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The Effects of Dropouts and High-Performing Schools on Juvenile Crime

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Abstract

Objectives: We argue that assessing the level of crime concentration across cities has four challenges: 1) how much variability should we expect to observe; 2) whether concentration should be measured across different types of macro units of different sizes; 3) a statistical challenge for measuring crime concentration; 4) the temporal assumption employed when measuring high crime locations.

Methods: We use data for 42 cities in southern California with at least 40,000 population to assess the level of crime concentration in them for five different Part 1 crimes and total Part 1 crimes over 2005-12. We demonstrate that the traditional measure of crime concentration is confounded by crimes that spatially locate due to random chance. We also use two measures employing different temporal assumptions: a *historically adjusted crime concentration* measure, and a *temporally adjusted crime concentration* measure (a novel approximate solution that is simple for researchers to implement).

Results: There is much variability in crime concentration over cities in the top 5% of street segments. The standard deviation across cities over years for the temporally adjusted crime concentration measure is between 10% and 20% across crime types (with the average range typically being about 15% to 90%). The historically adjusted concentration has similar variability and typically ranges from about 35% to 100%.

Conclusions: The study provides evidence of variability in the level of crime concentration across cities, but also raises important questions about the temporal scale when measuring this concentration. The results open an exciting new area of research exploring why levels of crime concentration may vary over cities? Either micro- or macro- theories may help researchers in exploring this new direction.

Keywords: neighborhoods, crime, schools, adolescents.

Schools and Neighborhood Crime:

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INTRODUCTION

Scholars have identified relationships between school failure and social hardships throughout the life course in a variety of settings. Low-performing students and students who do not complete high school are more likely to experience a host of negative outcomes, including lower earnings, poor health, unemployment (Oreopoulus, 2007), increased delinquency, and contact with the juvenile and criminal justice systems (Gottfredson, Wilson, & Najaka, 2003; Sum, Khatiwada, McLaughlin, & Palma, 2009; Thornberry, Moore, & Christenson, 1985). Henry and colleagues (2012), for example, found that school disengagement predicts dropping out as well as a number of other problem behaviors from middle school to early adulthood, such as serious violent and property crime, arrest, and drug use. Although the national dropout rate has been declining since 2000, about six percent of individuals aged 16 to 24 had dropped out of school in 2016 (Child Trends Databank, 2018). A plethora of research demonstrates how education can shape a person's life course (see, for instance, Day & Newburger, 2002; Freudenberg & Ruglis, 2007; Orfield, Losen, Wald, & Swanson, 2004; Ramey, 2015), making it crucial that schools prepare students for academic success and graduation. Further, the impact of disengaged students may extend beyond the individual and his or her family; schools that fail to graduate students may have important consequences for the neighborhoods in which they live.

Previous research has linked the presence of high schools with increased crime in the local community (Bernasco & Block, 2009; Murray & Swatt, 2013; Roncek & LoBosco, 1983; Willits, Broidy, & Denman, 2013, 2015). However, there is little research that assesses specific school characteristics that might influence neighborhood crime. That is, schools that

promote academic engagement and success may lower crime in the surrounding area, whereas schools with considerable dysfunctionality – such as those that produce a high number of dropouts – may increase neighborhood crime. To understand the variable effects schools have on community disorder, and to properly address the mechanisms leading to increased crime in the surrounding community, specific characteristics of the school must be analyzed. Individual-level studies have provided ample evidence that dropping out and criminality are highly correlated (Gluek & Gluek, 1950; Monrad, 2007; Thornberry, Moore, & Christenson, 1985), but the direct impact schools have on their communities by allowing students – perhaps even enabling students by way of school discipline or unsupportive school staffs (Fabelo et al., 2011; Thapa, Cohen, Guffey, & Higgins-D'Alessandro, 2013) – to permanently leave school is still unknown. If these school practices inadvertently contribute to community crime, an emphasis on student engagement and retention must be prioritized in schools. In the present study, we consider the effect of academic success on local juvenile crime and integrate concepts from social bond and routine activity theories to guide our research.

We draw from multiple data sources to answer the following research question: Do school achievement factors influence neighborhood juvenile crime? More specifically, we assess the influence of high-performing schools and dropouts on violent crime in the surrounding area. This study improves upon previous work on the intersection of schools and crime by (1) looking at how distinct school and neighborhood characteristics influence juvenile crime and (2) comparing our results using juvenile crime to results using all crime (not limited to crime committed by juveniles). Previous studies have exclusively examined the effect of schools on all crime rather than juvenile crime; we argue that juvenile crime is more appropriate for understanding how characteristics of the school might contribute to neighborhood violent crime.

School Engagement, Academic Performance, and Delinquency

From a criminological perspective, attachment to school – an institution that provides social control – is a means of deviance avoidance. According to Travis Hirschi's (1969) social bond theory, which focuses on an individual's bonds to prosocial institutions, crime occurs when an attachment to society is weakened. School bonding plays an important role in delinquency prevention, as students who are engaged in school (i.e., display active participation and constructive behaviors towards academic achievement) are significantly less likely to experience the social problems that burden those who are not (Hahn et al., 2015; Levin, Belfield, Muennig, & Rouse; Prus, 2011; Waldfogel, Garfinkle, & Kelly, 2005). For example, school support and an attachment to school lessens the likelihood that an individual will be involved in delinquent acts (Banyard & Quartey, 2006; Resnick, Ireland, & Borowsky, 2004; Sprott, Jenkins, & Doob, 2005). Hirschi also theorized that, in addition to attachment to respected individuals (i.e., parents, teachers), social bonds are based on one's commitment to and involvement in conventional activities, which reflects a belief system that conforms to societal values. Students who are attached to school are more likely to involve themselves in school and school activities, making them less likely to be involved in delinquent acts. Moreover, it provides greater opportunities for financial success and fewer social hardships in the future.

Empirical research supports this notion that school engagement matters for social advancement. Attachment to school has been associated with numerous beneficial outcomes, including increased work-life earnings (Day & Newburger, 2002; Julian & Kominski, 2011), decreased substance use (Li et al., 2011; Maynard et al., 2012) and delinquency (Hirschfield & Gasper, 2011; Li et al., 2011), and lower rates of serious criminal offending (Henry, Knight, & Thornberry, 2012). Likewise, disengaged students and high school dropouts are more likely to be

unemployed, earn lower wages, have higher rates of public assistance, and are more likely to be single parents and have children at a younger age (Monrad, 2007).

Students not in school are also more likely to engage in harmful behaviors (Farchi et al., 1994). This may be particularly important for dropouts, where unstructured time with peers may increase following their exit from school; this creates opportunities for deviant behavior, including substance use, criminal behavior, and dangerous driving (Osgood et al., 1996). Osgood and colleagues (1996) found that better high school grades resulted in less unstructured socializing activities and less deviant behavior, noting the importance of academic success in shaping how time is spent outside of school.

In a national study examining why students drop out of high school, most dropouts listed disinterest in school and lack of motivation as major reasons for leaving school, while a third listed personal reasons, such as finding a job, becoming a parent, and caring for a family member (Bridgeland, DiIulio, & Morison, 2006). Thus, many dropouts leave school because other responsibilities are prioritized, but most of these former students pointed to school disengagement as the driving factor.

School as an Agent of Socialization

The literature on school climate and disorder demonstrates the importance of the school as a wholly functioning system that affects students academically, ideologically, and behaviorally. School climate is a term used to describe the total environmental quality of the school (Anderson, 1982). If the preferred school climate is one that encompasses orderliness, connectedness, and a supportive staff (Thapa et al., 2013), then school disorder (often measured by student crime and misconduct) is the effect of unhealthy organizational climates.

Schools that engage students are less likely to exhibit disorder and more likely to shape civic-minded youth, while schools that do not engage students experience more incidents of illicit behavior. Welsh (2003), for instance, found that as school effort – a five-item scale reflecting how much effort the average student devotes to schoolwork – increases, offending (i.e., illegal behavior) and misconduct (i.e., general misbehavior) decrease. Furthermore, the organization of a school as a community – that is, a school with supportive relationships between staff and students, shared beliefs, and a common set of goals and norms – improves student bonding to school and academic achievement and reduces delinquent behavior (Payne, Gottfredson, & Gottfredson, 2003). While these concepts are generally applied to student behaviors within school, the school's role as a socializing agent suggests that schools are responsible, in part, for the behaviors and outcomes of its students both in and outside of school.

Routine Activity Theory and Schools

In addition to the literature on the socializing functions of school, we draw on routine activity theory and related research to explicate the possible impact of schools on local juvenile crime. The tenets of routine activity theory suggest that the simple presence of a school increases crime in the surrounding community by bringing together more suitable targets and potential offenders, often under limited supervision. Empirical research on the presence of schools has supported the theoretical notion of increased local crime. The present study suggests that schools may also *function* in ways that contribute variably to neighborhood crime by influencing student engagement and opportunities to offend.

According to routine activity theory, three things must converge in time and space for crime to occur: (1) suitable targets, (2) motivated offenders, and (3) the absence of capable guardians (Cohen & Felson, 1979). How these three elements converge predicts whether

criminal inclinations will develop into criminal actions. Building on routine activity theory, criminologist John Eck developed a crime prevention model known as the "problem analysis triangle" that considered crime controllers – those who can monitor and control targets, offenders, and places (2003). While interactions with "guardians" may prevent would-be targets from crime victimization, interactions with "handlers" prevent would-be offenders from committing crime. Among school-aged youth, teachers often act as effective guardians and handlers.

Some studies testing routine activities have found that local institutions impact crime at the location of the institution as well as the surrounding area (e.g., Roncek & Bell, 1981). Studies that examined schools have also found that crime spatially clusters near the school (Bernasco & Block, 2009; Kautt & Roncek, 2007; Murray & Swatt, 2013; Roman, 2004; Roncek & Faggiani, 1985; Willits et al., 2013, 2015). The area immediately surrounding the school tends to be more criminogenic, implying that school-aged youth are involved in these crimes as either offenders or victims. Research on the effects of schools on local crime has shown that schools attract a number of different crime types. Roncek and LoBosco (1983) found higher rates of burglaries and auto thefts in locations that had high schools compared to those that did not. Neighborhoods with middle and high schools experience more drug crimes than areas without them (Willits et al., 2015), as well as more aggravated assault and larceny incidents (Willits et al., 2013). Examining why robberies occur in particular areas, Bernasco and Block (2009) found that tracts with high schools experienced more robberies. Notably, the authors perceived high school students as attractive targets rather than potential offenders. The significant correlation between schools and local crime has been found while controlling for several neighborhood disorganization indicators, including neighborhood instability and structural disadvantage; thus,

while schools are in part reflections of neighborhood resources, their impact on the community is also independent of the location of the school.

Roman (2004) explored to what extent middle and high schools act as generators of violent crime using social disorganization and routine activity constructs. Three school characteristics were examined in this study: (1) block distance in miles to the closest school, and whether a block was close to (2) a low-resource school or (3) a school with characteristics that represent disorder, on average. Proximity to schools, generally, increased violent crime during the day, which supported routine activity theory. Since schools attract youths during school hours, crime was higher in the blocks closest to schools during this time. Proximity to resource-deprived schools, however, increased violent crime after school hours. Finally, schools with disorderly milieu also increased violent crime in nearby blocks, but only during the morning commute. In sum, none of the school variables were linked to violent crime when students were not in their school routines (i.e., weekend, school nights, curfew, and summer).

An Integrated Theoretical Approach to Schools and Neighborhood Crime

There is no single theory of crime that explains how and why schools may increase crime in the local community. The brief review of the literatures on social bonding and routine activities that have addressed this topic demonstrates the complexity of this phenomenon, and thus, an integrated approach to understanding the impact of schools on neighborhood crime is utilized. To focus exclusively on functions of the school or neighborhood ignores important individual-level explanations, but individual-level theories cannot explain why crime clusters near schools. As such, an approach that incorporates concepts from both social bond theory and routine activity theory is aptly applied to this study.

In addition to school proximity, resources, and disorder, schools characterized by academic failure may foster unconventional behaviors and increase local crime, as schools with low student engagement signal other potential problems among the student body. Those with high numbers of dropouts, in particular, may be more likely to increase crime due to high numbers of youth residing in the area without supervision, especially during school hours when the relationship between school and neighborhood crime is most pronounced (Murray & Swatt, 2013; Roman, 2004; Willits et al., 2015). Dropping out of school is a long, gradual process that correlates with other delinquency risk factors – such as tobacco and alcohol use, socioeconomic status, delinquent peers, and school suspensions (Sweeten, Bushway, & Paternoster, 2009) – but the act itself results in a sudden lack of school supervision. Once students drop out, teachers and school staff – who normally act as handlers for disengaged students – no longer supervise their actions. For this reason, we anticipate more local juvenile crime based on increased opportunities for offending and a lack of handlers among youths who are no longer associated with formal schooling.

Alternatively, schools that reflect a commitment to education may be associated with less crime. Students who attend these schools display mainstream beliefs about academic success through high performance on standardized tests and high graduation rates. As such, we predict that schools with large numbers of dropouts are associated with more juvenile crime in the surrounding area, while high-performing schools are associated with fewer neighborhood violent crime incidents. We control for other criminogenic influences of the neighborhood to isolate the effects of these school characteristics on juvenile crime.

The present study contributes to the literature on schools and community crime in a few ways. First, most studies do not account for specific characteristics of the school that might

influence crime. This is the first study to assess how school achievement impacts local crime. Second, whereas previous studies have used crime committed by people of all ages as the outcome, we specifically examine juvenile crime to estimate the effects of these schools on local juvenile offending. General crime measures account for both juvenile offenses and victimizations but also include crime committed by adults. We use juvenile crime to capture how processes occurring within schools can affect delinquent student behaviors outside of school.

DATA AND METHOD

We combined a number of datasets to create block-level data from 2000 to 2012. Demographic data were retrieved from U.S. Census and were linearly interpolated across years. For block-level data that were not provided by Census, we used information from the block groups in which these blocks were nested to impute block-level values (more information on this "synthetic estimation" approach can be found in Author, 2015). Incident-level crime data were collected from local police agencies. The Orange County Sheriff's Department (OCSD) provided information about the suspect(s) for each crime incident, enabling an analysis of juvenile crime but also limiting the sample to areas in Orange County, CA that were covered by the OCSD. The following cities are included in this study: Aliso Viejo, Dana Point, Laguna Hills, Laguna Niguel, Laguna Woods, Lake Forest, Mission Viejo, Rancho Santa Margarita, San Clemente, San Juan Capistrano, Villa Park, and Yorba Linda.

Orange County is a densely populated metropolitan county in southern California. We use information from the 2010 Census to describe the OCSD patrol area used in this study. Over 71 percent of the populace were white, 16 percent were Latino, 9 percent were Asian, 3 percent were other race, and 1 percent were black. Orange County is the second most densely populated

county in California; the average block in the current sample had 133 inhabitants. Most residents (68 percent) were married, over a third of all households had children, and only 6 percent of households were single-parent households. On average, these areas in Orange County are distinctively upper-middle-class, and over 40 percent of the populace aged 25 or older had obtained a bachelor's degree. Despite county averages, there is considerable variation in the sample.

School data were retrieved from the California Department of Education (CDE) and Common Core of Data (CCD). CDE collects information from all public schools in California, while CCD gathers information from all public schools nationwide. Primary schools were omitted from the sample because graduate rates and dropouts are not applicable to (and not available for) lower grade levels. The Academic Performance Index (API) and dropout, graduate, and enrollment counts were drawn from several CDE datasets. The API is a single score ranging between 200 and 1000. It reflects each school's performance based on statewide testing in multiple content areas. We also used measures from CCD to multiply impute missing cases in our variables of interest.[1] This study uses information from all public high schools in areas covered by OCSD, which is a total of 19 schools from 2000 to 2012. The final sample used in analyses after listwise deletion includes approximately 2,567 blocks per year.

>> INSERT TABLE 1 HERE <<

Dependent Variables

The crime data utilized in this study are aggravated assault and robbery incidents. Burglary, larceny, and motor vehicle theft were considered, but the proportions of incidents with suspect information were too small to include these crime types in the study (14%, 20%, and 18%, respectively). Drug offenses, while previously found to be higher in areas with secondary

schools (Willits et al., 2015), were not provided by OCSD. Instead, we focus on the two crime types with a sizeable portion of suspect information: aggravated assault and robbery (79% and 40% had suspect information, respectively). These crime types are aggregates of more specific incident labels supplied by OCSD. We included any incident involving a juvenile suspect, defined in this study as those aged 20 and under at the time of the incident. We included ages 18-20 (those who are considered "adults" in the legal sense) to capture older students who may have repeated grade levels before dropping out.[2] This age group is also pertinent to temporally lagged models. We do not limit the outcomes to crimes committed at certain times (i.e., before or after school), as has been done in other studies on schools and neighborhood crime, because dropouts may commit crimes at any point in the day. See Table 1 for descriptive statistics.

Independent Variables

The two primary variables of interest are number of dropouts and a measure of school performance. Because we included all public high schools and high school equivalents – including three alternative programs with high enrollment counts – the average number of dropouts was 55 per school. However, the median number of dropouts within a two-mile buffer of each school was about 24, which is more reflective of the "typical" school in Orange County. Although alternative schools are fundamentally different than traditional high schools, we chose to keep these schools in the sample to include any high school aged youths not supervised in a school setting during the day. Dropout counts are utilized rather than rates to capture the number of unsupervised youths in the area. Based on the integrated theoretical approach, higher dropout counts in the area are expected to yield more local juvenile crime. The dropout count was log transformed to obtain a normal distribution and reduce the effects of outliers.[3]

Graduate rates were generated using graduate counts and the number of enrolled students in grade 12. Although not a perfect estimate of those graduating (some students may graduate early, for example), this measure approximates school success. We did not expect graduated students to become potential guardians in the same way dropouts might become potential offenders; therefore, a rate (rather than a count) was the more appropriate measure to use. The average graduate rate was approximately 92 percent, which is generally consistent with other reports of Orange County high schools (Leal, 2015). As stated above, the API score is a school achievement measure that reflected how well participating students performed on all statewide standardized tests in multiple content areas. It did not track individual student progress across years, but instead estimated overall student achievement and was used to rank schools. The mean API for Orange County high schools was 720 during the study period, which is slightly higher than the state average (the statewide target was 800).

To measure *high-performing* schools, we created a factor variable using graduate rates and API scores,[4] which is the sum of the standardized values. While all three variables (dropouts, graduate rates, and test scores) are measures of school achievement, we hypothesized different relationships between schools with a high number of dropouts and neighborhood crime compared to schools with high graduate rates and test scores and neighborhood crime. Local crime was posited to increase with the number of dropouts since each unsupervised youth is a potential offender in the community. Schools with high-performing students were not posited to reduce local crime; fewer local crimes would likely be attributed to a lack of criminal participation rather than crime prevented by students, as it seems improbable that youths would become "handlers" for others in the same age group.[5] Thus, both measures capture academic success but their relationships with crime differ theoretically.

Both the crime and school data were geocoded using ArcGIS. We then created two-mile spatial buffers with an inverse distance decay function (blocks closer to schools are assigned higher values) for both school measures such that any school within these buffers was associated with the focal block. If more than one school was within two miles of the focal block, we summed the dropout counts and averaged the high-performing school factor score. We elected to use two-mile spatial buffers assuming most students attend high schools within their assigned catchment areas, which are schools in close proximity to the students' homes. Journey-to-crime research shows that offenders generally travel short distances to commit crime (Bernasco & Block, 2009; Rengert, 2004), and this is particularly true for juveniles, who have more limited means of traveling greater distances. As demonstrated by Wiles and Costello (2000), any node familiar to the offender can be the origin of the offender's journey to crime. High school students, who spend a great deal of time in and around the school, are well acquainted with the neighborhood surrounding the school, even if it is not their home neighborhood. Therefore, it is assumed that youths commit crimes near their school and/or home, and it is most likely that their school and home neighborhoods are the same. Thus, a spatial buffer of two-miles captures both the school attended by local students and the most probable offending area.

Control Variables

Several neighborhood demographic variables are included as controls to isolate the relationships between the school characteristics and juvenile crime. We utilize the following demographic variables in our models to minimize the risk of spurious results: (percent) black, Latino, occupied housing, aged 15 to 19, and land use measures (i.e., industrial, office, residential, and retail). We also control for population (logged). Higher reports of crime committed by juveniles may be due to more youth residents in the neighborhood; thus, we

control for the percentage of residents aged 15 to 19 to isolate the findings of the school characteristics, specifically. It is plausible that some areas report more crime based on the availability of desirable resources or report fewer crimes due to more guardianship and limited access to desired goods. To account for these differences, we include four types of land use measures in our models. Racial/ethnic heterogeneity is measured using the Herfindahl index, where higher values represent greater heterogeneity. Greater levels of ethnic heterogeneity are posited to decrease social interaction, thereby increasing crime (Sampson, 1991). Finally, measures of disadvantage and residential stability were created using factor analysis. Disadvantage is captured by percent below poverty, average household income, persons with a bachelor's degree, and single parent families (estimated as a confirmatory factor analysis, scaled to percent below poverty using national estimates). Residential stability is measured as the mean of the standardized values of percent home owners and average length of residence. Finally, quarter-mile demographic spatial buffers were included in the final models, which is a suitable unit for block-level spatial models (Author, 2015).

Analytic Strategy

We integrate school data with longitudinal demographic and crime data for small geographic units (i.e., census blocks) in cities in Orange County. We answer the proposed research question by estimating fixed effects models using negative binomial and logistic regression (depending on the distribution of crime) with two juvenile crime type outcomes: aggravated assault and robbery. The crime outcomes are estimated in separate models for both school characteristics for a total of four models.[6] Serious and violent crimes are extremely rare events, especially among those under 20 years of age (Cooper & Smith, 2011). We estimate negative binomial regression models with juvenile aggravated assault as the outcome variable

because juvenile aggravated assault is an overdispersed count variable. Among the blocks in the sample that contain at least one juvenile robbery, less than 5 percent had more than a single incident. We therefore estimate logistic regression models for juvenile robbery. All models are estimated with robust standard errors.

The temporal ordering of the dependent and independent variables is complicated by mismatched school and calendar years. Dropout and graduate counts and API scores are reported at the end of the school year, whereas crime counts are totaled at the end of the calendar year. However, this should not pose an analytical problem for a few reasons. First, graduate rates and API scores are general measures of student achievement. The ordering of these measures and crime should not significantly affect the results because they capture overall school performance for that school year. Schools with high graduate rates and test scores typically have students dedicated to education for the entire school year, not just at the end of the year when the measures are reported. Moreover, these measures do not vary drastically from year to year. Second, the impact of dropouts on crime is presumed to occur close to the dropout date since a lack of guardianship and educational responsibilities begins immediately. The longest gap between dropping out and crime is roughly six months (June to December), which is a plausible time frame for this phenomenon. The results using an approximate one-year lag (e.g., school characteristics from school year 2010-11 predicting crime in 2012) were comparable except for the effect of high-performing schools on juvenile robbery.[7]

An additional set of models is estimated using all crime incidents (as opposed to just crime incidents committed by juveniles) for both crime outcomes. Previous studies on the effects of schools on neighborhood crime have used an aggregated crime measure that included crimes committed by adults. While some incidents might involve a student as either the victim or the

perpetrator, using an aggregated crime measure masks the impact of the school on local juvenile offending. We present the differences in using crime committed by juveniles as the outcome with the results for crime, generally, in the following section. The proportion of crime events that were committed by juveniles compared to the total number of crime events is described in greater detail below. Among this study's sample, juveniles only made up 10.6% of crime victims and 20.5% of crime suspects.

We found no evidence of multicollinearity issues in our models as all variance inflation factor values are below 5. We also checked for spatial autocorrelation – when values of a variable are spatially clustered – using Moran's I. Spatial autocorrelation is problematic because it violates the assumption that observations are independent from one another. We calculated this statistic in ArcGIS for the residuals for both types of crime using the models with dropouts as the main predictor and found no evidence of spatial autocorrelation. The Moran's I statistics were essentially zero (approximately -0.003 for both crime models).

>> INSERT TABLE 2 HERE <<

Results

Juvenile Crime

Table 2 displays the models predicting juvenile crime. Statistically significant results are detected for the two models assessing the relationship between dropouts and neighborhood crime. First, we find that higher dropout counts increase juvenile assault (b=0.059, p<.05) on blocks within two miles of the school.[8] More specifically, a standard deviation increase in dropouts is associated with an increase in juvenile assaults by 16%, on average (exp(0.059 × 2.55) – 1). Second, dropouts are associated with increased local juvenile robbery (b=0.175, p<.05), and this is the strongest effect of any of the school characteristics on neighborhood

crime. A standard deviation increase in dropouts yields a 56% increase in local juvenile robberies.

Whereas dropouts positively affect juvenile violent crime, the high-performing school measure is not statistically associated with local aggravated assaults or robberies. As such, academically unsuccessful schools – those that produce a high number of dropouts – are associated with more juvenile crime in the surrounding community, but academically successful schools do not appear to share a relationship with neighborhood violent crime.

Among the block demographics, higher percentages of black residents and adolescents are associated with more robberies and assaults, respectively. Of the land use variables, percent residential is the only measure that is significantly associated with juvenile crime, where residential blocks experience fewer robberies compared to blocks with other types of land use. Population, as expected, is positively associated with both crime types – the greater the population count, the more crime observed on that block. Interestingly, the neighborhood disadvantage measure is not related to either type of juvenile crime.

There are slightly different results among the spatial buffer demographic variables. For example, percent black is not related to juvenile aggravated assault or robbery, and a larger proportion of people aged 15 to 19 in the nearby area is associated with fewer juvenile robberies. Percent Latino is significant and positive in direction in the juvenile robbery models; areas with more Latino residents experience more robberies. The residential land use measure is not related to crime incidents, but areas that are more industrial or retail experience more juvenile assault and robbery, respectively. Again, neighborhood disadvantage and stability are unrelated to these juvenile crime types.

One concern for the current sample and the attendant findings is that it primarily consists of upper-middle-class suburbs. We therefore performed two checks on how these processes may work in more affluent communities compared to disadvantaged communities. First, we estimated the models again using blocks with a disadvantage factor score greater than -1 within the 0.25-mile buffer to capture the effects of schools in more disadvantaged areas (n=6,236 blocks).[9] Our findings reveal a strong similarity between these disadvantaged neighborhood models and the full sample, with coefficients comparable in magnitude and direction. Second, we estimated the models without the dropouts or high-performing schools measures to test whether these school characteristics mediate the relationship between structural measures of community disorganization and neighborhood juvenile crime. These disorganization measures (i.e., disadvantage, residential stability, percent occupied, ethnic heterogeneity) were not statistically significant in these models, and this remains true when splitting the sample by relative advantage and disadvantage. Hence, the relationship between school achievement and juvenile crime is fairly consistent across levels of neighborhood disadvantage, and the findings from the full sample may be applicable to areas with greater disadvantage.

>> INSERT TABLE 3 HERE <<

All Crime

Table 3 presents the results from the same models estimating the effects of dropouts and high-performing schools on *all* robbery or aggravated assault events, not just those committed by juveniles. Note that this is the common strategy in much of the existing literature, though it conflates adult and juvenile offenders. In this section, "crime model" is used to describe the models predicting all crime incidents as the outcome.

An increase in the number of dropouts within a two-mile radius is associated with an increase in both violent crimes. We find similar relationships between dropouts and overall aggravated assault as we did with dropouts and juvenile aggravated assault. In both models, a rise in the number of dropouts increases aggravated assault by about the same amount (b=0.059 for juvenile aggravated assault and b=0.057 for total aggravated assault). The effect size for dropouts in the robbery model, however, is less than one-third of the effect size in the juvenile robbery model (b=0.051 compared to b=.175). Thus, it seems the true impact of dropouts on juvenile robbery is captured when juvenile offenders are modeled separately.

The crime models also produce a positive relationship between high-performing schools and neighborhood aggravated assault (b=0.039), though this is not a statistically significant relationship, similar to the juvenile crime model. However, the direction of the relationship – that higher performing schools yield more local crime – may indicate that the models are improperly constructed with total crime as the outcome. It is also possible that high-performing schools are more likely to attract crime rather than produce crime, with students posing as suitable targets rather than motivated offenders, though this is not likely for reasons explained below.

Studies that use all neighborhood crime as the outcome when estimating the effect of schools assume students are involved as either offenders or victims. The alternative explanation is that schools somehow bring together adult offenders and adult victims; or in this case, that high-performing schools attract more adult offenders to the area. We examine the relationship between schools and neighborhood crime further by calculating the percentage of reported incidents between 2000 and 2012 that were committed by adults or juveniles against adults or juveniles, separately (see Table 4). The only incidents included are those in which both the suspect and victim's ages are known. The results show that most (64.5%) of these crimes

involved adult suspects and adult victims, and only 13.9% of aggravated assaults and robberies in the OCSD patrol area involved adult suspects and juvenile victims. Moreover, only about 18% of all adult robberies and assaults involved a juvenile victim, while over half of all juvenile robbery and assault involved a juvenile victim. Based on these statistics, it seems less probable that schools are responsible for bringing adult offenders to the area to prey on students; therefore, juvenile offending is more suitable for measuring the impact of schools on violent crime.

Finally, to compare the juvenile crime models with the total crime models in an auxiliary analysis, we conducted a Chow test to evaluate whether modeling juveniles separately is appropriate. The Chow test is an assessment of whether the coefficients in two linear regressions on different datasets are equal. Because these samples share considerable overlap (juvenile crimes are included in the crime counts), we instead identify juvenile and adult crimes for the Chow test. This gives us an idea of whether the school characteristics have varying effects on the propensity of adults and juveniles to commit crimes. Significant results are identified for both crime type models ($p<0.001$), meaning juvenile and adult crimes should be modeled separately when estimating the effects of schools on neighborhood crime.

>> INSERT TABLE 4 HERE <<

DISCUSSION

This study sought to assess how two school achievement characteristics influence juvenile violent crime in the surrounding school neighborhood. Using an integrated theoretical approach that incorporates elements of social bond theory and routine activity theory to guide this research, we anticipated juvenile crime would be higher in areas with more dropouts because these schools, on average, indicate lower levels of student engagement and generate more unattached and unsupervised youths. Similarly, we hypothesized that blocks near high-

performing schools – as measured by statewide standardized test scores and graduate rates – would experience fewer violent crime incidents. These high-performance indicators generally reflect a student body that is attached to school and aspires for academic achievement. Previous work on schools and crime often only include the presence and proximity to schools and neglect the processes within schools that might affect local crime. We also specified juvenile crime to examine how high schools might *contribute* to neighborhood violence and compared the results with models estimating all local crime to demonstrate why juvenile crime is the appropriate measure for this research question.

Our findings suggest that schools with more dropouts may influence violent crime in the area. More specifically, we found evidence that large numbers of dropouts are associated with more juvenile assault and robbery in the neighborhood. This supports our hypothesis based on social bonding and routine activities that when youths are unattached to school and are no longer reaping the social control benefits of formal schooling, violent crime in the area goes up. However, interpreting our results may not be this straightforward. In a recent study examining the moderating mechanism by which suspended students become involved in the criminal justice system, Novak (2019) found that school commitment was not affected directly by suspension but indirectly through deviant peers. Students who were suspended by age 12 were more likely to associate with deviant peers, and deviant peers predicted justice system involvement by age 18. Although this study tested the impact of school discipline rather than dropping out, and dropouts are arguably less attached and certainly less involved in school than students who were suspended, the two school experiences are related and both lead to more crime (Fabelo et al., 2011). A follow-up study might examine the effect of dropping out on deviant peer association and criminal justice system contact.

These findings indicate the short-term effects of dropouts, but the long-term effects of schools that produce disengaged students may be even more severe. The empirical findings on dropouts and social deprivation are consistent and robust. Unemployment is associated with a host of negative economic (Bureau of Labor Statistics, 2019), health (Pickett & Wilkinson, 2015), and criminal justice outcomes (Bushway, 2009), and dropouts are less likely to secure full-time work as adults (Sum et al., 2009) and earn significantly less than those who remain in school (Oreopoulus, 2007). Thus, schools that produce high numbers of dropouts contribute to negative community conditions in the short term as well as over time.

There is also the possibility that some student dropouts were pushed out of the education system against their own volition as opposed to leaving school due to disinterest. As mentioned above, a growing body of literature has demonstrated how exclusionary school discipline (i.e., suspension and expulsion) influences dropping out and delinquent behaviors (Fabelo et al., 2011; Mowen & Brent, 2016; Wolf & Kupchik, 2017), making it especially important that schools consider the potential attrition effects of school punishment. Another recent study – framed using labeling theory – examined the effects of suspension on peer association and found that school punishment related to greater discontinuity in friendship ties (based on self-reported preferences and peer reports) and increased involvement with substance-using peers (Jacobsen, 2019). This study suggests that there are potential labeling effects of school punishment, whereby suspended students are socially excluded and turn to the company of deviant peers. If this labeling act later manifests as delinquency, as the theory suggests (Becker, 1963; Matza, 1969), the same might be true of dropouts. In this case, crime results as a reaction to the deviant label rather than a disinterest in school. It is also plausible that students who have been suspended from school – and are therefore absent from school during their suspension periods – are also contributing to

local crime. Future research should investigate the impact of school punishment on neighborhood crime.

We also posited that high-performing schools – as measured by graduate rates and standardized test scores – would be associated with fewer violent crimes because they represent schools with engaged students and help develop rule-abiding local youth. However, our findings did not support this hypothesis; high-performance and juvenile violent crime were unrelated. As such, communities near high schools seem to experience the criminal consequences associated with the school's academic shortcomings, but the positive qualities of the school do not provide a protective effect for the neighborhood against local violent crime. The lack of statistically significant findings also indicates that *low* school performance does not increase crime in the area; that is, low graduate rates and low standardized test scores are not associated with more juvenile violent crime in the school neighborhood. This is somewhat surprising because both dropouts and the high-performance measure were posited proxies for overall school engagement among attending students. It seems, then, that the integrated theoretical approach – or perhaps labeling theory, if the deviant label explains increased criminality – provides a better understanding of the relationship between dropouts and juvenile violent crime, but school engagement alone may not sufficiently explain local violent crime. It is possible that school "handlers" and adult supervision are more important for crime prevention than social bonds.

When comparing the results from models using juvenile crime as the dependent variable to models using all crime, we argued that juvenile crime is the theoretically appropriate measure given that school characteristics likely impact juvenile violent offending and not adult violent offending. We highlighted that care must be taken to align the outcome measures with the posited theoretical mechanisms. As exhibited by the models predicting juvenile robbery and all

robbery, the true effect of dropouts on neighborhood juvenile crime is muted when the outcome variable includes both adults and juveniles. Moreover, we found that only about 14 percent of the cases in the sample involved a juvenile victim and adult suspect, making it improbable that schools attract violent adult offenders who target youths. We also found evidence in supplementary analyses that juvenile and adult crime should be modeled separately when estimating the effects of schools on neighborhood violent crime.

Limitations

There are limitations to this research that warrant mention. First, to use juvenile crime in the analysis, the sample was limited to data with suspect age. Unfortunately, the patrol area covered by the OCSD is neither ethnically nor socioeconomically diverse in total. Thus, the sample is mostly comprised of affluent, suburban neighborhoods in south Orange County, and our findings most aptly apply to similarly situated communities. However, even without the social and economic disadvantages that plague disadvantaged neighborhoods, we found that dropouts significantly increase local crime. A replication study in a low SES or ethnically diverse community – where the social barriers that protect more privileged youth from participating in delinquent behaviors are absent – might find even stronger effects. Alternatively, there is the possibility that local disadvantage has a different meaning when it is surrounded by a large area of disadvantage, which is not the case in our study area. A second limitation is that the reason(s) for which students in this study's sample dropped out of high school is unknown. Dropouts have reported a number of different motives for leaving school besides low school attachment, including personal, economic, and disciplinary reasons (Bridgeland et al., 2006; Sweeten et al., 2009). Further, some of these students return to school while others complete their GED requirements elsewhere. These students may not be on the same trajectory as students

who drop out of school with no plans to complete their education. It would also help elucidate this study's findings to know whether dropouts are more likely to spend their time in unstructured socializing with peers, which has been shown to increase delinquency at both individual and group levels (Osgood & Anderson, 2004). Third, this study utilized the crime types for which there was a sizeable portion of known suspects in the sample in order to identify juvenile participation; other crime types should be investigated in future studies, such as drug offenses, which have previously been associated with the presence of secondary schools (Willits et al., 2015). Finally, the common "boundary problem" in spatial analysis is present in this study; estimates for blocks closest to the sample's boundaries are limited by available data.

CONCLUSION

This study, in conjunction with numerous long-term socioeconomic benefits reported for those who complete high school, highlights the importance of student retention. As an institution, schools have a unique social responsibility in assisting with adolescent development by providing structure and support. However, schools that fail to retain students also fail to set these youths up for success in adulthood and may inadvertently increase violent crime in the neighborhood. Based on the findings from this study, school engagement alone may not be enough to ensure a safe and bright future. It is in both the school's and the community's best interest to keep at-risk students in school by offering continuing support or by placing these students in alternative education programs that better suit their educational needs. The social control aspects of school, particularly adult supervision, appear to play a significant role in curbing delinquent behaviors outside of school, stressing the need to keep students in school.

Notes

[1] We use multiple imputation by chained equations to handle missing data. Over the 14-year period, approximately 21% of cases were missing for dropout and graduates and 22% were missing for API. The following variables are used to impute the main school characteristics: percent black, percent Asian, percent Latino, percent white, magnet, charter, percent full-time equivalent teachers, percent students eligible for a free or reduced lunch, and the number of students included in the API.

[2] The legal definition of a juvenile may be less important here since we are primarily interested in whether the number of dropouts covaries with the number of violent crime incidents by school-aged youths, and the age of high school students is not limited by the legal definition. It is common for seniors to begin high school at ages 17 or 18. When only 19-20 year olds are considered, 48.7% of those who committed a robbery and 45.6% of assaults fall under this age group. Less common is the 20-year-old high schooler, but this age is included to capture students who may be older due to grade retention. When considering only 20-year-olds, 28.9% of the robberies and 24.1% of aggravated assaults involved a 20-year-old suspect.

[3] We also tested for the quadratic effect of dropouts, but the results were not statistically significant.

[4] The use of a statewide accountability measure (the API) introduces cultural biases now known about standardized testing; that is, students from marginalized communities perform worse on standardized tests that routinely draw material from mainstream, middle-class culture (Ladd, 2012). However, the measure utilized in this paper combines the API with graduate rates, and this serves as a sufficient proxy for high-performing schools.

[5] Including counts for graduates rather than a graduate rate also produced nonsignificant results.

[6] Because we believe the two school performance variables are measuring conceptually distinct but overlapping constructs, we assess their independent relationships with crime by including them in separate models. When both school performance measures are included in the models, the standard errors for each increase, as expected. The high-performing schools measure remains non-significant, and the measure of dropouts was reduced 20% in the assault model and 8% in the robbery model.

[7] Results for the one-year lag models are available upon request.

[8] The reported computations could be considered incident rate ratios.

[9] The disadvantage factor score is scaled to a national disadvantage measure.

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Table 1. Descriptive Statistics

Variable	*M*	*SD*	Min.	Max.
Juvenile Crime in Blocks				
Aggravated Assault	0.01	0.12	0	5
Robbery	0.00	0.07	0	4
All Crime in Blocks				
Aggravated Assault	0.06	0.35	0	26
Robbery	0.03	0.20	0	7
School Characteristics: 2 Mile Spatial Buffer				
Dropouts (logged)	2.75	2.55	-6.91	8.39
High-performing	0.00	1	-7.22	2.40
Demographic (%) in block				
Ethnic Heterogeneity	36.53	16.77	0	76
Black	1.06	2.80	0	100
Latino	15.98	17.15	0	100
Occupied Housing	96.36	6.26	1	100
Ages 15 to 19	6.40	4.09	0	100
Land Use				
Industrial	2.06	10.77	0	100
Office	1.58	8.81	0	100
Residential	67.69	39.87	0	100
Retail	3.39	14.25	0	100
Population	135.24	252.08	0	17,010
Disadvantage	-8.45	8.07	-49.12	38.36
Home Ownership	80.60	23.21	0	100
Demographic: 0.25 Mile Spatial Buffer (%)				
Ethnic Heterogeneity	41.70	14.22	0	73
Black	1.16	1.87	0	100
Latino	18.10	15.98	0	100
Occupied Housing	99.95	0.07	99	100
Ages 15 to 29	6.32	3.66	0	94.87
Land Use				
Industrial	2.92	9.49	0	100
Office	2.14	6.53	0	100
Residential	55.25	29.36	0	100
Retail	4.40	9.82	0	100
Disadvantage	-8.58	8.20	-52.90	39.97
Residential Stability	0.26	0.55	-2.43	1.48

NOTE: High-performing, disadvantage, and residential stability are factor scores.

Table 2. Negative Binomial and Logistic Regression Models Predicting Juvenile Crime

	Assault			Robbery			Assault			Robbery		
	b	SE		*b*	SE		*b*	SE		*b*	SE	
School Characteristic:												
Dropouts (logged)	0.059	0.028	*	0.175	0.073	*						
High-performing[a]							-0.011	0.063		-0.013	0.122	
Demographic (%)												
Ethnic Heterogeneity	-0.005	0.005		0.004	0.008		-0.005	0.005		0.005	0.008	
Black	0.012	0.031		0.055	0.024	*	0.013	0.031		0.056	0.024	*
Latino	0.007	0.005		0.001	0.008		0.007	0.005		0.001	0.008	
Occupied Housing	-0.015	0.014		-0.022	0.022		-0.016	0.014		-0.022	0.022	
Ages 15 to 19	0.045	0.019	*	0.012	0.034		0.049	0.019	**	0.015	0.033	
Land Use												
Industrial	0.009	0.006		0.008	0.009		0.009	0.006		0.008	0.009	
Office	-0.001	0.005		0.004	0.009		-0.001	0.007		0.005	0.009	
Residential	-0.003	0.002		-0.010	0.004	*	-0.002	0.002		-0.009	0.004	*
Retail	0.001	0.005		0.006	0.006		0.001	0.005		0.006	0.006	
Population (logged)	0.978	0.053	***	0.852	0.090	***	0.983	0.053	***	0.852	0.090	***
Disadvantage	-0.010	0.011		0.024	0.020		-0.008	0.011		0.025	0.020	
Home Ownership	0.000	0.003		-0.002	0.005		0.000	0.003		-0.002	0.005	
Demographic: 0.25 Mile Spatial Lag (%)												
Ethnic Heterogeneity	-0.001	0.006		0.000	0.011		0.001	0.006		0.003	0.011	
Black	0.003	0.006		0.082	0.118		0.025	0.068		0.101	0.117	
Latino	0.003	0.006		0.025	0.010	*	0.004	0.006		0.025	0.010	*
Occupied Housing	-1.141	2.273		-4.967	3.283		-1.004	2.309		-4.375	3.355	
Ages 15 to 19	0.018	0.020		-0.060	0.022	**	0.020	0.019		0.058	0.022	**
Land Use												
Industrial	0.016	0.007	*	0.018	0.013		0.016	0.007	*	0.017	0.013	
Office	-0.002	0.010		0.006	0.015		-0.000	0.010		0.008	0.015	
Residential	-0.001	0.003		0.004	0.006		0.002	0.003		0.004	0.006	
Retail	0.002	0.007		0.028	0.010	**	0.003	0.007		0.029	0.010	**
Disadvantage	0.009	0.013		-0.046	0.026		0.007	0.014		-0.043	0.026	
Stability	-0.070	0.174		0.067	0.319		-0.053	0.176		0.125	0.319	
N[b]	36,460			36,460			35,403			35,403		

NOTE: Dummy variables for year are included in the models but not displayed. Negative binominal regression is utilized for the assault models, and logistic regression is utilized for the robbery models.

* p < .05, ** p < .01, *** p <.001

[a] High-performing is a factor score using graduate rates and standardized test scores.

[b] This number represents the total number of observations over the 14-year study period. There were 3,646 unique blocks that contributed to the dropouts model and 3,571 unique blocks (this number varied by year based on available school data) that contributed to the high-performing model.

Table 3. Negative Binomial Models Predicting All Crime Regardless of Age of Victim or Offender (School Characteristics Only)

	Aggravated Assault			Robbery		
	b	SE		*b*	SE	
School Characteristic: 2 Mile Spatial Lag						
Dropouts (logged)	0.057	0.013	***	0.051	0.020	*
High-performing school	0.039	0.030		-0.062	0.047	

NOTE: * p < .05, *** p <.001. Demographic and year variables (same as Table 2) are included in the models but not displayed. Negative binominal regression is utilized for the assault models, and logistic regression is utilized for the robbery models.

Table 4. All Reported Aggravated Assaults and Robberies by Offender and Suspect Age

	Adult Victim	Juvenile Victim
Adult Suspect	5,720 (64.5%)	1,237 (13.9%)
Juvenile Suspect	920 (10.4%)	998 (11.2%)

NOTE: Juveniles include persons 20 years of age or younger. Frequencies reported reflect incidents involving persons in which the age and suspect(s) are known to the Orange County Sheriff's Department.