In doing so, we also change the interpretation of the outcome from a count to a rate, because, by controlling for population size, the exposure variable effectively transforms the crime counts into populations adjusted rates (Osgood, 2000).

To assess the degree to which any potential relationship between schools and drug crime is a function of social disorganization, we include our structural disadvantage and instability indicators of social disorganization in each of our regression models. Including these variables ensures that any significant association between school presence variables and drug crime are not simply reflective of patterns of social disorganization. We also estimated an additional series of models with interaction terms between social disorganization indicators and school presence. Significant interactions between social disorganization and school presence variables would suggest that the relationship between schools and drug crime depends on neighborhood characteristics.

To examine the time disaggregated relationship between schools and neighborhood drug crime incidents, we estimated regression models for seven different time periods. These seven models include an overall model, a morning model, a school model, an afternoon model, an evening model, a weekend model, and a summer model. The overall model includes the school presence variables, social disorganization variables, and control variables and utilizes all drug crime incidents throughout the entire time period of the study as the dependent variable. The other time period-specific models include the same variables but utilize dependent variables composed of only the incidents that occurred during the specified time period. Table 2 displays days and hours

utilized for these time periods and the mean number of drug crimes per time period. The summer hours category was included to account for the period of the year in which schools are less used and less likely to be routine activity nodes. For the purposes of this research, we defined the summer as the months of June and July. Albuquerque Public Schools start sometime in August and end sometime in May each year. However, the specific dates change each year and can vary between schools. Therefore, we opted to construct a more conservative summer category that likely misses some summer days but that includes summer days that are shared by all schools in Albuquerque.

We also addressed spatial dependency in each of the regression models. Spatial dependency occurs because geographically close observations are likely to be more similar to each other than units that are geographically distant. Spatial dependency can come from multiple sources, including the artificial nature of census jurisdiction and “spillover.” Significant spatial dependency can lead to issues of spatial autocorrelation in statistical procedures. Spatial autocorrelation is a substantial problem, as it suggests that observations are not independent. For regression analyses, spatial autocorrelation can result in unstable regression coefficients and inaccurate standard error estimates. In other words, it is difficult to determine the effects of independent variables in the presence of spatial autocorrelation. To address this concern, we calculated Moran’s *I* for the dependent variable utilized in our overall model and found evidence of significant clustering and spatial autocorrelation. We used GeoDa software to calculate spatial lags for each dependent variable in our analysis. The spatial lag is defined as  $\sum_j \omega_{ij} x_j$ , where  $x_j$  is the  $j$ th observation of variable  $x$  and  $\omega_{ij}$  is the weight from the  $i$ th row of the spatial weights matrix (Anselin, 1992). This is essentially the weighted average of values in adjacent block groups. Therefore, spatial lags account for spatial autocorrelation by controlling for levels of a variable in surrounding areas. These spatial lags were created for each time period model. Many studies on schools and neighborhood crime also include adjacency measures to capture the effects of schools on crime in nearby areas (Kautt & Roncek, 2007; Roncek & Faggiani, 1985; Roncek & Lobosco, 1983). Such measures are unnecessary here because there is little variation in adjacency across block groups (400 of the 432 block groups in Albuquerque are adjacent to one or more block groups that contain a school). In other words, Albuquerque neighborhoods have similar odds of bordering another neighborhood that has a school.

## Results

The results of the negative binomial regression models are displayed in Table 3. Consistent with expectations, results from the overall model (column 1) support

**Table 3. Negative Binomial Regression Coefficients on Drug Crime Incidents by Time Period (N = 430).**

	Afternoon					Weekend	Summer
	Overall	Morning commute	School session	commute	Evening		
Elementary school	0.032 (0.133)	0.255 (0.218)	0.137 (0.153)	0.303 (0.163)	-0.058 (0.147)	0.023 (0.142)	-0.055 (0.155)
Middle school	0.665** (0.189)	1.087** (0.296)	1.619** (0.229)	0.380 (0.260)	0.368 (0.233)	0.035 (0.231)	0.378 (0.240)
High school	1.608** (0.338)	1.594** (0.359)	2.858** (0.296)	1.012** (0.323)	0.269 (0.313)	0.471 (0.301)	0.331 (0.319)
Disadvantage	0.525** (0.121)	0.542** (0.158)	0.632** (0.118)	0.652** (0.126)	0.492** (0.113)	0.390** (0.111)	0.454** (0.120)
Instability	0.410** (0.058)	0.367** (0.092)	0.383** (0.0649)	0.475** (0.072)	0.439** (0.065)	0.388** (0.062)	0.494** (0.069)
% Hispanic	0.008 (0.005)	0.005 (0.007)	0.006 (0.005)	0.001 (0.005)	0.009* (0.004)	0.010* (0.005)	0.010* (0.005)
% below 18	-0.033** (0.009)	-0.055** (0.012)	-0.048** (0.008)	-0.041** (0.009)	-0.026** (0.007)	-0.031** (0.007)	-0.034** (0.007)
Spatial lag	0.004** (0.001)	0.000 (0.095)	0.012 (0.008)	0.051** (0.018)	0.030** (0.009)	0.023** (0.008)	0.038** (0.012)
Intercept	-3.529** (0.224)	-6.881** (0.0381)	-5.397** (0.263)	-5.869** (0.0296)	-5.619** (0.244)	-5.120** (0.250)	-5.856** (0.265)

Note. Robust standard errors in parentheses.

\*p < .05. \*\*p < .01.

the general argument that the presence of middle and high schools significantly increase the neighborhood drug activity. Conversely, and as expected, elementary schools do not affect the neighborhood drug activity. Specifically, block groups with middle schools are expected, controlling for other factors, to report 94% ( $e^{0.665} = 1.94$ ) more drug crimes than the block groups without middle schools, while block groups with high schools are expected to report 399% ( $e^{1.608} = 4.99$ ) more drug crimes than the block groups without high schools. The overall model suggests that in addition to middle and high schools, the socioeconomic factors (both disadvantage and instability) are statistically significant predictors of drug crimes. Block groups with higher levels of disadvantage and instability are likely to report more drug crime incidents than other block groups. The percentage of the population below the age of 18 is associated with a significant decrease in drug crime incidents. Models examining the time disaggregated patterns of drug crimes show similar patterns with respect to neighborhood-level controls.

Turning to these time disaggregated models (columns 2-7, Table 3), results generally support our expectations, suggesting notably stronger school presence effects during times of the day and year when school is in session. Such effects are particularly notable for high schools. The effect of high school presence on block group drug crimes is significant before, during and after school, but not in the evenings, weekends, or during the summer. We find similar effects for middle schools, though only before and during school. These results suggest that the significant relationship between middle schools, high schools, and drug incidents in the overall model are largely generated by incidents occurring during the morning commute, school session, and afternoon commute hours. More to the point, the effect size of middle schools and high schools is largest during the school session hours. Block groups containing middle schools are expected to report 404% increased rate of drug crime incidents than block groups without middle schools during the school session hours, while block groups containing high schools are expected to report 1,643% increased rate of drug crimes than block groups without high schools during school hours. This is a very large coefficient, suggesting a strong relationship between school presence and drug crime arrests during school hours (though it should be noted that this factor difference of 17.43 must be interpreted in the context of the relatively low number of drug crimes that occur during these hours). Moreover, this coefficient is supported by descriptive statistics. For example, block groups without high schools report a mean of 4.07 drug crimes during school sessions, while block groups with high schools report a mean of 44.46, indicating that, even when not accounting for other factors, there is a substantial difference in block groups with and without high schools.

Finally, we examine whether the effect of school presence on drug crime activity is stronger in socially disorganized areas. We estimated a series of interaction models (available upon request) to determine if the effect of middle schools and high schools was larger in socially disorganized areas. We find no statistically significant interactions between school presence and either of our indicators of social disorganization, overall or during school activity hours. Social disorganization processes do not appear to condition the effect of school presence on drug crime activity.

## Summary and Conclusion

In general, our results suggest that drug crime activity is related to the presence of middle schools and high schools in a given neighborhood. Importantly, this finding is the net of controls for social disorganization and neighborhood demographics, all of which have been implicated in the spatial distribution of drug crimes. The effect of school presence, then, is at least partly independent of these influences, which are also significant in our models. Before discussing these results in detail, we note that our control variables, in general, operated as expected. Block groups with higher levels of disadvantage and instability reported higher numbers of drug crimes. We also found that block groups with larger populations below the age of 18 reported fewer drug crimes, controlling for other factors. This result may seem counterintuitive given the robust individual-level relationship between age and crime that other researchers have found (Hirschi & Gottfredson, 1983). However, this result is not uncommon. A number of researchers have found a negative relationship between youth population and crime at aggregate levels (e.g., see Haynie & Armstrong, 2006; Jackson, 1991; Krivo & Peterson, 1996; Peterson, Krivo, & Harris, 2000; Steffensmeier & Haynie, 2000).

Our results support expectations that drug crime activity is inflated in neighborhoods with middle schools or high schools and that this link is strongest during school hours. Specifically, school presence only influences drug crimes during the school year (not the summer) and only during the daytime hours before, during, and after school. Notably, the influence of middle and high schools on drug crimes holds controlling for indicators of social disorganization and for interactions between indicators of social disorganization and school presence. This suggests that schools are linked to drug crimes in ways that are independent of the social disorganization processes that they often share with the neighborhoods in which they are situated. In fact, the effect of schools on the distribution of drug crime is similarly strong in advantaged and disadvantaged areas as tested using interaction models. In addition to being statistically significant predictors of drug crime at the



neighborhood level, the effect sizes for middle schools and especially for high schools are quite large, suggesting that the presence of a middle school or high school is a substantively important factor that explains neighborhood-level variation in drug crime. Empirical research suggests that drug market activity is linked to increases in violent crime (Martinez, Rosenfeld, & Mares, 2008), and as such, our results may also help explain the relationship between schools and violent crime (Murray & Swatt, 2013; Willits et al., 2013) in that drug markets that emerge in neighborhoods with schools may promote violent crime in these same areas.

As noted above, we did not find any statistically significant interactions between school presence and measures of structural disadvantage associated with neighborhood disorganization. This implies that middle and high school presence promotes drug crime in poor and affluent areas alike. From a policy perspective, this indicates that both urban planning and drug interdiction efforts need to consider the location of schools in the broader community. In disorganized areas, the presence of middle schools and high schools serves as an additional risk factor for neighborhood crime. Although we found no interaction between our indicators of social disorganization (disadvantage and instability) and school presence, schools may independently increase the rates of criminal behavior in areas that are already at risk for high rates of criminal behavior. Targeting school-based crime may prove to be a useful practical strategy to reduce crime in these areas, given that addressing levels of disadvantage and instability are likely to be substantially more difficult. Furthermore, though we found no significant interaction in our cross-sectional models, it is plausible that crime in and around schools, if not addressed, may, over time, contribute to the destabilization of surrounding neighborhoods (i.e., it is possible that there is a longitudinal interaction between schools and levels of social disorganization). In this sense, tending to the increased crime and drug activity schools appear to generate can potentially assist in the stabilization of more disorganized areas. In addition, our results suggest that even in more stable neighborhoods with strong social institutions, schools increase the rate of drug crime activity.

Our analysis is not without its limitations. First, we recognize the possibility that drug arrests are simply more likely to occur at or around middle schools and high schools and that this may be driving our results. In other words, it is possible that our findings reflect increased guardianship and policing at and near schools and not increased drug-dealing activity near schools. We cannot speak to this question with our data and recognize it as a potential limitation of the current analysis. But, even if the results are, in part, an artifact of police activity, the data still suggest that schools generate a fair amount of drug crime and that additional intervention beyond patrol and

arrest strategies could help reduce the comparatively high levels of drug activity police are responding to in areas with schools.

That we cannot disaggregate between possession and sales arrests is a related limitation. We argue that the patterns we see suggest that schools foster not just youth drug use but youth access via drug market formation around schools. This would mean we should see not just possession arrests but a significant number of sales/distribution arrests at or near schools as well. Without disaggregated drug crime data, we cannot assess this question. Relatedly, it is important to note that our data, at the block group level, cannot distinguish between drug crimes that occur on school grounds and drug crimes that occur in the neighborhood surrounding school grounds. This may limit our ability to definitely state the degree to which schools are related to broader neighborhood drug activity because we cannot model and compare crimes occurring on and off school grounds. Finally, we cannot discern whether the drug-related arrests are of school-aged youth or others because we have data on the incident, not the offender. Although we argue that what we are seeing is arrests tied to school youth access and drug use (possession) and to the influx of drug dealers to these areas to tap this youth market (distribution).

We acknowledge that our inability to disaggregate the drug crime data, to locate crimes on and off school property, and to assess who is responsible for the increased drug activity around schools introduces some limitations. However, we think these results still provide important insight on the relationship between schools and neighborhood drug crime. At a minimum, our findings indicate that block groups containing schools are ripe for drug activity and for drug markets. This conclusion, in itself, has important implications for community-level intervention. Moreover, even if most of these arrests are for possession (in any given drug market, it is likely that the majority of arrests are for possession), this still indicates the presence of a population of suitable buyers (or targets for drug dealers) and that these areas are, at a minimum, ripe for the formation of an illicit drug market. Research, in fact, indicates that schools facilitate youth access to drugs (Fletcher et al., 2009). Furthermore, research suggests that drug arrests are “reasonably valid indicators of the relative level of visible drug trafficking among neighborhoods” (Warner & Coomer, 2003, p. 133). This suggests that it is probably reasonable to assume (as we do) that the drug arrests do, in fact, represent a combination of possession and distribution offenses. Even if these results were driven entirely by arrests of students for drug possession, we suggest that these results have important implications for neighborhoods and drug crimes. Schools are located within communities and if large numbers of students are being arrested for drug crimes, this school-related social problem is also

likely a neighborhood-related social problem, as students commute to and from school and likely spend a substantial amount of time in the area surrounding school grounds. If the reverse were true, and what we are seeing in nonstudent-related drug activity in areas with schools, this is a problem neighborhoods would need to address in the interest of protecting both the neighborhood and the youth attending its schools from such activity and its attendant risks to both individuals and to community cohesion more generally. Finally, the sheer size of the regression coefficients for the middle school presence and high school presence variables suggests that there is a substantial amount of drug crime in neighborhoods containing middle schools and high schools.

In the end, we feel confident in using our results as evidence that schools are places that serve as routine activity nodes for the emergence and sustainment of drug markets. Still, it is essential that future research examine the relationship between schools and neighborhood drug crime disaggregated by drug crime type. In some sense, perhaps the true test of whether schools facilitate drug markets is to examine the relationship between school presence and drug sales arrests. Moreover, future research on neighborhoods, place, and drug markets would benefit from a comparative analysis of multiple types of places (e.g., schools and liquor stores). Although the effect sizes for schools were quite large in our research, it is difficult to fully appreciate these results without comparing the effect size for schools to those for other criminogenic places.

In terms of effect sizes, it is possible that the magnitude of the regression coefficients is reflective of the number of cases per dummy category in our regression models. In supplementary analyses, we combined the middle and high school categories in an attempt to address this potential problem. These results were substantively similar to the results presented above, with the primary difference being that aggregating middle and high schools resulted in regression coefficients that were predictably smaller than the coefficients for the high school variables presented above. These supplementary analyses and the fact that the school presence variables were not significant in all time periods indicate that there is a very strong relationship between middle and high school presence and drug crime and that this relationship is not simply reflective of the number of schools included in our analyses.

Broadly then, our results suggest that additional policy and research attention is warranted on the issue of drugs in and around schools. Given that our research cannot identify the general characteristics of drug dealers and buyers, additional research using demographic incident-level information is also likely to be useful in the development of specific strategies and tactics to reduce the role that schools play in generating drug crime. Assuming,

however, that a substantial proportion of the relationship between schools and drug crime is due to the adolescents who congregate in these areas, our results suggest that schools are an important point of intervention for adolescent drug abuse. We demonstrate a large relationship between school presence and neighborhood drug crime, and that of previous research linking schools to individual drug abuse (Fletcher et al., 2009) indicates that schools play a central role in adolescent access to drugs. This implies that policy efforts focused on schools and on neighborhoods in which schools are located might help limit adolescent access to drugs and, in this way, reduce adolescent use and abuse. For example, additional police patrols may be warranted in neighborhoods where middle schools and high schools are located. Police presence in these areas may alter the routine activity patterns in the area, making drug dealing and buying more risky, given the increase in capable guardianship. Similarly, there may be areas within schools where guardianship is lacking. Although we cannot determine the amount of crimes within a neighborhood that actually occurred at a school, it is possible that some of the effect of middle schools and high schools on drug crimes is reflective of drug crimes that actually occur on school grounds. Although schools are relatively safe locations where teachers, administrators, and parents serve as capable guardians, within schools, there are often areas where there are large numbers of youth but little supervision by adults. These areas, which are sometimes conceptualized as “undefined spaces” (Astor, Benbenishty, Marachi, & Meyer, 2006), are those physical areas where no one feels responsible for monitoring, such as bathrooms, areas around buildings, hallways, outdoor gathering spaces, parking lots, and so on. These undefined spaces within the school environment deserve additional research attention. It may be that this is where the bulk of drug-related crime happens and that providing more consistent guardianship in these spaces could reduce school-based drug crime activity. Furthermore, it is likely that there are undefined spaces in the neighborhoods around schools. These may be the private residences, parks, and other locations that students frequent when skipping school.

In addition, our research treats middle and high schools as largely homogeneous and assumes similar effect sizes across schools. However, this is not likely the case. Although the influence of schools does not vary by levels of neighborhood disorganization, it may vary by other school characteristics. For instance, it is likely that variables capturing school quality, school size, student–teacher ratios, or student involvement in school activities, among other things, would be influential and could help further refine policies designed to reduce the influence of school presence on neighborhood drug crime. For example, if researchers are able to identify the characteristics of schools that impede drug market activity, schools could then

implement programs designed to promote or expand such characteristics. Although our sample size was too limited to use NCES data to disaggregate by such school-based characteristics, future research, either examining larger cities or combining several cities, may be able to address this issue utilizing NCES data.

In addition, we focus solely on public schools because we were unable to access similar geographic data on private schools operating during the relevant time period. If private schools have a similar impact on drug activity, this would mean our estimate of school effects is potentially conservative, because some neighborhoods without public schools may actually be home to private schools. Of course, private schools may not influence neighborhood drug crime activity in the same way as public schools. Among other things, many private schools have smaller student–teacher ratios and more resources and may be better able to monitor and limit potential drug activity. If this is the case, it reinforces the importance of examining the specific mechanisms through which schools might exacerbate or limit neighborhood-level drug activity. Future studies should not only assess the comparative and joint influence of both public and private schools on neighborhood-level drug crime but also the school-level features implicated in this relationship.

On the whole, the current research suggests that the presence of middle and high schools increase the occurrence of drug crimes in a neighborhood. These results indicate that schools likely play an important role in the emergence of drug markets and in the facilitation of drug access for adolescents. Given the magnitude of this relationship and the general interest in adolescent drug patterns, we suggest that this is a fruitful area for both additional research and for the development of drug policy.

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