

Nearby Organizations and Juvenile Recidivism Risk

Neighborhood Context and Juvenile Recidivism: A Spatial Analysis of Organizations and Reoffending Risk

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Abstract

Leveraging point-level spatial data from the Phoenix area, we consider the role of nearby organizations as contextual factors that amplify or reduce reoffending risk among juvenile offenders after court completion. Using survival models, we examine whether residential proximity to seven types of organizations impacts risk of recidivism, net of neighborhood disadvantage and offender characteristics.

Aggregate neighborhood disadvantage was not associated with reoffending risk and organizational findings were mixed. Low-level offenders with more total organizations nearby had a higher risk of new property offenses, while the risk of drug and violent reoffending nearly doubled for diversion youth residing near police facilities or detention centers. Individual demographics and prior offense histories remained the strongest, most consistent predictors of juvenile recidivism.

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The neighborhood where children grow up has long been known to impact their lives (Leventhal & Brooks-Gunn, 2000), yet there are unanswered questions about “where, when, why, and for whom” these neighborhood effects hold (Sharkey & Faber, 2014). A robust literature has associated community-level economic disadvantage and residential instability with poor health, decreased civic participation, and crime (Browning & Cagney, 2003; Sampson, Raudenbush, & Earls, 1997; Wilson, 1996). However, critics argue that aggregate disadvantage measures such as percentage of poor or minority residents at an arbitrary spatial unit do not adequately reflect neighborhood resources (Allard & Small, 2013). The organizational infrastructure of a neighborhood is a promising but understudied aspect of environmental context that shapes the risks and opportunities youth residents face (McQuarrie & Marwell, 2009). Yet, no prior work has examined residential spatial proximity to organizations in relation to juvenile repeat offending.

Historically, juvenile recidivism research has focused on individual and family-level characteristics to predict re-offending, but practitioners and policymakers increasingly recognize that community factors play a role in successful juvenile reentry (Abrams & Synder, 2010). There is also growing interest in better understanding the spatial distribution of crime (Allard & Small, 2013; Hipp & Williams, 2020) and the role organizations play in “the production, reproduction, and arrangement of urban social relations, neighborhood conditions, and individual outcomes and identities” (McQuarrie & Marwell, 2009; p. 247). In theory, nearby organizations can amplify reoffending risk by introducing opportunities for delinquency or reduce the likelihood of recidivism through social control and/or service provision¹. Prior work documents

¹ Organizations are defined here as formal entities with a specific purpose, geographic presence, and a non-profit, for-profit or governmental auspice, adopted from Allard and Small (2013:3-4).

a link between adult parolee recidivism and neighborhood context (Kubrin & Stewart, 2006) with evidence that spatial access to supportive organizations impacts reentry outcomes (Hipp et al., 2010; Wallace & Papachristos, 2014; Wallace, 2015). To date, relatively few studies have examined neighborhood resources and juvenile recidivism in the U.S. and there is no consensus as to whether organizations might impact youth reentry (Grunwald et al., 2010; Mennis et al., 2011). To address this gap we use point-level data to test whether organizational resources impacts recidivism overall and for specific crime times for high and low-risk juvenile offenders in the urban southwest.

Organizations and Crime

Scholars have long recognized that crime is spatially concentrated, with socioeconomic disadvantage viewed as a risk factor for delinquency and disorder (Park & Burgess, 1925; Shaw & McKay, 1942). However, empirical study of where organizations are located in relation to crime is relatively new. Extant research on organizations has primarily sought to categorize facilities as crime-enhancing or crime-reducing based on the types of services provided or clients the organization attracts, or to document observed relationships between establishments and crime rates (reviewed by Groff & Lockwood, 2014). Crime pattern theory asserts that criminogenic organizations bring together targets for crime (e.g., sports stadium, subway facilities) or attract motivated offenders (e.g., red light district, bars) (Brantingham & Brantingham, 1995). Prior empirical work has documented higher crime near subway stations (Groff & Lockwood, 2014), alcohol outlets (Wo, 2016), public schools and shopping malls (Kautt & Roncek, 2007; Slocum et al., 2013) and public parks (Groff & McCord, 2012).

Other work has examined the potential protective effect of organizations theorized to reduce crime, either through direct engagement or through collective efficacy and supervision

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(Sampson et al., 1997). The idea is that some establishments provide rehabilitative goods/services for offenders or create generalized trust between neighbors that will, in turn, reduce crime opportunity and motivation. Results of this literature have been mixed. Wo (2016) found across nine cities that neighborhoods with more “third places” such as coffee shops and cafés had lower crime, though civic and social organizations had no impact. In the Bronx, Slocum and colleagues (2013) found advocacy organizations bridging the neighborhood reduced crime overall and the presence of family-serving institutions reduced property crime. Rather than general protective effects, some organizations such as religious-based charities and social services for at-risk populations have been shown to be dependent on the type of organizations, type of crime, and characteristics of the neighborhood (e.g., commercialization, disadvantage). For example, Peterson and colleagues (2000) found recreation centers reduced crime rates in areas of high economic distress but had no general protective effect. Recidivism rates have also been linked to gains or losses in health care, education, and emergency assistance organizations over time, particularly in impoverished neighborhoods (Wallace & Papachristos, 2014; Wallace, 2015). Other work suggests the relationship between nonprofits and crime control may be curvilinear with diffuse spatial effects beyond the focal census tract (Wo & Park, 2019; Wo, 2019). Together, this mixed empirical evidence provides some indication that organizations and crime are linked, but additional empirical and theoretical attention is needed to specify under what conditions the relationship holds.

Recidivism, Neighborhood Context, and Nearby Organizations

At the individual-level, there is interest in understanding how neighborhood context impacts the recidivism trajectories of ex-offenders. Research finds adult parolees who return to poorer, more resource deprived areas have an increased risk of repeat offending in some contexts

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(Kubrin & Stewart, 2006; Mears et al., 2008), but not others (Morenoff & Harding, 2014; Tillyer & Vose, 2011; Wang et al., 2014). Other work has tied recidivism outcomes specifically to the spatial distribution of organizations. Using residential addresses of California parolees, Hipp et al. (2010) found that ex-offenders with more social service agencies nearby were less likely to return to prison within one year of release, controlling for individual characteristics, though the effect was reduced in areas taxed by greater demand.

Among youth populations, there is evidence that residential contextual factors such as immigrant population (Wright & Rodriguez, 2014), social capital (Grunwald et al., 2010), and juvenile offender concentration (Harris et al., 2011) can impact juvenile reoffending risk, though effects have been limited to specific juvenile populations (i.e., gender, race, severity of priors) and types of offenses. Spatial access to organizations is a barrier identified by drug court professionals who cite a mismatch between service providers and where youth live as an impediment to success (Korchmaros et al., 2017). Lockwood (2012) found that youth who live farther from substance abuse treatment services are more likely to drop out prematurely, but this remains the only spatially informed empirical study, to our knowledge, to address the relationship between organization access and juvenile reentry outcomes.

We argue an examination of nearby organizations is warranted to better understand neighborhood effects. Although the role of organizations is not explicit in existing theories of juvenile delinquency, we suggest the logic of routine activities (Cohen & Felson, 1979), and social control theory (Hirschi, 1969) have utility for linking organizations to offending risk. Both theories indicate delinquent behavior is regulated by social or formal control (i.e., authority supervision, association with delinquent peers, involvement in bonding activities). Routine activities theory suggests delinquency is likely to occur when motivated offenders and available

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crime targets coalesce in space and time in the absence of supervisory guardians. This perspective has been invoked to explain hotspots of criminal activity (Sherman, Gartin, & Buerger, 1989) and the association between unstructured socializing without parental supervision and juvenile delinquency (Maimon & Browning, 2010; Osgood & Anderson, 2004).

In social control theory (Hirschi, 1969), a weak bond to society leads to delinquency. A strong social bond develops through attachment to others, commitment to and involvement in conventional activities, and belief in the legitimacy of the law. Thus, both internal self-regulation as well as external sources of social control such as adult supervision can keep youth out of trouble. Thus, the presence of particular organizations nearby could increase opportunities for crime without adequate supervision or reduce recidivism through collective social control and/or delivery of services that enhance social bonds.

The Present Study

Informed by prior work on adult recidivism, neighborhood context, and theories of juvenile delinquency, we posit that spatial accessibility (or inaccessibility) to criminogenic or protective organizations creates differential opportunities and risks in the institutional environment. Though we cannot test directly whether youth engage with neighborhood institutional resources, we argue that accounting for the organizational infrastructure of the local community better captures the ecological context for modeling risk than aggregate disadvantage scores alone. We hypothesize:

H1: Neighborhood disadvantage in a juvenile's residential neighborhood will increase recidivism risk, net of individual risk factors and organizations nearby.

H2: Juveniles within a walkable distance of risk enhancing organizations will face higher risk of recidivism, net of neighborhood disadvantage and offender characteristics.

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H3: Juveniles within a walkable distance of risk reducing organizations will face a lower risk of recidivism, net of neighborhood disadvantage and offender characteristics.

Organizations Under Study

For this paper, we examine seven types of organizations with some prior literature suggesting a link to juvenile delinquency listed below by predicted direction of effect.

Predicted Effect of Organizations Types on Recidivism	
Risk Enhancers	Risk Reducers
Public Parks	Library/Community Center
Middle/ High Schools	Civic/Membership/Voluntary Organizations
	Social Services
	Police/Detention
	Religious Establishments

Public parks and public middle/high schools have been largely viewed as criminogenic facilities. Evidence finds a link between park location and higher crime rates (Groff & McCord, 2012; McCord & Houser, 2017) as well as youth substance use (Kotlaja, Wright, & Fagan, 2018). Areas around middle and high schools are known hotspots of youth crime and victimization, particularly for drugs, interpersonal violence, theft, and vandalism (Willits, Broidy, & Denman, 2013; 2015).

In contrast, libraries/community centers and civic/membership/voluntary associations have been conceptualized as crime reducers by generating collective efficacy and trust at the neighborhood-level (Sampson et al., 1997). Further, they provide supervision and youth development opportunities that could inhibit delinquent behavior (Intravia et al., 2017; Zimmerman, Welsh & Posick, 2015). Social service support following justice involvement has been advanced as a way to reduce risk of repeat delinquency (Altschuler & Brash, 2004) and there is some evidence that youth who utilize resources use after incarceration have more positive engagement in work and school (Bullis et al., 2004). Other work finds individual treatment services can modestly reduce recidivism for high-risk, older delinquent youth (James

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et al., 2013) with proximity to provider being a predictor of successful completion (Lockwood, 2012). Police and detention facilities have also been viewed as crime reducers by limiting opportunities for motivated offenders to engage in delinquency without apprehension (Sherman et al., 1989). Randomized experimental and quasi-experimental research on hot-spot policing showed reduced crime with strong police presence (Sherman & Weisburd, 1995), though these have examined officer routes, not facility location as we do here. Lastly, religious congregations, according to social control theory, are expected to reduce crime and empirical evidence finds youth religiosity reduces anti-social behavior and violence (see meta-analysis by Baier and Wright, 2001). However, at an organizational level several studies have observed a positive association between the location of houses of worship and crime (Desmond et al., 2010; Triplett, White, & Gainey, 2012) or no statistical relationship at all (Slocum et al., 2013) suggesting there may not be a strong effect of religious establishment proximity on youth crime.

Data and Methods

The data for this study include point-level geolocated data on juvenile offenders and organizations from 2007 in the Phoenix urbanized area coupled with census tract sociodemographic data from the U.S. Census American Community Survey (ACS). Situated in the sprawling Sunbelt, urban Arizona provides a contrasting case to Chicago, Philadelphia or Baltimore, as recent work argues these cities are atypical of poor urban neighborhoods across the country (Small, Manduca, & Johnston, 2018). In a study of 331 U.S. metropolitan areas, Small and McDermott (2006) found that poor neighborhoods in the South and West had more organizations than other regions of the U.S. Our prior work using geolocated organizations in the Phoenix-metropolitan area finds a higher density of social services, religious, civic/voluntary/membership organizations, and detention/police centers in more disadvantaged

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areas (omitted for review). Areas with a high Latino population had fewer risk reducing organizations per capita, suggesting a focus on the type of organizations rather than the overall counts may elucidate differences in neighborhood risks and protective factors. Understanding the relationship between nearby organizations and youth residents is particularly interesting in the Phoenix metro area which has a less robust transit system and lower density of jobs and workers than other large metropolitan areas. The *Access Across America: 2014* project from the Center for Transportation at the University of Minnesota provides a direct comparison of job accessibility using transit systems in 46 of the 50 largest metropolitan areas of the United States. This study ranked Phoenix-Mesa-Glendale 19th with cities such as New York, San Francisco, Los Chicago, Philadelphia, and Boston ranking in the top 10. For these reasons, centering our study in the Phoenix area offers a contrasting case to much of the neighborhood effects literature and can elucidate the impact of nearby organizations in a sprawling metropolis lacking efficient transit access to services.

Outcome Measure

Juvenile Offenders. Our key outcome measure is recidivism, operationalized as a new formal complaint filed against the juvenile offender within one year of their completion from diversion or probation. We obtained de-identified data on youth offenders ages 8-17 who ended supervision with Maricopa County Juvenile Court between January 1, 2007 and December 31, 2007. Diversion included primarily first-time or low-level offenders who completed consequences outside of formal justice adjudication and were supervised by a probation officer or community board. Probation included offenders with more serious charges or prior offending histories who were formally adjudicated in juvenile court, assigned formal consequences and were overseen by probation officers. Entries with a valid residential address were automatically

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geocoded in ArcGIS by juvenile court administrators prior to release to researchers to protect anonymity². Eighty-four percent of probation youth and 83% of diversion youth fitting the sample criteria had a valid address within the study area, which is comparable to previous work using geocoded offender addresses (Hipp et al., 2009; 2010; 2011). We excluded cases that were dismissed outright and instances where youth paid a fine/restitution but did not have other engagement with the justice system. Offenders who were committed to ADJC (Arizona Department of Juvenile Corrections) and sex offenders were also excluded for a final dataset of 6,730 cases from diversion and 1,608 cases from probation. We controlled for factors associated with recidivism including gender, race/ethnicity, years of age at first offense, and community services hours complete (10+). Two race/ethnicity binary measures were included, one for Hispanic youth, and one for other, non-Hispanic minority youth³ with white as the reference category⁴. The other-minority measure included black, Native American, and other/unknown race⁵. Offense history for diversion youth was a binary measure for any prior offenses; 72% were first time offenders. For probation youth, we controlled for detention time (24+ hours), the total number of prior offenses and any prior offense in the specific category (e.g., past drug offense for drug recidivism) consistent with literature on offender specialization (see Baker et al., 2013).

² Automatic address geocoding in ArcGIS using Census Tigerline Shapefiles assigns address points to street segments based rather than parcels, so addresses are not located at the precise home location but within the expected address range for a street segment.

⁴ The Hispanic population in Maricopa County is predominately Mexican American, rather than a mix of Latinx cultures as can be found in other metropolitan cities. The 2010 Census reports 86% of the Hispanic population identified as Mexican.

⁵ Diversion was 9.3% black, 2.9% Native American, and 3.2% other/unknown and probation was 11.6% black, 3.2% Native American, and 1.3% other/unknown. These categories were collapsed into “other minority” to avoid too few cases for survival modeling.

Explanatory Variables *Neighborhood Disadvantage*. In Hypothesis 1, neighborhood disadvantage is the key explanatory variable predicted to impact recidivism risk. We used tract-level data from the American Community Survey (ACS) five-year estimates 2005-2009 to conduct principal component analysis in Stata⁶. The final composite measure of disadvantage included percent unemployed, percent in poverty, percent of female-headed households, percent with no car, percent with different house in past year, and median family income (KMO=.812). Each offender was assigned a disadvantage score was based on their home census tracts, with robust standard errors to account for juveniles nested in the same tracts (Hipp et al., 2010).

Organizations. Organizations are our key independent variables in Hypotheses 2 and 3. The organization data were collected at the establishment level (e.g., all YMCA locations) as part of a multi-year study of children's activities in the Phoenix area. The original data collection efforts were based on a phone survey administered in area codes 480, 602, and 623 which encompassed the greater metropolitan area (see omitted for review). Given that no single source provided comprehensive address-level data on organizations, the research team compiled a locational database at the establishment level from Dun and Bradstreet, the National Center for Charitable Statistics, Maricopa County Juvenile Probation, phonebooks and web searches which were cross checked for duplicates and geocoded to an XY location.

We categorized by subtypes where public parks (N=576) included general purpose spaces open to the public from SIC 7999 (amusement and recreation services not otherwise classified). Middle and high schools (N=340) included SIC 8211 (elementary and secondary schools) entities that were K-12, middle or high schools, excluding preschools, technical schools,

⁶ Additional indicators of race/ethnicity and economic status were examined using an iterative process to determine the optimal measure based on factor loading scores.

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specialty schools (e.g., for autistic children, online). Community centers (N=130) included YMCAs, Boys and Girls Clubs and community centers open for general usage. Public libraries (N=51) included establishments with SIC code 8231 that were verified to be a government library. Civic, voluntary, and membership organizations (N=5,134) included organizations with SIC 8641 (civic, social, and fraternal associations) with entities like the Lions Club, Kiwanis, alumni and neighborhood associations, parent-teacher organizations, senior centers; SIC 8699 (membership organizations not otherwise classified), art councils, athletic associations; SIC 7997 (membership sports and recreation clubs) which includes: sports and clubs restricted to use by members (country clubs, little league, recreation centers); and SIC 7999 (amusement and recreation services not otherwise classified). Specialized sports facilities owned or managed by city governments (e.g., Red Mountain Baseball Complex) and private parks such as HOA recreation centers were also included in this category. Social services (N=2,437) included SIC 8322 (individual and family social services) such as counseling, youth centers, treatment facilities, debt counseling, legal help, affordable housing, food banks, family services and SIC 8093 (specialty outpatient clinics NEC) that were residential substance abuse or mental health treatment facilities. Social services were cross-checked with an internal referral document from 2007 used by Maricopa County Juvenile Probation officers and judges to refer youth to services. Religious congregations/ministries (N=4,711) included SIC 8661 (religious organizations) which consisted of religious or faith-based congregations as well as non-congregational ministries supporting outreach, charities, local and global ministries, and church support activities. Finally, police stations and juvenile detention center locations (N=44) were captured for each police district within the study area (e.g., municipal and county) back to 2007 using the Internet

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Wayback machine. A binary variable was used instead of counts since some police/detention facilities were co-located.

Buffer Analysis. We used the network analyst tool in ArcGIS to calculate a walkable buffer zone around each residence based on the distance an average person can walk in 15 minutes using the street grid, after testing various buffer sizes⁷. Using the street grid better approximates walkable areas since purely distance-based measures dissect the metropolitan areas in ways that do not reflect accessibility, such as access zones across major freeways or roadways that are not traversable on foot. Our intent was not to operationalize the entire activity space where teens go, as older adolescents may be of driving age, but rather to approximate the ecological environment of their residence as is customary in neighborhood effects research. According to ACS data, 6.9% of households in the study area have no car (n=655 tracts). These rates were higher, on average, where diversion (7.6%) and probation (8.2%) populations reside suggesting what is nearby may be even more influential for the juvenile populations given lower car accessibility. To capture organizational context, we calculated a unique count of the organizations accessible in the buffer for each offender⁸.

Modeling Individual Risk of Recidivism. We used Cox proportional hazard models to predict individual risk of recidivism. This method employs a two-part outcome measure for event occurrence (yes/no) and time to event (measured in days). The recidivism ‘event’ was the first new complaint filed against a youth within one year of completion. We examined any type of new offense, as well as specific types of offenses. The model is expressed as

$$y = \alpha + J\beta_j + \varepsilon$$

⁷ Based on 3 mph average walking pace, a 15 minutes offers a localized measure of the youthful offenders’ neighborhood that could be accessed by walking a short distance, though we also used buffer sizes of 5, 10, and 30 minutes walking distance as a robustness check on the findings.

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where y is the time until recidivism or right censoring, α is the intercept, J is a matrix of juvenile offender predictors including youth characteristics, as well as the counts of organizations within 15-minute walking distance of the residential address of the juvenile, which have a vector of β_j on time to recidivism. The models by offense-type account for competing risk. Youth remain in the risk pool until the end of the study period (366 days post release) or until they repeat offend. Youth who repeat offend for a different type of new offense than the focal model (e.g., property charge in status/peace model) are right censored from the model (Allison, 2014). We restricted our analyses to offenders with valid XY coordinates with the geographic catchment area of 652 census tracts. None of the independent variables had inflated pairwise correlations or VIF scores indicative of problematic multicollinearity.

Descriptive Statistics

As shown in Table 1, girls represented 42.6% of offenders ending diversion and 23.4% of the youth ending probation. Reflective of the large Latino population in Arizona, Hispanic youth comprised 43.8% and 46.2% of the reentering juvenile offenders, respectively. The U.S. Census Bureau reported Maricopa County, Arizona was 29.6% Hispanic/Latino compared to 16.3% of the national population in 2010. Other racial minorities represented 15.5% of the diversion sample and 16.2% of the probation youth. Prior offense and supervision histories represent two different juvenile court experiences for each population. Nearly three-quarters (72.3%) of youth completing diversion were first-time offenders whereas most probation youth (76%) had prior offense records with an average of 3.7 prior offenses. Nearly half of probation youth had completed at least 10 hours of community service (45.2%) compared with only 13.8% of diversion youth. Neighborhood disadvantage scores for both samples were higher than the mean disadvantage score of -1.24 for the entire study area. Probation youth lived in more

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disadvantaged neighborhoods than their diversion counterparts, but the magnitude of the difference was modest (.47 to .61, respectively).

[Table 1 about here]

Notably, most youth who successfully completed diversion or probation did not reoffend. Only 23.3% of diversion cases resulted in a new complaint within a year of completion. For those who did reoffend, new status offense/public peace violation were the most common (12.3%) followed by property complaints (5.8%) and violent/drug offenses (5.2%). Roughly one-third (33.6%) of probationers reoffended, most commonly for status/public peace offenses (14.8%) followed by violent/drug (10.4%) and property offenses (8.4%). These figures are slightly lower than reported averages in existing research. Cottle et al. (2001) reported an average recidivism rate of 48% from 22 samples of juvenile offenders with a range of 22-75%. However, many of these studies examine only male populations and the juvenile delinquency rate is lower among female offenders.

Most youth had at least one of the specified organizations nearby; just 5.2% of diversion and 6.3% of probation youth had no establishments within their buffer. On average, juveniles had nearly 11 total organizations of the specified types nearby (mean of 10.99 and 11.21, respectively). Youth had, on average, about five religious establishments, three civic/voluntary/membership organizations, and two social services located in their residential buffer zone. About 40% of youth had a public park nearby, while one-quarter (26%) were within walkable distance of a middle or high school. Libraries and community centers were less common; 13% percent of diversion and 14% of probation youth lived near a neighborhood library or community center. Detention/police facilities were the least common, with only 3% of diversion and 4% of probation youth residing within the buffer walking distance of these entities.

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Results

Table 2 reports the hazard ratio of recidivism overall (Models 1 and 2) as well as for specific types of offenses (Models 3-8), controlling for individual predictors. Notably, there was no statistical relationship between neighborhood disadvantage and individual risk of repeat offending in any of the models, counter to the predictions of Hypothesis 1. Simply, youth in poor neighborhoods were no more likely to repeat offend than youth in more economically advantaged communities.

Hypothesis 2, which predicted that youth living near schools and public parks would have an amplified risk of recidivism was not also supported. Spatial proximity to a public park was not predictive of recidivism overall or by specific type of offense. Schools were not associated with recidivism risk except in one model; probation youth with at least one middle or high school nearby had a 35.7% reduction in status/public peace offense risk ($HR=.643$), but this effect was not observed for diversion youth. One organization type, however, was positively associated with the likelihood of repeat drug or violent offending among low level offenders. Diversion youth who lived near to a detention/police facility faced nearly doubled the risk of violent/drug recidivism than youth without these facilities in their neighborhood ($HR=1.950$), running counter to the expected deterrent effect.

Evidence in support of Hypothesis 3 was similarly mixed. There was no consistent protective effect of risk reducing organizations across juvenile populations and type of new offense. However, three organization subgroups were associated with recidivism reduction, though the effects were population- and offense-specific. Diversion youth who lived within walking distance of one or more public library or community center were 33.6% less likely to repeat offend for a violent/drug charge than those without ($HR=.664$). For probation youth, each

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additional civic/membership organization within walking proximity of an offenders' home reduced the risk of a repeat violent/drug offense by 6.6% (HR=.934). Probation youth with a school nearby faced lower risk of status/public peace offending (HR=.643).

Aligning with prior work on juvenile recidivism, individual variables were the most consistent predictors of recidivism across all models (Cottle et al., 2001). Girls were less likely to incur new offenses of all types, excepting risk of status/public peace offenses for probation offenders (Model 4). Youth with prior offense histories faced amplified risk of recidivism. Reentering diversion offenders with any prior offense were more likely to repeat offend for any new offense (HR=3.381) and for all subtypes especially property recidivism (HR=4.250). Risk among diversion youth with a prior offense was highest at time of completion for all offense types except violent/drug offending, indicated by significant time-varying interaction terms showing reduced risk over time. Among probation youth, the number of prior offenses amplified risk of any recidivism or status/public peace offenses (Models 2 and 4), while youth who served detention time faced high risk of property recidivism (HR=1.923) and a prior violent/drug charge more than doubled the risk of a new offense in this category (HR=2.354).

Robustness Tests Using Aggregate Categories

To further evaluate the robustness of the findings, we collapsed the organization categories to see if the cumulative effect of all organizations was more predictive of recidivism than the presence or absence of specific types. For simplicity, Table 3 shows only the organization and neighborhood disadvantage measures, though individual predictors were included in the models. A square root transformation for the number of all organizations was used to address the skewed distribution of the data. The aggregate organization predictor was

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only significantly associated with juvenile property offending for diversion youth (HR=1.092), but not significant in the other models.

[Table 3 about here]

Discussion/Conclusion

This study applied innovative spatial methods and point-level geographic data to examine the individual risk of repeat offending among juvenile offenders in the greater Phoenix area. In line with existing juvenile recidivism research, we found that youth demographic and offense histories were the most robust predictors of repeat offending (Cottle et al., 2001). Neighborhood disadvantage was not statistically associated with recidivism risk. This counters the classic social disorganization perspective providing evidence that compositional neighborhood disadvantage measures do not adequately capture environmental risks of recidivism (Sampson et al., 2002; Tillyer & Vose, 2011). Consistent with prevailing research, we observed a nuanced, complicated association between organizations and crime where different offender populations and delinquent acts are differentially impacted by the local institutional environment (Houser et al., 2018; Slocum et al., 2013; Sharkey & Faber, 2014).

In review, four organizations were associated with specific categories of juvenile recidivism, with three of the four linked to violent and drug recidivism. Among diversion populations, a library or community center nearby reduced violent/drug recidivism risk while living near a police/detention center nearly double the risk. Among probation youth, more civic/membership/voluntary organizations nearby reduced the risk of a new violent/drug complaint in the first year, while a middle/high school nearby reduced the likelihood of status/public peace recidivism. When all organizations were combined, there was an amplified risk of property recidivism among diversion track juveniles only.

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Drug Recidivism and Neighborhood Context

Congruent with prior research, we found that violent/drug recidivism was sensitive to aspects of the youth's residential environment, after accounting for individual characteristics. Grunwald and colleagues (2010) published one of the only prior studies of neighborhood-effects and specific types of juvenile crime recidivism. They found that neighborhood-level disadvantage increased the odds of repeat drug offending for male juvenile offenders in Philadelphia, while a higher aggregate social capital score reduced the odds. Further, they found that Hispanic youth were more likely to offend and reoffend for drug offenses. They argued that the kinship ties within the Hispanic communities that facilitate drug organizations explain why poor neighborhood conditions, coupled with high concentrations of low economic opportunity, enhance the likelihood of criminal drug involvement in their study. In contrast, our study found neighborhood disadvantage was not associated with repeat drug offending among youth offenders in Phoenix and minority youth were no more likely than white juveniles to reoffend for violent or drug charges. Instead, an individual's prior offense history and the presence of key organizations nearby were significantly associated with likelihood of repeat offending. For low-level juvenile offenders, the presence of a police facility nearby amplified the risk of new offenses, which challenges the premise that police facilities deter risk behavior. Spatial proximity to these establishments may make it more likely and convenient for police to catch juvenile offenders who choose to engage in illicit drug activities. At the census tract level, disadvantage was positively correlated with detention/police stations, but modestly so (.126, $p < .05$), suggesting this measure is not simply a proxy for poverty. A routine activities approach suggests that authority presence deters would-be offenders. However, our results suggest further

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distinction may be necessary to differentiate supervisory agents with the power to arrest from generalized eyes on the street.

Libraries/community centers and civic/social/membership organizations were associated with reduced likelihood of repeat drug or violent offenses, while proximity to school campuses reduced relative risk of public peace and status offenses for more serious offenders. These findings are consistent with social control theory where collective efficacy and the social bond reduce delinquency. Libraries/community centers such as the YMCA and city recreation centers serve as anchors for the community seeking to serve the general public. Reflecting the diversity of the voluntary sector, the civic/voluntary/membership organizations provide collective efficacy through direct influence over local neighborhood affairs (e.g. homeowners associations) and youth activities (e.g., little league, parent-teacher organizations), as well as more generalized civic engagement (e.g., toastmasters, animal rescue, art councils). We observed that both were negatively associated with recidivism risk, though it is not clear why each category was influential for only one juvenile population and for only violent/drug recidivism. One potential explanation is that the protective effects of these types of establishments are more diffuse, as Wo (2019) observed in Southern California where the number of voluntary organizations in a focal block reduced the incidence of burglary nearby, but reduced crime of all types in a .5 mile radius.

Extant research provides evidence that school attachment and attendance are protective factor for delinquency (Henry, Knight, & Thornberry, 2012) and we did observe a modest salutatory effect for probation youth through reduced risk of status/public peace recidivism. Burdick-Will (2018) found residents drew neighborhood boundaries around their local schools where their children attended, potentially increasing trust and solidarity that could impact

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juveniles in regions where local schools anchor communities, but we are unable to test this assertion without data on where juvenile offenders attend school.

Property Offending: Opportunity-Driven

Property recidivism was the only type of repeat offending influenced by the total number of organizations nearby. Low-level offenders with more organizations nearby had an increased risk of property reoffending, but this finding did not hold for probation offenders or for other types of crimes. A place-based theory of crime suggests non-residential zones are opportune for property crimes such as shoplifting (Brantingham & Brantingham, 1995) which may explain what we observe here. Retail spaces, such as large shopping centers, where teens are just ‘hanging out’ (Osgood & Anderson, 2004) could also be consequential, though we did not have data on these types of establishments. Future research could closely examine the relative contributions of retail space proximity to juvenile reoffending for property complaints.

Public parks, religious congregations, and social services had no statistical relationship with juvenile delinquency in our study. While prior work cites public parks as areas that incentivize criminal behavior given the mixed-use space and lack of consistent supervision (Groff & McCord, 2012; McCord & Houser, 2017), we did not observe these effects. One explanation may be due to the measurement of recidivism as an official new complaint filed against the juvenile rather than self-reported delinquency. One prior study in Chicago found that youth with a nearby park had a greater likelihood of self-reported substance use than youth without (Kotlaja et al., 2018). Park adjacency may be associated with opportunities to engage in substance use or other delinquent acts better accounted for by self-report measures.

Limitations and Recommendations

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It is important to note research limitations that impact the interpretation of these results. This study cannot establish causality from cross-sectional data so additional work using longitudinal spatial data is advisable to understand whether changes in the density of accessible organizations impact juvenile crime, as has been shown with adult recidivism (Wallace & Papachristos, 2014; Wallace, 2015). We also faced data limitations related to organizations based on counts by type and encourage additional research addressing heterogeneity between organizations (e.g., size, program diversity, financial breadth, catchment area). Additionally, while the spatial proximity model we employed to model organizational impact is an improvement over neighborhood effects studies that ignore the institutional infrastructure of community, it remains limited. The walkable buffer used to account for organizational proximity is an improvement over county or census tract counts. Yet it merely approximates the potential for use and the ecological context of residential environment and may not adequately capture where youth spend their time. Nevertheless, Bernasco (2010) found offenders are more likely to target areas near the current or former homes, so residential environment remains an important activity space that explains exposure to and opportunities for criminal activity. Further, we acknowledge that physical nearness to an establishment is but one component of accessibility; personal resources and agency also determine whether individuals can capitalize on resources or are insulated from neighborhood risks (Abramson, 2015; Guagliardo, 2004). Structural constraints may restrict the range of options and scenarios available to individuals, which may, in turn, influence desistance or repeat criminal involvement. However, individual agency and peer connections remain important determinants of repeat offending (Laub & Sampson, 2003; Mennis & Harris, 2011) that we are unable to address here.

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In conclusion, this study suggests the relationship between neighborhood context and juvenile recidivism risk is nuanced, though not inconsequential and requires a closer look at organizations that comprise local communities. Aggregate neighborhood disadvantage was not predictive of repeat offending risk, controlling for individual offending characteristics. Instead, establishments that uniquely shape community context, such as detention or police facilities and libraries or community centers, were associated with individual repeat delinquency. These results challenge the notion that aggregate disadvantage alone can elucidate community context. This study motivates the need for more research on the institutional environments of local neighborhoods as structural components of successful reentry among former juvenile offenders.

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Table 1. Descriptive Statistics

Individual Measures	Diversion			Probation			Variable Metric
	Mean	%	SD	Range	Mean	%	
Female	42.6%	0.49	0-1	23.4%	0.42	0-1	1=female, 0=male
Hispanic	43.8%	0.50	0-1	46.2%	0.50	0-1	1=Hispanic, 0=other
White (Reference)	40.7%	0.49	0-1	37.6%	0.48	0-1	1=white, 0=other (reference category)
Other Race	15.4%	0.36	0-1	16.2%	0.37	0-1	1=Black, Native American, Asian, other/unknown, 0=other
Community Service	13.8%	0.35	0-1	45.2%	0.50	0-1	1=completed 10+ hours community service 0= <10 hours completed
Age at 1st Offense	13.9	1.62	7-16	13	1.64	8-16	Age of juvenile in years
Count of Priors	---	---	---	3.7	2.88	1-21	Count of prior offenses excluding current offense
Any Priors	27.7%	0.45	0-1	---	---	---	1=any prior offenses excluding current offense, 0=first-time offender
Prior Status/Peace	---	---	---	65.2%	0.48	0-1	1=prior status/peace offense, 0=none
Prior Property	---	---	---	66.5%	0.47	0-1	1=prior property offense, 0=none
Prior Violent/Drug	---	---	---	49.3%	0.50	0-1	1=prior violent/drug offense, 0=none
Juvenile Detention	---	---	---	36.6%	0.48	0-1	1=detention time 24+hours served, 0= <24 hours
Recidivism							
Status/Public Peace	12.3%	0.33	0-1	14.8%	0.36	0-1	1=new status/public peace offense, 0=other offense or none
Property	5.8%	0.23	0-1	8.4%	0.28	0-1	1=new property offense, 0=other offense or no recidivism
Violent/Drug	5.2%	0.16	0-1	10.4%	0.31	0-1	1=new violent/drug offense, 0=other offense or no recidivism
Any Offense	23.3%	0.42	0-1	33.6%	0.47	0-1	1=new charge all types, 0=no recidivism
Neighborhood							
Census Tract Disadvantage	0.47	1.64	-3.71-7.33	0.61	1.60	-3.71-7.8	Factor: % unemployed, % poverty, % female-headed, % no car, % different household, median household income
Organizations Nearby							
Library/Community Center	0.13	0.34	0-1	0.14	0.35	0-1	1=one or more establishments, 0=none
Middle/High School	0.26	0.44	0-1	0.26	0.44	0-1	1=one or more establishments, 0=none
Public Park	0.41	0.49	0-1	0.43	0.50	0-1	1=one or more establishments, 0=none
Detention/Police Center	0.03	0.16	0-1	0.04	0.19	0-1	1=one or more establishments, 0=none
Social Services	2.04	3.10	0-31	2.03	2.93	0-21	Count of establishments
Civic/Voluntary/Membership	3.25	3.37	0-43	3.30	3.5	0-53	Count of establishments
Religious	4.58	4.50	0-33	4.72	4.44	0-27	Count of establishments
Count of All Organizations	10.99	9.90	0-109	11.21	9.80	0-100	Count of establishments
Juvenile Offenders N=	6,730			1,608			

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Table 2. Hazard Ratios of Recidivism by Offense Type

	Any Recidivism				Status/Peace				Property				Violent/Drug			
	1. Diversion		2. Probation		3. Diversion		4. Probation		5. Diversion		6. Probation		7. Diversion		8. Probation	
Individual	HR	SE	HR	SE	HR	SE	HR	SE	HR	SE	HR	SE	HR	SE	HR	SE
Female	0.597***	(.034)	0.699***	(.034)	0.744***	(.056)	0.962	(.157)	0.534***	(.064)	0.502**	(.127)	0.375***	(.049)	0.403**	(.109)
Hispanic	1.100	(.069)	1.108	(.115)	1.259**	(.104)	1.364*	(.209)	1.039	(.138)	0.714	(.153)	0.857	(.119)	1.132	(.226)
Other Minority	0.951	(.081)	1.182	(.150)	0.753*	(.086)	0.328*	(.086)	1.418*	(.206)	1.371	(.321)	0.912	(.146)	1.393	(.285)
Comm. Service	0.833*	(.063)	1.018	(.094)	0.735**	(.073)	1.237	(.162)	0.915	(.131)	0.810	(.152)	0.974	(.152)	2.131*	(.682)
Age at 1st	1.035*	(.016)	1.001	(.029)	1.131**	(.046)	1.115*	(.051)	1.073*	(.031)	1.046	(.116)	0.995	(.031)	0.963	(.052)
Any Priors	3.384*** (.326)				3.026*** (.423)				4.250*** (.793)				2.739*** (.312)			
Time*Any Priors	0.988*** (.000)				0.998** (.000)				0.996*** (.001)							
Time*Age at 1st					0.999** (.000)											
Count of Priors			1.087*** (.020)				1.096** (.032)				1.044 (.031)				0.963 (.052)	
Detention			1.032 (.120)				0.630** (.114)				1.923** (.392)				1.150 (.264)	
Prior Status/Peace							1.603** (.288)									
Prior Property											1.276 (.265)					
Prior Violent/Drug															2.354** (.746)	
Time*Other Minority							1.005** (.002)									
Time*Age at 1st											0.999 (.000)					
Time*Comm Service															0.995** (.002)	
Time* Prior V/D															0.996* (.002)	
Neighborhood																
Disadvantage	0.922	(.021)	1.007	(.032)	0.974	(.025)	0.970	(.051)	1.052	(.041)	1.110	(.068)	0.935	(.039)	0.987	(.062)
Public Park (0/1)	1.058	(.061)	1.006	(.093)	1.144	(.085)	1.146	(.159)	0.971	(.106)	0.854	(.160)	0.975	(.120)	0.949	(.485)
School (0/1)	1.064	(.062)	0.742	(.087)	1.047	(.080)	0.643*	(.114)	0.994	(.116)	1.017	(.201)	1.223	(.161)	0.703	(.162)
Library or Center (0/1)	0.864	(.077)	1.049	(.123)	0.934	(.115)	1.179	(.217)	0.885	(.127)	1.243	(.260)	0.664*	(.134)	0.695	(.215)
Civic/Membership (#)	0.990	(.010)	0.974	(.016)	0.980	(.014)	0.989	(.027)	1.001	(.015)	0.997	(.032)	0.997	(.022)	0.934*	(.030)
Social Services (#)	1.021	(.083)	1.015	(.020)	1.020	(.018)	1.030	(.033)	1.026	(.018)	0.927	(.041)	1.014	(.024)	1.063	(.037)
Religious (#)	0.994	(.007)	1.002	(.032)	0.990	(.009)	0.984	(.019)	1.018	(.014)	1.037	(.026)	0.973	(.019)	0.999	(.026)
Police/Detention (0/1)	1.210	(.175)	0.852	(.188)	0.986	(.222)	0.567	(.227)	1.131	(.316)	1.093	(.387)	1.950**	(.453)	1.171	(.485)
Recidivism N=	1568		540		826		238		393		135		349		167	

Notes: * p <.05 , **p <.01, *** p<.001. Diversion n=6,730 juvenile offenders, 2,151,267 time at risk spells; Probation n=1,608 juvenile offenders, 485,589 time at risk spells

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Table 3. Partial Table of Hazard Ratios of Recidivism by Offense Type: All Organizations

	Any Recidivism				Status/Public Peace				Property				Violent/Drug			
	1. Diversion		2. Probation		3. Diversion		4. Probation		5. Diversion		6. Probation		7. Diversion		8. Probation	
	HR	SE	HR	SE	HR	SE	HR	SE	HR	SE	HR	SE	HR	SE	HR	SE
All Orgs (Sqrt #)	1.011	(.021)	0.953	(.029)	0.998	(.026)	0.983	(.048)	1.092*	(.045)	0.993	(.065)	0.954	(.040)	0.878	(.058)
Disadvantage	0.987	(.020)	1.029	(.033)	0.972	(.025)	0.964	(.053)	1.048	(.039)	1.117	(.067)	0.953	(.042)	1.047	(.061)

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

Individual-level predictors not shown but included in the models.

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