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SMOKE AND MIRRORS?

EXAMINING THE RELATIONSHIP BETWEEN

MEDICAL CANNABIS DISPENSARIES AND CRIME

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Abstract: Medical cannabis dispensaries (MCDs) are storefront businesses that distribute cannabis to qualified patients for medical purposes. Opponents of MCDs have criticized policies in California and other states that allow for storefront distribution of the drug, which they allege attracts crime. Proponents contend that some MCDs actually reduce crime in their communities. This study seeks to evaluate these competing claims by analyzing crime rates, MCD density, and other neighborhood characteristics across 189 census tracts in San Francisco using data for the year 2010. Lists of reported crimes obtained from the San Francisco Police Department are classified into two categories: violent crimes (assault and robbery) and property crimes (arson, burglary, larceny-theft, vandalism, and motor vehicle theft). Location data for 26 MCDs and a total of 43,688 reported crimes are geocoded and aggregated into census tracts. Regression analysis is used to test for the criminogenic effects of MCD density and three "exogenous sources of social disorganization": socioeconomic disadvantage, family disruption, and residential instability. Findings indicate a weak relationship between MCD density and nearby crime, casting doubt on the claim that MCDs are magnets for criminal activity.

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INTRODUCTION

Sixteen states have legalized the medical use of cannabis, and several others may do so by the end of the 2012 election cycle.[1] Medical cannabis dispensaries (MCDs)—storefronts that dispense the drug to qualified patients—have proliferated in several of these jurisdictions.[2] California was the first state to legalize medical cannabis, and there are now hundreds of dispensaries serving an estimated 300,000 patients throughout the Golden State (Americans for Safe Access 2011). In this paper I aim to contribute knowledge that can be used objectively by researchers and policymakers interested in the relationship between MCDs and crime.

The overarching question facing state and local policymakers in medical cannabis states like California is not *whether* but *how* to allow for the drug's distribution. One option is to do nothing and simply let patients grow their own. Or, taking a more aggressive approach, a government could take steps to actively control cannabis production within its borders (Kreit 2002). Somewhere in the middle of this policy spectrum is the dispensary system as it exists today. In California, the state imposes few requirements (e.g. MCDs cannot operate within 600 feet of a school) and for the most part defers to cities and counties, who in turn use their zoning authority to place restrictions on the location and operation of MCDs within their jurisdiction. This has allowed patients to have safe and reliable access to the drug in many parts of the state, including San Francisco.

But what about the other outcomes of this policy—do dispensaries attract crime, as some critics claim? In this study I investigate whether, and to what extent, MCDs are associated with

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[1] The terms "cannabis" and "marijuana" are used interchangeably in this paper.
[2] The District of Columbia has also legalized medical cannabis. For a list and a map of medical cannabis states see National Organization for the Reform of Marijuana Laws (NORML), 2011, *Medical Marijuana Overview*, http://norml.org/marijuana/medical (accessed April 29, 2012).

higher crime rates. Using spatial data and linear regression analyses, I explore the relationship

between MCDs and crime across 189 census tracts in San Francisco. In framing a land use

question, this study strives to analyze dispensaries in the same way that local government

officials and staff might analyze bars, retail stores, or any other business in their community.

<div align="center">**BACKGROUND**</div>

The Current Debate Surrounding Medical Cannabis Dispensaries

Opponents of medical cannabis, most notably law enforcement officials, have argued that

MCDs attract crime. In the words of Melinda Haag, current U.S. Attorney for Northern

California:

> Marijuana dispensaries are full of cash and they're full of marijuana and everybody
> knows that. And many of them are very public about their operations. Some of them go
> on television, most of them have web sites, and everybody knows where they are. They
> are at risk of being robbed and many of them are robbed.[3]

Of course, if she had omitted the word "marijuana", Haag could have just as easily been talking

about banks (which have more cash and are even more accessible to the public than MCDs). But

nonetheless, her point is a valid one: criminals looking for a big score probably do consider

MCDs to be attractive targets.

Law enforcement groups have mounted organized resistance against the proliferation of

MCDs, focusing their attacks first and foremost on California—the state that opened Pandora's

box. A 2009 report entitled *Marijuana Dispensaries and the Federal Government:*

Recommendations to the Obama Administration stated that: "In, California, dispensaries have

had 13 years to flourish, and it is in California that their abuses have become evident" (Friends of

the D.E.A. 2009). In 2009 the California Police Chiefs Association also published its *White*

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[3] Michael Montgomery, "Interview with US Attorney Haag on Pot Operations," *KQED News*, 15 March, 2012. http://blogs.kqed.org/newsfix/2012/03/15/interview-w-us-attorney-haag-on-pot-operations-if-its-close-to-children-thats-a-line-were-going-to-draw/ (accessed March 16, 2012).

Paper on Marijuana Dispensaries, which alleges that dispensaries "have been tied to organized criminal gangs" and that murders and armed robberies occur commonly as "ancillary byproducts of their operation" (California Police Chiefs Association 2009). It goes on to relate a series of sensational anecdotes involving "hooded home invaders", victims bleeding to death, and even poisonings (8-10). However, neither report provides empirical evidence indicating that MCDs are associated with these crimes at rates higher than any other business.

Proponents of MCDs contend that regulated dispensaries actually reduce crime in surrounding areas, and they point to several successful jurisdictions in making the case that regulation is preferable to prohibition. In a report released in early 2011, Americans for Safe Access, a non-profit advocacy organization representing medical cannabis patients and MCDs, cites agreement from local government officials representing municipalities as diverse as Kern County, Oakland, and Sebastopol. In Oakland, a notoriously high-crime jurisdiction, city administrator Barbara Killey said that since enacting its dispensary ordinance, "the areas around the dispensaries may be some of the safest areas of Oakland now because of the level of security, surveillance, etc." that the dispensaries provide (Americans for Safe Access 2011, 6). These anecdotal reports conflict with those put forward by law enforcement and other critics of MCDs. In this paper I aim to test these competing claims using empirical evidence from San Francisco, where MCDs have been officially permitted since 2005.

The Legal Environment Surrounding Medical Cannabis Dispensaries

California legalized medical cannabis through a 1996 ballot initiative known as Proposition 215 ("The Compassionate Use Act"). Prop 215 protects physicians who recommend medical cannabis as well as those qualified patients and caregivers who cultivate, possess, and use cannabis with a valid recommendation. The word "dispensary", however, does not appear in

the law, and thus dispensaries in California hold a precarious legal existence to this day.[4] The

uncertainty created by federal cannabis prohibition further contributes to this legal ambiguity.[5]

To the extent that there are "legal" dispensaries in California, they are authorized and

regulated at the municipal level. Governor Jerry Brown recently indicated an intention that this

policy remains in effect. In vetoing S.B. 847, a bill that would have imposed a statewide

prohibition on dispensaries within 600 feet of residential areas, Brown issued the following

statement to the California Senate, dated September 20, 2011:

> I have already signed AB 1300 that gave cities and counties authority to regulate medical
> marijuana dispensaries—an authority I believe they already had. This bill goes in the
> opposite direction by preempting local control and prescribing the precise locations
> where dispensaries may not be located. Decisions of this kind are best made in cities and
> counties, not the State Capitol.[6]

California is a large state with a population of more than 37 million people; it includes 58

counties and nearly 500 incorporated cities.[7] In such a state, a policy of "local control" has

diverse and far-reaching consequences.

Although Prop 215 extends its protections to designated individuals ("primary

caregivers") who may cultivate cannabis on behalf of qualified patients, the original law is silent

as to how medical cannabis might be distributed outside of the patient-caregiver relationship. In

2003 the California legislature passed Senate Bill 420, the "Medical Marijuana Program Act",

which established an optional statewide registry system for patients and caregivers. Although

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[4] The United States Supreme Court ruled in *Gonzalez v. Raich (2005)* that the federal government, under the authority of the Commerce Clause, may still enforce its drug laws against individuals who are qualified under state law to use cannabis for medical purposes.

[5] John Hoeffel, "Federal Crackdown on Medical Pot Sales Reflects a Shift in Policy," *Los Angeles Times,* 7 October, 2011.

[6] Brown, Edmund Jr., Letter to the California State Senate dated 20 September 2011. http://gov.ca.gov/docs/SB_0847_Veto_Message.pdf (accessed December 12, 2011).

[7] Metropolitan Transportation Commission and the Association of Bay Area Governments, undated, "Bay Area Census," http://www.bayareacensus.ca.gov/index.html (accessed December 10, 2011).

S.B. 420 was intended to clarify the provisions of Prop 215, it largely ignored the question of distribution.

Beyond the statutory restrictions of Prop 215 and S.B. 420, the State of California imposes very few regulations on medical cannabis. Jerry Brown, then Attorney General of California, issued a directive to law enforcement in 2008 regarding the state's medical cannabis laws. He noted that "dispensaries" are not defined by law but posited that storefront dispensaries that are properly organized as cooperatives or collectives may be legal if they meet certain requirements (Brown 2008). He listed requirements similar to those already found in some municipal ordinances, including: non-profit status, restriction of membership to qualified patients and caregivers (and verification thereof), and prohibition of sales to non-members. The California State Board of Equalization has issued seller's permits to dispensaries since a 2005 ruling that sales tax must be assessed on all medical cannabis transactions, regardless of their legality (California State Board of Equalization 2009). In 2010 Governor Arnold Schwarzenegger signed A.B. 2650, prohibiting dispensaries within 600 feet of schools. Beyond these scant regulations at the statewide level, responsibility for MCDs has largely been left to the discretion of municipal governments.

WHY SAN FRANCISCO?

This study examines the relationship between MCD density and crime rates in San Francisco neighborhoods, based on the locations of the 26 MCDs operating with city permits in the year 2010. In San Francisco, MCDs must comply with certain requirements as to their location and operation, and must undergo a local permitting process before opening their doors

to the public. These requirements include security measures meant to reduce crime.[8] Thus San

Francisco presents an important manifestation of this study's primary independent variable,

which is not medical cannabis per se but the set of *policies* governing medical cannabis

dispensaries. San Francisco presents an opportunity to test the effect of *locally regulated* MCDs

on crime in surrounding neighborhoods.

San Francisco is not the only city in California to issue permits to MCDs, nor is it

necessarily unique in doing so—the San Francisco *Medical Cannabis Act* (2005) is similar in

language and purpose to Berkeley's *Patients Access to Medical Cannabis Act* (2008) and several

other ordinances throughout the state. But among the jurisdictions that have enacted local

ordinances regulating MCDs, San Francisco is in a fairly unique position. It contains a large

number of dispensaries—but not *too* large a number. It can be said with a high level of certainty

that there were 26 dispensaries operating in San Francisco in 2010.[9] Cities with larger numbers

of dispensaries do not offer this certainty. Los Angeles provides an excellent example. At one

point there were an estimated 1,000 MCDs operating in Los Angeles, leading one observer to

claim that medical cannabis was more popular than Starbucks.[10] To analyze the relationship

between dispensaries and crime in Los Angeles would require a substantial amount of field

research in order to determine exactly how many dispensaries were open when, and where.

At the other end of the spectrum are cities like Berkeley, which imposed a hard limit on

the number of MCDs permitted within its jurisdiction.[11] Such a case would provide a high level

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[8] Section 3308(m) of the *San Francisco Medical Cannabis Act* (2005) states that dispensaries must "provide and maintain adequate security on the premises, including lighting and alarms reasonably designed to ensure the safety of persons and protect the premises from theft."

[9] Personal correspondence with members of the San Francisco Medical Cannabis Task Force and the San Francisco Department of Public Health. Also see David Downs, "San Francisco Dispensaries' Annual Sales Estimate: $41 Million", *East Bay Express* (Oakland, Calif.), 31 January, 2012.

[10] Martin, Michel. "In California, Marijuana Dispensaries Outnumber Starbucks". National Public Radio, October 15, 2009. http://www.npr.org/templates/story/story.php?storyId=113822156 (accessed March 12, 2012).

[11] Berkeley's zoning code allows for a maximum of four permitted dispensaries. See City of Berkeley (2008).

of certainty, but at the cost of relevance: there are too few dispensaries in those jurisdictions to merit meaningful statistical analysis. Berkeley's dispensaries are similar to San Francisco's in many ways, but there were only three of them operating in 2010—making it difficult to conduct a meaningful analysis of MCD density and local crime rates in Berkeley. San Francisco may not be the only case worthy of study, but given the limitations faced by this type of research, it is a particularly compelling one.

METHODOLOGY

This study uses crime data obtained from the San Francisco Police Department (SFPD).[12] A formal request was made under the California Public Records Act for lists of serious crimes at the citywide level for the year 2010 including date, category of crime, and location by city block. Lists were also compiled of the addresses of all MCDs operating in the city in 2010, using data from the Public Health Department. Borrowing from a research design presented by Williams, Freisthler, and Sims (2011a), all data were aggregated to census tract boundaries. Census tracts are convenient units of analysis because they have fairly consistent populations (averaging about 4,000 residents) and their boundaries tend to align with the physical environment.[13] Regression analyses are conducted to test the relationship between MCD density and crime rate, controlling for socioeconomic disadvantage, family disruption, and residential instability.

FINDINGS

Findings indicate a weak but statistically significant relationship between MCD density and crime. It appears that, in San Francisco, neighborhoods containing MCDs have slightly higher rates of crime than neighborhoods that do not contain MCDs. Due to the limited number

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[12] Thanks to the SFPD Crime Analysis Unit, including Gina Gendotti, Michael Connolly, and Jeffrey Taylor, for their time and assistance.

[13] U.S. Census Bureau, Geography Division, "Census Tracts and Block Numbering Areas," 19 April 2000, http://www.census.gov/geo/www/cen_tract.html (accessed December 10, 2011).

of cases—26 dispensaries across 16 census tracts, compared to 173 non-MCD-containing tracts—I am cautious about speculating as to the causal nature of this link. Stronger links are found between crime and some of the other variables examined by this study, which are derived from the criminological literature on social disorganization theory. According to social disorganization theory as put forward by Sampson and Groves (1989, 780), high crime rates can be explained by the presence of certain "exogenous sources of social disorganization" including socioeconomic disadvantage, family disruption, and residential instability. Measures of each of these concepts are significantly associated with crime, and with much greater explanatory power than is found for MCD density. Thus, these findings cast doubt on the claim that MCDs are magnets for criminal activity.

OVERVIEW OF FOLLOWING SECTIONS

In chapter II, I review the existing literature on cannabis, MCDs, and crime. Routine activities theory provides a useful lens through which to analyze competing claims about the potentially criminogenic effects of certain land uses (in this case, MCDs), while social disorganization theory helps identify variables that may confound such a relationship. In chapter III, I present a conceptual model for explaining the relationship between crime, MCDs, and selected "exogenous sources of social disorganization". The research design employed by this study is described in greater detail in chapter IV, along with a presentation of results. In Chapter V, I discuss important findings as well as limitations faced by the present study, and conclude by providing some direction for future research.

CHAPTER II.

CANNABIS, MCDs, AND CRIME

Introduction

The State of California has recognized cannabis as a legitimate medical treatment since 1996. In this paper I argue that the important policy question, then, is not *whether* but *how* to allow for the drug's distribution. One model of distribution that has proliferated in recent years is the medical cannabis dispensary (MCD). In the political arena, proponents and critics of MCDs have made antithetical claims about the relationship between MCDs and crime. Proponents claim that MCDs decrease crime, while critics allege that they are magnets for criminal activity (Americans for Safe Access 2011; California Police Chiefs Association 2009). In this paper I explore these competing claims and their empirical implications, which have received little attention to date from the academic community. Specifically, this study explores the spatial relationship between MCDs and crime in San Francisco.

In this chapter I review the relevant literature on cannabis and crime. I first discuss the potential links between drug use and crime—which seems especially weak with respect to cannabis, compared to alcohol and other drugs (MacCoun, Kilmer, and Reuter 2003; Pacula and Kilmer 2003; Resignato 2000). Then I discuss the potential links between MCDs, as a land use, and nearby crime. In the third section I present an ecological framework known as routine activities theory, which attempts to explain crime based on the *circumstances* in which it occurs. Specifically, routine activities theory states that three convergent factors are required in order for a direct-contact predatory crime to occur: motivated offenders, suitable targets, and lack of capable guardianship (Cohen and Felson 1979; Williams, Freisthler, and Sims 2011a). In the fourth and final section of this chapter I discuss social disorganization theory, which attempts to explain the relationship between crime and certain neighborhood characteristics. Building on the

work of urban sociologists Henry Shaw and Clifford McKay, social disorganization theorists have identified economic deprivation, residential instability, population heterogeneity, and family disruption as categories of neighborhood characteristics that explain crime and delinquency (Sampson and Groves 1989; Shaw and McKay [1942] 1969; Veysey and Messner 1999). I incorporate these insights into the model of urban crime that I develop and test in subsequent chapters.

<div align="center">CANNABIS AND CRIME</div>

In the next two sections I aim to clarify the important distinction that exists between cannabis and medical cannabis dispensaries (MCDs), and how these different concepts might affect crime. This paper is concerned with the latter. In the empirical analysis that I present in the following chapters, the key independent variable under review is not a drug per se but a *land use* that distributes a drug to certain qualified individuals. The present study is not designed to address the relationship between cannabis*,* as a substance, and criminal behavior—a question that would require controlled behavioral experiments or field research. Instead, I explore the criminological impact of MCDs as retail businesses that operate in complex urban environments. The policy question is therefore one of *land use*, not substance control per se. Nonetheless, it is possible that MCDs could have an indirect effect on neighborhood crime rates via the underlying effects of cannabis (as a psychoactive drug), if the latter were independently associated with criminal behavior. Toward that end, I review in this section the relevant literature on drug use and crime.

The alleged link between cannabis and socially undesirable behavior dates almost as far as back any other mention of the drug in United States history. In fact, a compelling argument can be made that modern cannabis prohibition has its roots in the historical perception, fueled by

racist and xenophobic stereotypes of Mexican immigrants, that use of the drug (then known as "marihuana") led to violent criminal behavior. In 1914, an article appeared in the *Los Angeles Times* linking a mysterious plant with Mexican immigrants and "many revolting crimes."[14] Years later, a Montana lawmaker would say of the drug: "When some beet field peon takes a few rares of this stuff, he thinks he has just been elected president of Mexico so he starts out to execute all his political enemies."[15] These stories from the west were relayed nationally by outlets like the *New York Times*, who quickly caught on to the stereotype of the violent, marihuana-fueled Mexican criminal. One piece in 1925 ran with the headline, "Mexican, Crazed by Marihuana, Runs Amuck With Butcher Knife." It went on to describe the violent slaying of six hospital patients by a veteran of the Mexican Army, who was allegedly intoxicated at the time of the murders.[16] When the United States Congress first discussed a proposal to prohibit the drug federally in 1937, its members likely had these violent images in mind.

Fast forward to present day. The link between marijuana and violent criminal behavior has been challenged by research in economics and criminology. In 2000 the economist Andrew Resignato reviewed existing drugs-crime research and concluded that—despite the assumption made by national drug control policies that there is a clear and causal relationship between drugs and crime—greater evidence may actually exist to suggest a link between "drug enforcement/control/prohibition" and crime. Benson and others have also found that drug enforcement policies can affect crime rates, independently of actual drug use (Benson and Rasmussen 1991; Benson et al. 1992). These findings highlight a core challenge faced by drug policy researchers. It is impossible, in most cases, to study the social consequences of a drug

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[14] "Drugs To Rise Like Incense: Officials Destroy Contraband." *Los Angeles Times (1886-1922)*, October 16, 1914. http://www.proquest.com/ (accessed March 10, 2012).
[15] Quoted by Gray (1998, 77).
[16] "Kills Six In a Hospital: Mexican, Crazed by Marihuana, Runs Amuck With Butcher Knife." *The New York Times (1923--Current File)*, February 21, 1925. http://www.proquest.com/ (accessed March 10, 2012).

(e.g. criminal behavior) without considering, at the same time, the legal status of that drug and what conditions that might impose on users of the drug.

Much of the relevant drugs-crime literature employs a tripartite theoretical framework put forward by Goldstein (1985; Weiner and Wolfgang 1989). Goldstein identified three mechanisms through which drugs might contribute to criminal behavior: psychopharmacological factors, economic compulsion, and systemic violence. "Psychopharmacological risk" of criminal behavior refers to the possibility that the psychoactive components of a drug might make a user more likely to engage in criminal behavior, strictly in terms of his or her neurobiology. "Economic compulsion" refers to the process by which drug users might engage in criminal activity in order to fund their potentially expensive drug habits. "Systemic violence" occurs when drug markets are enmeshed in broader networks of crime and violence, in which drug users become involved (Goldstein 1985).

Regarding psychopharmacological links to crime, Pacula and Kilmer (2003) report a positive association between marijuana use and reports of nonviolent crime, but no causal link between marijuana use and violent crime. They conclude that marijuana use might play a greater role in a criminal getting caught than in the original decision to commit the crime. Indeed, a large number of arrestees test positive for cannabis in the United States (National Institute of Justice 1999; Pacula and Kilmer 2003; Taylor et al. 2003). But correlation does not mean causation. Several explanations exist for the high rate of marijuana use among criminal offenders that do not point to a causal link between the drug and criminal behavior. First, there is the simple observation that cannabis use is very prevalent in the United States. In 2010 an estimated 22.6 million Americans above the age of 12 were "current users" of illicit drugs; of these, 17.4 million—or 6.9% of the population —were current users of marijuana (Substance Abuse and

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Mental Health Services Administration 2011).[17] Given these high rates of use, one would expect significant portions of *any* sample of Americans to test positive for marijuana. Taylor and colleagues report that between 34% and 61% of adult males used cannabis at least once in the year 2000, including between 17% and 63% of violent criminal offenders and between 34% and 74% of offenders in property crimes (2003, 278-279). These findings, while far from definitive, do not suggest a clear and direct link between cannabis use and crime.

Many arrestees who test positive for cannabis also test positive for alcohol or other drugs (National Institute of Justice 1999; Taylor et al. 2003). This makes it difficult for researchers to infer the extent to which certain behaviors can be attributed to specific substances. Furthermore, because of the way that the human body metabolizes marijuana, positive tests for marijuana (e.g. THC) only indicate use within the past month, and therefore do not necessarily signify that a particular crime was committed while under the drug's influence (Pacula and Kilmer 2003). In fact, in some studies cannabis has been shown to *inhibit* aggression and violence (Miczek et al. 1994; White and Gorman 2000). Thus, although it may appear that marijuana use is associated with criminal arrests, there are many reasons to be skeptical about that correlation.

The drug-crime link, in psychopharmacological terms, is stronger for alcohol than it is for illicit drugs (MacCoun, Kilmer, and Reuter 2003). "In the case of marijuana," Resignato concludes, "the assumed psychopharmacological connection between use and violent crime has been almost completely disproved in the research" (2000, 682). Research on economic-compulsive drug related crime (i.e. crime that is committed by a drug user in an attempt to obtain drugs or money to buy them) tends to focus on drugs with higher addictive potentials than cannabis, most notably heroin and cocaine (for reviews see MacCoun, Kilmer, and Reuter 2003;

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[17] "Current use" is defined as self-reported use within the past 30 days (Substance Abuse and Mental Health Services Administration 2011).

Resignato 2010). Perhaps the most compelling mechanism through which drugs might lead to crime is through the occurrence of systemic violence (Goldstein 1985). The violence associated with markets for illegal drugs is at least indirectly caused by drug prohibition and enforcement, "a relationship that may be underestimated by many policy officials" (Resignato 2000, 683). It is plausible that this would apply to retail vendors of medical marijuana—although arguably less so than the illicit dealers of the drug, who are displaced by legal or quasi-legal cannabis businesses (i.e. MCDs).

I conclude from the available literature that cannabis has no significant relationship with crime via its psychopharmacological effects or its capacity to bring about economic-compulsive criminal behavior in its users (Goldstein 1985; Pacula and Kilmer 2003; Resignato 2000). I argue that the only plausible link between cannabis and crime lies in the extent to which the drug attracts "systemic violence", due to its illicit status and high market value. The following chapter presents a conceptual model that can be used to test empirically whether or not medical cannabis dispensaries are associated with crime in city neighborhoods. In the remaining sections of this chapter, I discuss potential linkages between MCDs and crime and present two theoretical approaches to urban criminology: routine activities theory and social disorganization theory.

MEDICAL CANNABIS DISPENSARIES AND CRIME

Do medical cannabis dispensaries increase crime? It depends who you ask. Empirical evidence is scant and is almost entirely overshadowed by anecdotal reports. For example, a 2009 report compiled by the Coalition for a Drug-Free California alleges that "marijuana escalates the level of mental illness, crime and all related problems" (Morgan 2009, 2). But the report offers little empirical evidence in support of these claims. The California Police Chiefs Association (CPCA)—an organization representing California's municipal law enforcement agencies—has

also been a vocal critic of dispensaries.[18] Its 2009 *White Paper on Medical Marijuana Dispensaries* concludes that the presence of dispensaries "poses a clear violation of federal and state law; they invite more crime; and they compromise the health and welfare of law-abiding citizens" (California Police Chiefs Association 2009, 47). The underlying evidence is entirely anecdotal: the CPCA presents no statistical analysis supporting the conclusion that medical cannabis dispensaries cause crime at a higher rate than any other business. The CPCA's assertion that dispensaries increase crime stands in conflict with an analysis conducted by the Police Department of Denver, Colorado, which in 2010 projected that dispensaries attract crime at a similar rate as pharmacies and a lower rate than banks or liquor stores.[19]

A recent study conducted by researchers at the UCLA Luskin School of Public Affairs examined crime data in 95 census tracts in Sacramento (Williams, Freisthler, and Sims 2011a). No clear link was found between the density of marijuana dispensaries and the rate of violent or property crime, suggesting that dispensaries do not increase crime and that some security steps taken by dispensaries may actually reduce local crime.

Despite the insistence of organizations such as the Coalition for a Drug-Free California and the California Police Chiefs Association, there does not appear to be an obvious link between medical cannabis dispensaries and criminal behavior in surrounding areas. Limited reports from California and Colorado suggest a neutral or negative correlation between MCDs and crime, but more empirical research is needed to substantiate a generalized claim to that effect. This study aims to extend current knowledge about the relationship between MCDs and crime by conducting a spatial analysis of crime data from San Francisco.

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[18] California Police Chiefs Association, "Medical Marijuana Dispensary Information", http://californiapolicechiefs.org/?page_id=806 (accessed March 14, 2011).
[19] John Ingold, "Analysis: Denver Pot Shops' Robbery Rate Lower Than Banks'," *Denver Post*, 27 January, 2010.

<center>ROUTINE ACTIVITIES THEORY</center>

In the remaining sections of this chapter, I review the theoretical literature that informs the present analysis of MCDs and crime. Routine activities theory is an ecological approach that attempts to explain crime by identifying the circumstances in which it is most likely to occur. According to this theory, crime rates are affected by the convergence of three factors: motivated offenders, suitable targets, and absence of capable guardians. The routine activities model of crime, first proposed by Cohen and Felson (1979), is presented in Figure 2.1 below.

Figure 2.1 Routine Activities Theory.

Taking away one or more of these three ingredients, Cohen and Felson argue, "is sufficient to prevent the successful completion of a direct-contact predatory crime" (1979, 589). The types of crime that this theory attempts to explain are "predatory" in that the offender "definitely and intentionally" does harm to the victim or the victim's property (Glaser 1971, 4). "Direct-contact" refers to the idea that these crimes occur when the offender and victim (or victim's property) are in direct physical contact, meaning that they take place at a precise point in space and time. This is a key element of routine activities theory and one with significant implications for empirical research (Cohen and Felson 1979, 589):

> Unlike many criminological inquiries, we do not examine why individuals or groups are inclined criminally, but rather we take criminal inclination as given and examine the manner in which the spatio-temporal organization of social activities helps people to translate their criminal inclinations into action.

Thus routine activities theory attempts to explain crime by looking at the ecological circumstances in which it occurs, while other criminological approaches (including social disorganization theory, discussed subsequently) tend to focus on the characteristics of criminal offenders. Both are useful to the present study, which analyzes whether crime is related to MCD presence (a condition of the local human ecology) in city neighborhoods but is also interested in controlling for demographic characteristics related to crime across those neighborhoods.

Regarding the number and concentration of *motivated offenders* in an area, MCDs could have a positive, negative, or neutral effect on crime. If cannabis use directly or indirectly leads to criminal behavior, then MCDs might increase crime in a neighborhood by concentrating a large number of cannabis users in one place. It is also possible that MCDs could reduce criminal behavior in a neighborhood by displacing illicit dealers of the drug. And it is of course possible that MCDs have no effect whatsoever on the number or concentration of motivated criminal offenders in an area.

From a routine activities perspective, the most likely link between MCDs and crime is probably in the extent to which MCDs present *suitable targets* for crime. Components of target suitability include value, visibility, and accessibility (Cohen and Felson 1979, 595). With respect to value, MCDs tend to possess large amounts of cash and cannabis, which are high-value targets for theft. As Felson notes, "lions look for deer near their watering hole" (1987, 914).[20] Patients, vendors, and especially staff are potential targets of crime: "Employees of the dispensaries can be at-risk for violent crimes, such as robbery or assault, as they are gatekeepers to both the marijuana products and the cash at the site" (Williams, Freisthler and Sims 2011a, 5). In California it is

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[20] Quoted in Roncek and Maier (1991).

estimated that MCDs conduct roughly $1.9 billion in gross sales annually.[21] Beyond the fairly

obvious point that criminals like to steal things of value—which is just as true for MCDs as it is

for banks, pharmacies, and other retail businesses—there are other valid reasons to believe that

criminals would perceive MCDs as suitable targets. Most MCDs are open systems that are

constantly seeking new members through advertising and other means. Thus they present, in

many cases, highly visible targets for crime.

　　Although few empirical studies have examined the relationship between MCDs and

crime, existing research has explored the criminogenic effects of other land uses. A study by

Roncek and Lobosco (1983) reported that high schools elevate local crime rates, probably

through the concentration of likely offenders (i.e. teenagers). Brantingham and Brantingham

(1982) found an inverse relationship between crime rates and distance from the nearest

McDonald's. As Felson explains, the restaurants themselves may be safe—but they attract

customers who are "in prime offending and victim ages, producing high crime risk for nearby

properties" (1987, 921). There is strong evidence to suggest that bars and other establishments

that serve alcohol meet the criteria for target suitability (Roncek and Maier 1991). This provides

an interesting point of comparison for medical cannabis dispensaries and other retail businesses.

A criminal might reasonably perceive that a patron entering or leaving such businesses would be

in possession of some amount of cash and therefore be an attractive target for theft (Williams,

Freisthler, and Sims 2011a). The establishments themselves operate largely in cash and are

accessible to the public, in many cases advertising themselves in an effort to increase their

accessibility. The perception that these would be easy targets is compounded by the perception

that patrons and staff might be medically ill (in the case of MCDs) or intoxicated (in the case of

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[21] See David Downs, "San Francisco Dispensaries' Annual Sales Estimate: $41 Million," *East Bay Express*, 31 January, 2012.

bars or MCDs that allow on-site consumption). Thus, as Roncek and Maier conclude in the case of bars, "the patrons and the businesses have all the components of target suitability" (1991, 726).

The degree to which MCDs present suitable targets for crime—a notion that is subject to considerable debate—is largely dependent on the effectiveness of MCD security measures. Here we see an inverse relationship between target suitability and the third core component of routine activities theory, *capable guardianship*. As guardianship increases, a potential target becomes less and less accessible (and therefore less *suitable*) to predatory crime. By definition, members of MCDs suffer from medical conditions that qualify for medical cannabis treatment. This could create a perception of vulnerability that is attractive to criminals seeking to obtain cannabis and/or cash without a fight. It is also possible that criminals perceive MCD operators to be less likely to report crime due to their precarious legal existence and a resulting incentive not to attract attention from law enforcement. Thus it is plausible that the presence of MCDs might increase crime in a neighborhood by presenting, in the terms of routine activities theory, accessible targets for crime. But it is also possible that criminals do not perceive MCDs to be suitable targets for crime, or that they consider them no more attractive than other retail businesses with high-value inventories and large amounts of cash. Furthermore, it is possible that—compared to other potential targets in the neighborhood—criminals actually perceive MCDs to be unsuitable targets. This largely depends on the effectiveness of *guardianship* in a neighborhood to prevent crime. Compared to other businesses, MCDs might represent superior guardianship in a neighborhood and thereby serve to reduce the frequency of crime. Security protocols are one way in which an MCD might do this.[22]

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[22] This claim has been made by proponents of MCDs (see Americans for Safe Access 2011).

Many dispensaries implement security protocols—in order to comply with local mandates or simply to protect their patients, vendors, and staff—that might serve to increase the level of guardianship in a community and thereby reduce crime in a neighborhood, as routine activities theory suggests. These range from I.D. verification to external lighting and alarms; some dispensaries even conduct external patrols (i.e. litter control) in order to demonstrate guardianship over their property and improve the surrounding community.[23] Unlike pharmacies and liquor stores, MCDs verify their customers' qualifications before they can enter the premises and make a purchase. It is plausible that these and other security protocols have a deterring effect on crime. If these outweigh the criminogenic aspects of MCDs—that is, the potential for MCDs to attract likely offenders to suitable targets—then it is likely that the net effect of MCDs on crime is neutral. I examine this possibility in the present study.

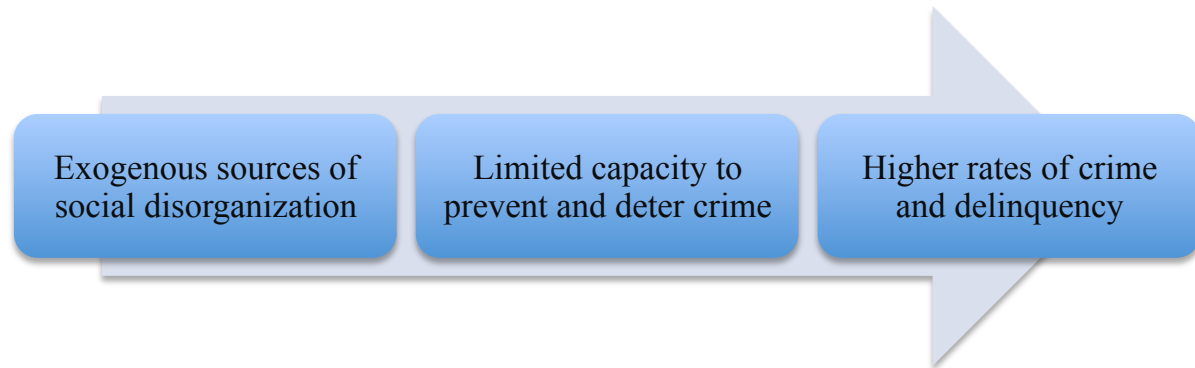## SOCIAL DISORGANIZATION THEORY

Introduction

Social disorganization researchers have identified several neighborhood characteristics that are positively associated with crime. This study borrows from their work in selecting control variables to address the fact that social and demographic characteristics vary widely across city neighborhoods, with significant implications for social and economic activity, public health and safety, and other outcomes. Whereas routine activities theory focuses on the *circumstances* in which crime occurs, social disorganization theorists point to the social and demographic *characteristics* of surrounding communities in explaining outcomes of high crime and violence. Social disorganization has been concisely summarized by Sampson and Groves: "The general hypothesis is that low economic status, ethnic heterogeneity, residential mobility, and family

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[23] See Americans for Safe Access (2011) and the *San Francisco Medical Cannabis Act* (2005).

disruption lead to community social disorganization, which, in turn, increases crime and delinquency rates" (1989, 774). This approach is summarized in Figure 2.2.

Figure 2.2. Social Disorganization Theory.

According to this theory, crime is associated with what Sampson and Groves call "exogenous sources of social disorganization" (1989, 780). This study controls for three such categories of neighborhood characteristics: economic deprivation, residential instability, and family disruption. Low socioeconomic status (SES) translates to lower levels of formal and informal social control. High residential turnover disrupts social relations and erodes collective efficacy. Higher rates of family disruption, i.e. a higher proportion of single-parent versus married-couple households, results in decreased parental supervision and a relative lack of guardianship (Cohen and Felson 1979; Sampson 1987; Sampson and Groves 1989). These conceptual links to crime, expounded originally by Shaw and McKay ([1942] 1969), have received more nuanced theoretical attention from Kornhauser (1978), Sampson and Groves (1989), and Veysey and Messner (1999). The explanatory power of their empirical correlates is discussed in the following section, which describes the measures to be analyzed in the present study.

Socioeconomic Disadvantage: Poverty and Unemployment

In the original test of social disorganization theory by Sampson and Groves (1989), low SES was found to be significantly associated with crime. The link between economic deprivation

and crime may be more complex than the simple explanation that poor people have higher

incentives to commit crime and suffer lower opportunity costs for doing so. For example,

Sampson reports in an earlier work that low SES neighborhoods have higher levels of police

supervision, independent of actual law violative behavior (Sampson 1986). Sampson concludes

that "the influence of SES on police contacts is contextual in nature, and stems from an

ecological bias with regard to police control" (1986, p. 884). Whether economic deprivation has

a direct relationship with crime through individuals' behavioral mechanisms (i.e. weighing costs

and incentives), or an indirect effect on crime rates through the operation of police bias, there is a

strong theoretical basis for the finding that poor neighborhoods report higher crime rates than

rich ones. The measures of economic deprivation that are controlled for in this study are poverty

and unemployment.

Mollie Orshansky developed the original poverty thresholds in 1963-64 when she was an

economist working for the Social Security Administration, shortly before the declaration of a

"War On Poverty" by President Johnson (Fisher 1992). An individual or household is in poverty

when its total cash income falls below the applicable threshold, determined by family size and

composition (Fisher 1992; N. White 2011). The 2010 poverty thresholds range from $11,139 for

a single individual living alone to $42,156 for a family of eight or more people living in the same

household.[24]

Indicators of socioeconomic disadvantage, including poverty and unemployment, have

been associated with higher crime rates in Miami, Florida and Columbus, Ohio (Martínez,

Rosenfeld, and Mares 2008; Peterson, Krivo, and Harris 2000). Other studies show that rates of

crime and violence are extremely high in neighborhoods containing public housing

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[24] U.S. Census Bureau, Current Population Survey, 2011 Annual Social and Economic Supplement. http://www.census.gov/hhes/www/cpstables/032011/pov/new35_000.htm (accessed March 12, 2012).

developments, which are areas of extremely concentrated socioeconomic disadvantage (Fagan and Davies 2000; Griffiths and Tita 2009). In their study of medical marijuana dispensaries in Sacramento, Williams and colleagues (2011a, 9) found that violent crimes were significantly associated with "concentrated disadvantage", a variable constructed from 2008 poverty guidelines. Property and violent crimes were not associated with density of marijuana dispensaries, but both categories were significantly related to unemployment rate (Williams, Freisthler, and Sims 2011a). Further evidence of the link between crime and unemployment is found in crime data from across the United States in the 1990's, a decade of incredible crime reduction. Raphael and Winter-Ebmer (2001) found that a substantial amount of the reduction in property crimes could be explained by the corresponding decline in unemployment rate. A weaker relationship existed between unemployment and violent crime, according to the researchers. Freeman (2001) presents similar findings and concludes that as much as one-third of the drop in crime in the 1990's can be explained by the expanding job market.

Family Disruption

Theorizing from earlier empirical work by Sampson (1987), which found that macro-level indicators of family disruption were related to rates of juvenile crime, Sampson and Groves include family disruption among their "exogenous sources of social disorganization" (1989, 780). The theoretical basis for this lies in the notion that "traditional" families (i.e. married couples and their biological children) provide their communities with greater parental-supervisory resources, compared to single-parent families. Additional supervision results in greater social control and more effective prevention against crime (Cohen and Felson 1979; Sampson and Groves 1989).

This theoretical link is supported by empirical evidence. In their reassessment of Sampson and Groves's (1989) original analysis, Veysey and Messner (1999) report that family disruption has significant relationship with crime even independently of other social disorganization processes. Indeed, percent of single person households was significantly related with crime in the Sacramento dispensary studies conducted by Williams and colleagues (Williams, Freisthler, and Sims 2011a).

Residential Instability

According to social disorganization theory, communities with higher levels of residential turnover suffer from correspondingly lower levels of social control and are therefore likely to report higher rates of crime (Hipp, Tita, and Boggess, 2009; Sampson and Groves 1989; Shaw and McKay 1969). The present study conceptualizes "residential instability" as an index of the percent of housing units in a given census tract that are vacant and the percent of individuals living within the tract who are between the ages of 18 and 29. These variables are also used by Martínez and colleagues (2008) in their study of crime and drug use in Miami neighborhoods. Williams and colleagues (2011a; 2011b) found that property crimes—but not violent crimes— were significantly associated with percent of owner-occupied households, which is a measure of residential stability. Hipp and colleagues examined residential turnover in an ethnic context and found it to be significantly associated with crime. They conceptualized "residential stability" as the average length of residence of households in the relevant census tract (Hipp, Tita, and Boggess, 2009, 12-13).

Population Heterogeneity

Although it is not included in the forthcoming analysis, there is one final measure of social disorganization that appears in the theoretical literature which is relevant to the present

discussion of crime in city neighborhoods: population heterogeneity (Sampson and Groves 1989; Shaw and McKay [1942] 1969; Veysey and Messner 1999). The argument here is that segregated communities suffer from lower rates of communication and interaction, which prevent them from organizing collectively to reduce crime and delinquency—even when the different population groups have a shared interest in law and order. A number of studies have found that population (i.e. racial/ethnic) heterogeneity is associated with higher crime rates (Bellair 1997; Hipp 2007; Roncek and Maier 1991; Sampson and Groves 1989, 1989).

<div align="center">CONCLUSION</div>

In this chapter I have reviewed the literature on cannabis, MCDs, and crime that is relevant to the present study. Particular attention has been given to routine activities theory (Cohen and Felson 1979; Felson 1987; Williams, Freisthler, and Sims 2011a) and social disorganization theory (Sampson and Groves1989). In the next chapter I extrapolate from these theories in developing a conceptual model of crime to test for the criminogenic effect of MCDs.

CHAPTER III.
A MODEL OF URBAN CRIME

Introduction

In this chapter I present a conceptual model for testing the relationship between density

of medical cannabis dispensaries (MCDs) and crime rates across city neighborhoods. Two

divergent hypotheses are drawn from routine activities theory, which predicts that crime will

occur when there is a convergence of three factors: suitable targets, likely offenders, and lack of

capable guardianship (Cohen and Felson 1979). Applied to the present research question, this

generates the following hypotheses:

> (H1): MCDs can promote crimes because they represent *suitable targets* for crime and/or
> attract *likely offenders* to the surrounding area.

> (H2) MCDs can also prevent crimes because their security protocols represent *increased
> guardianship*, which has a deterring effect on crime in surrounding areas.

The net effect of MCDs on crime will depend on the relative strength of these mechanisms. Thus
these competing claims can be tested, jointly, against a single null hypothesis:

> (H3) MCDs have no significant effect on nearby crime rates.

I test this hypothesis empirically in the following chapter using MCD locations and crime data

from San Francisco in 2010.

In comparing crime rates across city neighborhoods, it is important to control for

neighborhood characteristics that are related to crime independently of MCDs. In the present

study I consider three vectors of social and demographic variables, drawn from social

disorganization theory, that will be used as control variables in the forthcoming analysis:

economic deprivation, family disruption, and residential instability (Sampson and Groves 1989;

Shaw and McKay [1942] 1969).[25] "Social disorganization" is a concept used to describe

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[25] Historically, social disorganization researchers have also considered a fourth category of variables, "population
heterogeneity", which is generally an index of ethnic diversity (Sampson and Groves 1989), demographic transition
(Hipp, Tita, and Boggess, 2009), immigration status and/or linguistic isolation (Martínez, Rosenfeld, and Mares
2008). This vector is not included in the present model.

communities in which there is a lack of sufficient social cohesion among members—characterized by low socioeconomic status, few stable families, and high residential turnover—that might otherwise serve as a deterrent against crime. Higher levels of these social disorganization indicators are associated with higher crime rates at the citywide and neighborhood level (Hipp, Tita, and Boggess, 2009; Martínez, Rosenfeld, and Mares 2008; Morenoff, Sampson, and Raudenbush 2001; Sampson and Groves 1989). Controlling for these variables across city neighborhoods will help determine whether, and to what extent, MCDs have an independent effect on crime.

In the present study I examine three "exogenous sources of social disorganization": socioeconomic deprivation, residential instability, and family disruption. If these neighborhood characteristics predict crime, as social disorganization theory suggests, then they ought to be incorporated into more specific models of urban crime—including the present attempt to explain the relationship between MCD density and neighborhood crime rates. I do not argue that there is a direct relationship between MCDs and social disorganization. Rather, I look to social disorganization theory to identify neighborhood characteristics, independent of cannabis, which might confound the real relationship between MCDs and crime. Variables from each of the three categories of social disorganization variables analyzed in this study are summarized in Table 3.1 below. For a more thorough review of the underlying theories and concepts, see the previous chapter.

Table 3.1. Selected "Exogenous Sources of Social Disorganization"		
Category	**Component Variables**	**Relation to Crime Rate**
Economic Deprivation / Low SES	▪ Poverty ▪ Unemployment	The traditional explanation is that poor people have higher incentives and lower opportunity costs associated with crime. A more complex explanation may be that low SES city neighborhoods tend to experience higher rates of police contact, independent of actual criminal behavior, and that this police bias results in higher rates of reported crime.[i] (Sampson 1986).
Family Disruption	▪ Single-parent households with children under 18	Family disruption is linked to crime independently of SES and other characteristics. Fewer parents means fewer adults to supervise teenagers who are at risk for criminal behavior and a general lack of "social control", leading to decreased capacity to prevent crime (Cohen and Felson 1979; Sampson 1987).
Residential Instability	▪ Percent of units that are vacant ▪ Percent of population ages 18-29	Communities with high levels of collective efficacy look out for each other, report suspicious characters, and take other preventative measures against crime. High residential turnover makes it difficult for communities to establish collective efficacy (Sampson, Raudenbush, and Felton Earls 1997).

Note: See the previous chapter for a more detailed discussion of these theories studies and their empirical findings.
[i] Sampson, Robert J. 1986. "Effects of Socioeconomic Context on Official Reaction to Juvenile Delinquency." *American Sociological Review* 51(6): 876–885.
[ii] Sampson, Robert J, Stephen W. Raudenbush, and Felton Earls. 1997. "Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy." *Science* 277(5328): 918–924.
[iii] Sampson, Robert J. 1987. "Urban Black Violence: The Effect of Male Joblessness and Family Disruption." *American Journal of Sociology* 93(2): 348–382.

A CONCEPTUAL MODEL OF CRIME TO TEST FOR THE EFFECT OF MCDS

The dependent variable under examination is local crime rate, conceptualized as the number of crimes reported within the surrounding census tract for the given time period. The primary independent variable is the density of MCDs within a given tract, measured as the total number of dispensaries in that tract divided by the size of the tract in square miles. Additional independent variables are drawn from social disorganization theory and are meant to control for exogenous sources of crime unrelated to MCD density.

The causal mechanisms through which MCDs might affect crime are derived from routine activities theory. Of the three essential ingredients for crime, two might be expected to increase with the presence of additional MCDs: *likely offenders* and *suitable targets*. But the third, *capable guardianship*, might reasonably increase. The actual relationship between MCDs and crime depends on the balance of these effects. I hypothesize that, in sum, MCDs will not have a significant effect on local crime rates either way. The model presented in Figure 3.1 illustrates these hypotheses.

Figure 3.1. A Model of MCDs and Crime.

MCDs attract **likely offenders**	→	**Increase** in local crime rate
MCDs present **suitable targets**	→	**Increase** in local crime rate
MCDs provide **guardianship**	→	**Decrease** in local crime rate
<u>Net</u> effect of MCDs	→	**No effect on local crime rate**

Using data for 189 San Francisco census tracts in 2010, I test this model empirically in the following chapter.

CHAPTER IV.
SPATIAL ANALYSIS OF CRIME AND MCD DENSITY IN SAN FRANCISCO (2010).

Introduction

This study examines the spatial relationship between medical cannabis dispensaries (MCDs) and crime across 189 census tracts in San Francisco in the year 2010. I test two competing hypotheses drawn from the theoretical literature on routine activities theory (Cohen and Felson 1979), controlling for neighborhood characteristics drawn from social disorganization theory (Sampson and Groves 1989; Shaw and McKay [1942] 1969). The first is that MCDs increase crime by attracting *likely offenders* and presenting them with *suitable targets*; the second is that MCDs actually decrease crime by protecting their surrounding community with adequate security measures and thereby providing *capable guardianship*. The theoretical bases for these claims are discussed in greater length in the previous two chapters. In this chapter I discuss the research methodology employed by this study and present results.

Data are collected from the San Francisco Police Department, Planning Department, and Department of Public Health; the California Department of Finance; the American Community Survey (ACS); and the United States Census Bureau. Linear regression models are tested using four dependent variables at the census tract level: total property crimes, property crimes per 1,000 residents, total violent crimes, and violent crimes per 1,000 residents. Findings are largely but not perfectly consistent across these different models with respect to the spatial relationships between crime, MCD density, and the eight other neighborhood characteristics analyzed: poverty, unemployment, family stability, vacancy rate, percent of the population ages 18-29, percent of the population that is male, total population size, and percent of land commercially zoned.

As a matter of simple spatial correlation, MCD-containing tracts have higher rates of both property crime and violent crime than tracts that do not contain MCDs. But this relationship may be obscured by the limited number of cases under review—26 dispensaries across 16 census tracts, compared to 173 non-MCD-containing tracts—and the fact that MCDs are clustered in busy downtown areas (see Maps 4.1 and 4.2). This highlights the need to consider other variables related to crime. A more nuanced approach reveals that crime is more strongly predicted by certain "exogenous sources of social disorganization" (Sampson and Groves 1989, 780) than by MCD density. Poverty is a strong predictor of high crime rates across all four of the regression analyses conducted by this study—much stronger than MCD density. By "stronger" I mean that it has a larger correlation coefficient and a higher degree of statistical significance (see Table 4.2). "Family stability" (a measure of how many individuals in a given tract live in married-couple family housing) is negatively associated with crime across all four models. Again, this link is stronger than the link found between MCD density and crime. Residential instability is not as strongly predictive of crime in the present model as socioeconomic disadvantage or family disruption. In the following sections I discuss the current research design in greater detail and present empirical findings.

<div align="center">AREAL UNIT: CENSUS TRACT</div>

In a recent working paper for the California Center for Population Research at UCLA, Nancy Williams and colleagues present a routine activities approach for examining the link between MCDs and crime. They examine 95 census tracts in Sacramento using data for the year 2009. Their findings indicate that tracts containing dispensaries are not significantly associated with higher rates of crime when controlling for neighborhood characteristics associated with crime (Williams, Freisthler and Sims 2011a). This study borrows from their work in conducting

an observational study of the spatial relationship between MCDs and crime in 189 San Francisco census tracts for the year 2010.

All measures are aggregated to the level of census tracts. Census tracts are convenient units of analysis because they have similar population sizes, their boundaries align with the physical environment, and they are intended to be homogenous with respect to population characteristics and living conditions (U.S. Census Bureau, Geography Division 2000; Williams, Freisthler, and Sims 2011a; 2011b).[26] Thus they roughly approximate city neighborhoods. From a routine activities perspective, I argue that it is reasonable to assume in the case of densely populated cities like San Francisco that *likely offenders*, in choosing whether, where, and when to commit a crime—that is, in weighing the *target suitability* and *guardianship* of potential victims—are going to consider targets within an area roughly the size of a census tract. Maps presented in the forthcoming analysis should illustrate the geographic implications of this assumption. Another advantage to using census tracts as the spatial unit of analysis is that there is an abundance of demographic information available at the census tract level via the U.S. Census Bureau and ACS. This provides for an excellent range of control variables.

But this approach is not without its disadvantages. As Tita and Greenbaum (2009, 145) have noted:

> Modeling the clustering of crime through spatial regression requires two important decisions. First, one must choose a unit of analysis that is consistent with the social processes believed to be driving the observed patterns. Second, one must consider the relationships among these units such that the model captures the influence the activities in other areas have on outcomes in the neighborhood.

While I maintain that census tracts are an appropriate unit of analysis for the present study in that they meet the first criteria—census tracts reasonably capture the social process under examination, i.e. crime—I accept that this approach is vulnerable to criticism along Tita and

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[26] For a discussion of different spatial units of analysis, see Tita and Greenbaum (2009).

Greenbaum's second line of contention. The present model does not account for criminal activity in other tracts and therefore misses the "spillover effects" that a land use such as MCDs may have on crime in neighboring tracts. This presents a significant limitation for the present model—although one that could theoretically be corrected for, to some extent, through more sophisticated spatial analyses. Considering the lack of empirical evidence currently available with respect to this issue—and its significant implications for policymaking and future research—I argue that, as a preliminary analysis, this study has tremendous value despite this and other limitations. It may not account for inter-tract crime, but it does provide new knowledge about the nature of intra-tract crime. City residents probably are concerned about businesses in adjacent neighborhoods; but when it comes to crime they are concerned, first and foremost, with the people next door.

CASE SELECTION AND TIME FRAME: SAN FRANCISCO, 2010

In this study I examine the relationship between MCDs and crime rates across San Francisco neighborhoods in the year 2010. This provides an excellent case study for analyzing the criminological impact of MCDs because it offers a high level of certainty and relevance. It can be said with a high level of certainty that there were 26 dispensaries operating in San Francisco in 2010 and that they were open for most or all of that year; similar statements are difficult to make with respect to other jurisdictions. In some other municipalities, governments and MCD operators have undergone heated legal battles with one another. This has resulted in a "regulatory vacuum" with respect to MCDs in many jurisdictions (Cohen 2010). In such a vacuum, it is difficult if not impossible to determine exactly how many MCDs are open at a given time (not to mention their locations and whether they were open for the entire time period being studied). Perhaps the most notable example of this is Los Angeles, where MCDs have been

in legal limbo for years. [27] Studies of MCD density and local crime rates in Los Angeles, while certainly compelling, would require a substantial amount of field research. San Francisco provides a case in which important information (i.e. MCD locations) can be determined with high certainty and low cost. Other cities may provide even higher certainty, but these generally suffer from limited relevance because of the small number of dispensaries that they contain.

San Francisco is not the only municipality to escape the "regulatory vacuum". Other California cities have enacted similar MCD ordinances, including two prominent examples that can be found directly across the water from San Francisco in the cities of Berkeley and Oakland. But as a case study San Francisco has several advantages over these and other alternatives. First and foremost, it is a major city with a large sample of MCDs (n = 26) in the year for which data are collected. By comparison, Berkeley and Oakland have smaller populations and "hard caps" on the number of dispensaries allowed.[28] So although they present interesting pieces of the legal, social, and political puzzles presented by California's medical cannabis law, their small sample size limits the extent to which they are useful cases for empirical study.

Unlike the "regulatory vacuum" experienced by MCDs in some other jurisdictions, MCDs in San Francisco face a number of local regulations. Thus San Francisco is not only a convenient case to study, it is also relevant and important—it touches directly on whether, and to what extent, *locally regulated* MCDs are related to crime. The *San Francisco Medical Cannabis Act* (2005) sets up a permitting system for MCDs and places certain restrictions on their location and operation. Speaking directly to the issue of crime, Section 3308(m) of the Act states that dispensaries must "provide and maintain adequate security on the premises, including lighting and alarms reasonably designed to ensure the safety of persons and protect the premises from

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[27] "L.A.'s Medical Marijuana Roller-Coaster Ride," *Los Angeles Times,* 4 January, 2012. Editorial.
[28] Berkeley currently has a cap of four MCDs; Oakland recently voted to authorize four more, for a total of eight.

theft." The Act further requires that all MCDs comply with California state law as well as guidelines written in 2008 by then-Attorney General Jerry Brown entitled "Guidelines For The Security And Non-Diversion Of Marijuana Grown For Medical Use". Brown's guidelines state that "a properly organized and operated collective or cooperative that dispenses medical marijuana through a storefront *may be lawful* under California law" (emphasis added) if they meet certain requirements, including: operating on a not-for-profit basis, obtaining all of the relevant permits and licenses, taking steps to verify that their members are qualified patients or caregivers under state law, acquiring and distributing only marijuana that has been cultivated legally, prohibiting sales to non-members, and providing adequate security (Brown 2008, 11). Regarding security, Brown states that MCDs must "provide adequate security to ensure that patients are safe and that the surrounding homes or businesses are not negatively impacted by nuisance activity such as loitering or crime." Expanding on this theme, the San Francisco Medical Cannabis Act prohibits "any breach of peace… or any disturbance of public order or decorum by any tumultuous, riotous or disorderly conduct" within permitted MCDs.[29] MCDs are required to submit security plans as part of their permit application.[30] This study examines whether such security protocols amount to *capable guardianship*, which is an effective deterrent against crime according to routine activities theory (Cohen and Felson 1979; Williams, Freisthler, and Sims 2011a).

Cities that regulate MCDs tend to have so few of them that spatial analysis becomes impossible. In cities that do not regulate MCDs, it is difficult to determine when and where dispensaries operate, and for how long. It is also much more difficult, in the case of unregulated dispensaries, to infer whether MCDs implement security protocols amounting to *capable*

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[29] Sec. 3308(e).
[30] Sec. 3304(c)(9).

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guardianship against crime, from a routine activities perspective (Cohen and Felson 1979).

Simply put, San Francisco is the largest California city to have enacted meaningful legislation

with respect to MCDs. It has done so in a way that reasonably controls for crime, at least in

theoretical terms. Thus it provides an excellent case study for analyzing the spatial relationship

between crime and locally regulated MCDs.

All data analyzed in this study are for the year 2010, a year in which there were 26

permitted MCDs in San Francisco. Although it is too early to say, it is possible, due to the

current federal crackdown on MCDs in California and MCDs, that 2010 will end up being the

last full year for which this type of analysis can be conducted. Since research for this project

began in the summer of 2011, at least ten Bay Area MCDs have closed, including five in San

Francisco, under pressure from Melinda Haag, the US Attorney for the Northern District of

California.[31] Not surprisingly, Haag's justification for the crackdown is that MCD's attract crime

and endanger communities.

<div align="center">

PRIMARY VARIABLES: CRIME RATE AND MCD DENSITY

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Crime Frequency

Crime data were collected from the San Francisco Police Department in late 2011. The

Crime Analysis Unit provided lists of serious crimes reported in 2010 along with the date and

approximate location (i.e. city block or nearest intersection) of each crime. Here, "serious

crimes" refer to those classified as Part I offenses by the Federal Bureau of Investigation (FBI) in

its Uniform Crime Reports. The crime variables used in this analysis include measures of

"violent crime" (assault and robbery) as well as "property crime" (arson, burglary, larceny/theft,

vandalism, and vehicle theft); both as total counts and as rates per 1,000 residents.

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[31]Michael Montgomery, "Interview with US Attorney Haag on Pot Operations," *KQED News*, 15 March, 2012.
http://blogs.kqed.org/newsfix/2012/03/15/interview-w-us-attorney-haag-on-pot-operations-if-its-close-to-children-thats-a-line-were-going-to-draw/ (accessed March 16, 2012).

The lists of crimes and addresses were geocoded and aggregated into census tracts using ArcGIS software.[32] Geocoding refers to the process by which tabular data (in this case, street addresses and intersections) are attributed spatial components by a geodatabase. Geocoding resulted in a successful match for more than 98% of all crimes, which were the aggregated into census tracts using a "spatial join" analysis. The remaining 1-2% of crimes were discarded from analysis. In addition, some reported crimes were removed from analysis because their geocoding confidence ratings were below 95%. In the end 43,688 reported crimes were analyzed out of the original 44,422 for which the San Francisco Police Department (SFPD) provided 2010 data. For the purpose of analysis, these crime measures were aggregated together by census tract. This measure was then transformed by natural logarithm to address a right-skewed distribution (descriptive statistics for the various categories of crime are presented in their original form in Table 4.1).

Density of Medical Cannabis Dispensaries

The primary independent variable under examination is the density of MCDs. Lists of MCD names and addresses (n = 26) were compiled using information provided by the San Francisco Department of Public Health. These MCDs were located across 16 census tracts primarily in the downtown area, as illustrated by Maps 4.1 and 4.2. The MCD addresses were geocoded to 100%. As with crime frequency, data for MCDs are presented in two forms. Descriptive statistics presented in Table 4.1 include MCD density as the number of dispensaries per square mile in a given census tract. For the regression analyses presented by Table 4.2, this variable is transformed by natural logarithm to address a right-skewed distribution.

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[32] A special thanks to John Ridener at the UC Berkeley Earth Sciences and Map Library for his generous support with ArcGIS.

Crime rates by census tract are presented by Maps 4.1 (property crimes) and 4.2 (violent crimes). All data presented are for the year 2010. MCD locations are marked by green crosses. These addresses were obtained from the San Francisco Department of Public Health. Crime rates were calculated using data obtained from the San Francisco Police Department. Census tracts are assigned to one of five classes (symbolized by the five shades of grey that fill out the census tracts in Maps 4.1 and 4.2) based on their crime rates. Because crime rates were transformed by natural logarithm to address a right-skewed distribution, units are not given.

As Maps 4.1 and 4.2 illustrate, MCDs are largely concentrated in downtown San Francisco. This could confound the relationship between MCD density and crime. Downtown areas are densely populated and highly trafficked. In terms of routine activities theory (Cohen and Felson 1979; Felson 1987), they contain larger numbers of *likely offenders* and *suitable targets*. The high rate and volume of human activity also poses a challenge in terms of *guardianship*. Thus it is likely that these areas will have high rates of crime, independent of any other factor (including MCD density). This potentially confounding factor highlights the need to consider other variables in the forthcoming analysis, namely, the "exogenous sources of social disorganization" identified by Sampson and Groves (1987). The story told by Maps 4.1 and 4.2 is too simple to be of use to policymakers wishing to understand the relationship between MCDs and crime. Alongside MCD density, it is also important to analyze socioeconomic disadvantage, family stability, and residential turnover. I discuss these factors in the following section.

Map 4.1. Property Crimes Per Census Tract, San Francisco, 2010.
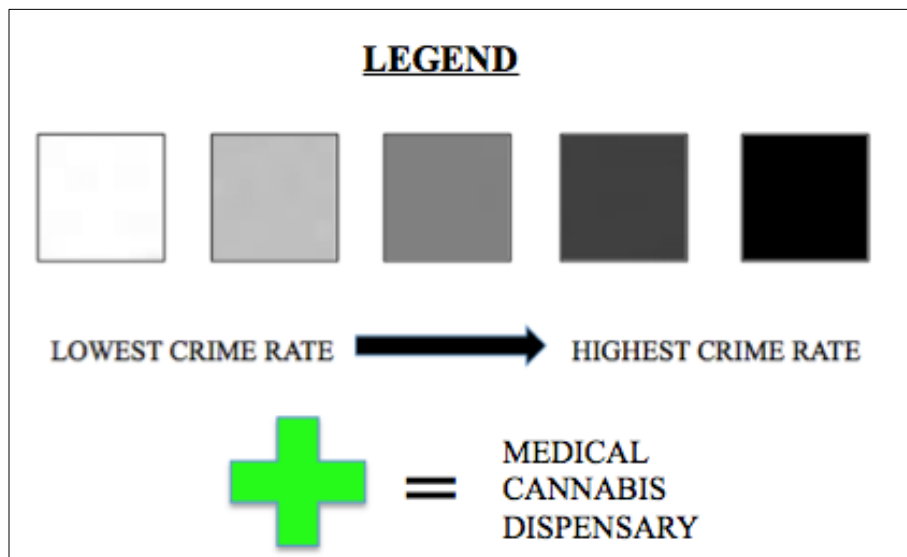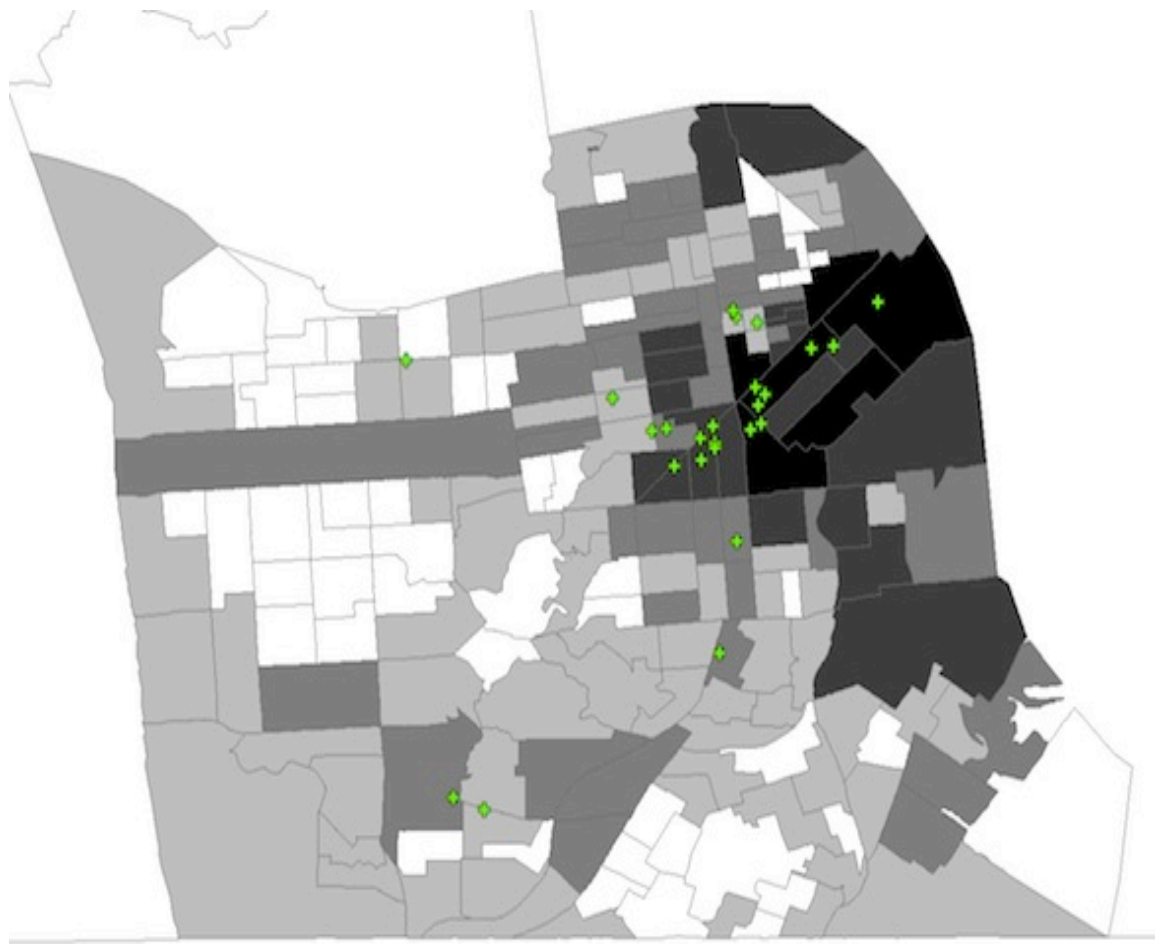
Map 4.2. Violent Crimes Per Census Tract, San Francisco, 2010.
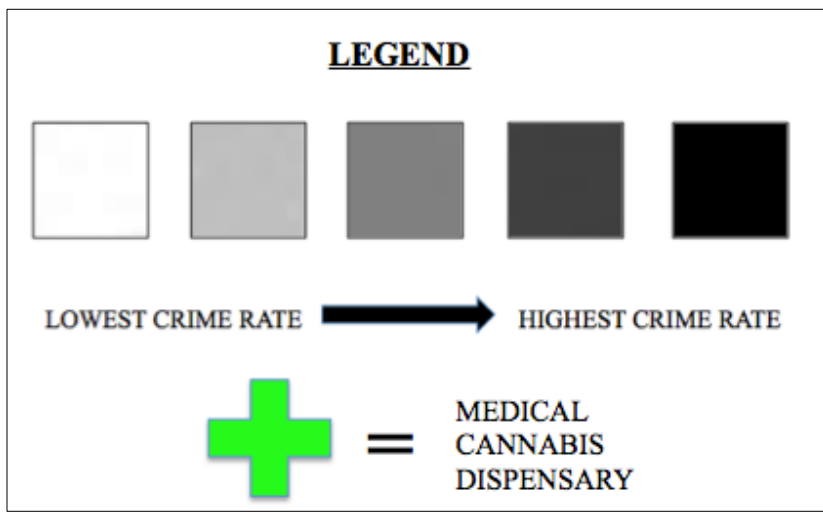
SECONDARY VARIABLES: EXOGENOUS SOURCES OF SOCIAL DISORGANIZATION

In addition to the primary variables already discussed, data were also collected for several neighborhood characteristics that could potentially confound the relationship between MCDs and crime. These neighborhood characteristics are drawn from social disorganization theory, which associates higher rates of crime with socioeconomic disadvantage, family disruption, residential instability, and population heterogeneity (Sampson 1987; Sampson and Groves 1989; Martínez, Rosenfeld, and Mares 2008; Hipp, Tita, and Boggess, 2009; Veysey and Messner 1999). From these, the present study examines the criminogenic effect of poverty, unemployment, percent of single-parent households, percent of housing units that are vacant, and percent of the population between the ages of 18 and 24. Demographic data are collected from the American Community Survey (ACS) database of the United States Census Bureau via the American FactFinder website, as well as the Demographic Research Unit of the California Department of Finance. With regard to the census data, variables are constructed from the ACS 5-year estimates for the year 2010.

Poverty. Criminological research has found that indicators of socioeconomic disadvantage—including poverty and unemployment—have been associated with higher crime rates (Martínez, Rosenfeld, and Mares 2008; Peterson, Krivo, and Harris 2000). In the present study economic data are collected from the ACS. The U.S. Census Bureau calculates the poverty status of individuals based on whether their total income in the past 12 months falls below the applicable poverty threshold, which is determined by age, family size, and family composition (American Community Survey 2011, 102). [33] The 2010 poverty thresholds range from $11,139 for a single individual living alone to $42,156 for a family of eight or more people living in the

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[33] American Community Survey. 2011. *S1701: Poverty Status in the Past 12 Months (2006-2010 American Community Survey 5-Year Estimates).*

same household.[34] For the present analysis, "poverty" means the number of individuals with incomes under their applicable poverty threshold in the past twelve months, divided by the total number of people for whom poverty status is calculated within a given tract

Unemployment. According to the United States Census Bureau, an individual is considered unemployed if he or she did not have a job *and* has been actively looking for work during the last four weeks *and* was available to start a job at the time of the survey (American Community Survey 2011, 62).[35] "Unemployment", in the present analysis, means the unemployment rate in each tract as estimated by the ACS. Research examining crime rates in the United States during the 1990's suggests that the job market can provide powerful explanations for criminal behavior (Freeman 2001; Raphael and Winter-Ebmer 2001). Poverty and unemployment are important measures in the model currently being tested, as they control for varying levels of socioeconomic disadvantage across city neighborhoods, which according to social disorganization theory affect crime rates in significant ways (Sampson and Groves 1989).

Family Stability. In this study I use "family stability" as an inverse measure of family disruption. I calculate family stability by taking the number of individuals living in married-couple family housing and dividing it by the number of people living in single-parent family households. Scholars of both routine activities theory (Cohen and Felson 1979; Felson 1987) and social disorganization theory (Sampson 1987; Sampson and Groves 1989; Veysey and Messner 1999) predict that higher concentrations of married-couple families are associated with lower crime rates in urban areas, because more parents can provide more supervision and therefore

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[34] U.S. Census Bureau, Current Population Survey, 2011 Annual Social and Economic Supplement. http://www.census.gov/hhes/www/cpstables/032011/pov/new35_000.htm (accessed March 12, 2012).
[35] American Community Survey. 2011. *S2301: Employment Status (2006-2010 American Community Survey 5-Year Estimates)*.

more social control. From a routine activities perspective, both "family stability" and "residential

stability" correspond with the notion of *capable guardianship*.

Vacancy. According to social disorganization theory, residential turnover weakens a

community's social cohesion and therefore its ability to deter and prevent crime within its

territory. In this study I use vacancy rates as measure of residential instability. I calculate

"vacancy" by dividing the number of vacant housing units within a census tract by the total

number of units within that tract. Data for this measure comes from the Census 2010

Redistricting Plan.[36]

Percent Young. Another indicator of residential turnover discussed in the criminological

literature is the percent of the sample population that is young (i.e "young adult"; older than 18

but not much older). The idea is that neighborhoods with a high concentration of young adults

will have correspondingly fewer older adults and children, which results in a lack of social

cohesion and crime-preventive capacity much in the same way as the other precursors of "social

disorganization" already discussed. The variable "percent young" was constructed using ACS

population estimates by dividing the total number of individuals between the ages of 18 and 29

by the total tract population.[37]

Other. Although they are not of particular theoretical interest, the following measures are

included as demographic control variables: population size, percent of the population that is

male, and percent of land that is commercially zoned. Population size and gender composition

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[36] California Department of Finance. Demographic Research Unit. 2011. *Total and 18+ Population by Race (Hispanic exclusive) and Hispanic or Latino and Total Housing Units, Occupied, and Vacant Units.* http://1.usa.gov/An2kgu (accessed March 15, 2012). Original data from the United States Census 2010 Redistricting (P.L. 94-171) Data File.
[37] American Community Survey. 2011. *B01001: Sex by Age (2006-2010 American Community Survey 5-Year Estimates).*

are adapted from the 2010 Census. "Percent of land commercially zoned" was calculated in

ArcGIS using zoning shapefiles provided by the San Francisco Planning Department.

RESULTS

Tables 4.1 and 4.2 present descriptive statistics for the measures analyzed in this study.

Here the crime data are provided as total counts by category, but in the regression analysis that

follows the crime variables are transformed by natural logarithm to address a right-skewed

distribution (see Table 4.3). All other variables are presented as described in the previous

section. A total of 189 census tracts within San Francisco are analyzed using data for the year

2010. Five census tracts (i.e. of an original 194) were removed from analysis because only partial

data were available; these were low population tracks with no MCDs and therefore their loss is

not analytically significant.

Of the tracts analyzed, the average population size is 4,234. The average crime rate is

197.38 property crimes per year (or 51.64 per 1,000 residents). The average violent crime rate is

much lower: only 28.65 reported instances per year (or 7.02 per 1,000 residents). According to

the results of regression analyses presented in Table 4.3, the current model is better at explaining

property crime than it is violent crime. The simplest explanation for this is that substantially

more property crimes are committed on a yearly basis than violent crimes, as illustrated by Table

4.1 below on the following page.

Table 4.1. Descriptive Statistics for Crime Categories, San Francisco (2010).

	Mean	S.D.	Min.	Max.
Arson	1.76	12.17	0.00	167.00
Burglary	47.01	323.19	0.00	4,466.00
Larceny/Theft	236.81	1,638.19	3.00	22,497.00
Vandalism	65.22	448.68	3.00	6,196.00
Vehicle Theft	41.87	287.72	1.00	3,978.00
Total Property Crimes	**197.38**	288.56	18.00	2,073.00
Assault	23.81	164.29	0.00	2,262.00
Robbery	33.18	229.07	0.00	3,152.00
Total Violent Crimes	**56.99**	393.27	0.00	5,414.00

Notes: n = 189 census tracts. Source: San Francisco Police Department (2010).

Descriptive statistics for the independent variables analyzed by this study are also presented in Table 4.2 These include "% Unemployed" and "% Under Poverty" as measures of socioeconomic disadvantage; "% of Housing Units Vacant" and "% of Population Ages 18-29" and measures of residential instability; and "% In Married-Couple Families" as a measure of family stability (an inverse measure of family disruption). These variables are included in the present model to test the explanatory power of social disorganization theory, which associates higher crime rates with "exogenous sources of social disorganization" (Sampson and Groves 1989, 780), including socioeconomic disadvantage, residential instability, and family disruption. Additional control variables presented in Table 4.2 under "Other Tract Characteristics" include population size, population density, percent of land commercially zoned, and percent of the population that is male.

Table 4.2. Descriptive Statistics for Dependent Variables, Independent Variables, and Other Neighborhood Characteristics for 189 Census Tracts in San Francisco (2010).

	Mean	Min	Max
Dependent Variables[†]			
Property Crimes	4.86 (0.81)	2.89	7.64
Property Crimes per 1,000 Residents	3.47 (0.81)	1.72	6.78
Violent Crimes	2.64 (1.2)	0	5.68
Violent Crimes Per 1,000 Residents	1.28 (1.13)	-1.26	4.24
Independent Variables			
MCD Density (per mi^2)	1.17 (5.73)	0.00	55.83
% Unemployed	0.07 (0.05)	0.01	0.34
% Under Poverty	0.12 (0.09)	0.01	0.53
% In Married-Couple Families	0.08 (0.04)	0.00	0.20
% Of Housing Units Vacant	0.08 (0.04)	0.03	0.38
% Of Population Ages 18-29	0.2 (0.08)	0.04	0.72
Other Tract Characteristics			
Population	4,234.13 (1,480.92)	1,500.00	11,502.00
Population Density (per sq mi.)	30,467 (22,691.93)	995.09	161,496.30
% Of Land Commercially Zoned	0.01 (0.02)	0.00	0.17
% Male	0.51 (0.06)	0.38	0.70
Property Crime			
Arson	1.76 (12.17)	0.00	167.00
Burglary	47.01 (323.19)	0.00	4,466.00
Larceny/Theft	236.81 (1,638.19)	3.00	22,497.00
Vandalism	65.22 (448.68)	3.00	6,196.00
Vehicle Theft	41.87 (287.72)	1.00	3,978.00
Total Property Crimes	197.38 (288.56)	18.00	2,073.00
Property Crimes Per 1,000 Residents	51.64 (94.88)	5.56	878.30
Violent Crime			
Assault	23.81 (164.29)	0.00	2,262.00
Robbery	33.18 (229.07)	0.00	3,152.00
Total Violent Crimes	56.99 (393.27)	0.00	5,414.00
Violent Crimes Per 1,000 Residents	7.02 (10.89)	0.00	69.65

Notes: n = 189. Sample includes all census tracts within San Francisco County, minus five tracts for which relevant data is only partially available. Standard deviations in parentheses. Crime data provided by the Crime Analysis Unit of the San Francisco Police Department. Tract characteristics collected from the American Community Survey of the U.S. Census Bureau and the Demographic Research Unit of the California Department of Finance.
[†]Crime categories were aggregated together and transformed by natural logarithm (see text for details).

For the vast majority of census tracts (177 out of 189) the value of the primary independent variable, MCD density, is zero. The 26 dispensaries operating in San Francisco in 2010 were largely clustered downtown. MCDs are not uniformly distributed throughout San Francisco. But neither is crime. Most crime also occurs downtown, with a large amount being reported in a cluster of densely populated census tracts. The fact that some of these high-crime tracts also contain the majority of San Francisco's dispensaries makes it especially difficult, in the present analysis, to rule out a spurious correlation. This presents a limitation to the present analysis, albeit one that is intimately tied to the nature of the research question.

Table 4.3 presents the results of four different linear regression analyses. The independent variables are the same in each, and so are the cases (n = 189 census tracts). What differs is the dependent variable: (1) total property crimes, (2) property crimes per 1,000 residents, (3) total violent crimes, and (4) violent crimes per 1,000 residents. The present study adds nuance to this picture by considering additional variables related to crime. The primary independent variables are MCD density (transformed by natural logarithm) and five indicators of social disorganization: poverty, unemployment, family stability, vacancy, and percent of the tract population between the ages of 18 and 29. Additional control variables include population size, percent of the population that is male, and percent of land that is commercially zoned.

Table 4.3. Regression Analysis Results: Property and Violent Crime Rates by Total Count and Per 1,000 Residents across 189 San Francisco Census Tracts (2010).

	Total Property Crimes (1)	Property Crimes Per 1,000 Residents (2)	Total Violent Crimes (3)	Violent Crimes Per 1,000 Residents (4)
(Intercept)	0.00	0.00	0.00	0.00
	(0.06)	(0.06)	(0.06)	(0.06)
MCD Density	0.10^	0.11^	0.14*	0.15*
	(0.06)	(0.06)	(0.06)	(0.06)
Poverty	0.25**	0.24**	0.30***	0.32***
	(0.08)	(0.08)	(0.08)	(0.09)
Unemployment	-0.13^	-0.14	0.04	0.02
	(0.07)	(0.07)	(0.08)	(0.08)
Family Stability	-0.41***	-0.41***	-0.22**	-0.21*
	(0.08)	(0.08)	(0.08)	(0.08)
Vacancy	0.17**	0.20**	0.00	0.02
	(0.06)	(0.06)	(0.07)	(0.07)
Young	-0.12^	-0.13^	-0.06	-0.06
	(0.07)	(0.07)	(0.07)	(0.07)
Population	0.32***	-0.079	0.28***	-0.00
	(0.06)	(0.06)	(0.06)	(0.06)
Male	0.14*	0.15*	0.20**	0.23***
	(0.06)	(0.06)	(0.06)	(0.06)
Commercially Zoned	-0.11^	-0.13^	0.05	0.05
	(0.07)	(0.07)	(0.07)	(0.07)
$R^2 =$	0.43	0.41	0.40	0.37

Notes: n = 189 census tracts. All measures presented in standard units. Standard errors in parentheses. Crime data provided by San Francisco Police Department. Tract characteristics adapted from U.S. Census (2010), American Community Survey, California Department of Finance, and San Francisco Planning Department. Measures of crime, MCD density, and percent of land commercially zoned were transformed by natural logarithm.
^ Significant at 10%; * significant at 5%; ** significant at 1%; *** significant at 0.1%.

CHAPTER V.
DISCUSSION OF FINDINGS, LIMITATIONS, AND IMPLICATIONS.

As Table 4.3 indicates, the four models tested by this study are fairly consistent in their findings with respect to which variables predict what, and with what power. One interesting difference is that MCD density is a stronger predictor of violent crime than property crime—although the property crime models have slightly better explanatory power over all (R^2 values of 0.43 and 0.41, as opposed to 0.40 and 0.37). The relationship between MCD density and crime is weak but statistically significant, according to this model. These findings cast doubt on the claim that MCDs are magnets for criminal activity. Although the relationship between MCDs and crime is not completely insignificant, it is consistently weak across all four regression analyses conducted in this study. This is particularly striking given the clustering of MCDs in downtown census tracts (see Maps 4.1 and 4.2).

Of the other independent variables under review, the strongest predictors of crime—much more so than MCD density—are poverty and family stability. Poverty provides the strongest explanation for differences in violent crime rates across tracts, while family disruption provides the strongest explanation for property crime rates. As with MCD density, poverty is found to be a better predictor of violent crime than property crime. The opposite is true for family stability. As family stability increases, crime rates decrease. This holds across all four models. But the strength of that correlation for violent crime is nearly twice what it is for property crime (ß coefficients of -0.41, as opposed to -0.21). These findings are consistent with past research on social disorganization theory (Sampson and Groves 1989; Veysey and Messner 1999). Taken together, these findings cast doubt on the claim that MCDs are magnets for crime.

LIMITATIONS

These findings should be considered in light of the limitations faced by the present study, which are several. Foremost among these is the narrow conception of the question. The link between MCDs and crime is an intriguing puzzle academically, and one that deserves greater attention. But for policymakers it is just one piece of a much larger puzzle. There are a multitude of factors to consider when deciding whether and how to regulate MCDs. Public safety is, of course, a necessary consideration. But in California so is the provision of state law, passed by a majority of voters in 1996, that qualified patients should have legal access to medical cannabis. And so are a number of other factors, ranging from potential effects on children and teenagers to the budgetary impact of MCD regulation and taxation by local governments. Thus, this study should be considered in light of its narrow academic approach to a broad real world problem. To the extent that this study says anything about the relationship between MCDs and crime, it must also be noted how little it has to say about these other factors.

In addition, there are certain technical limitations to this study that merit discussion. This study lacks breadth in both the quantity and quality of its case selection, which means that one should be cautious in generalizing from these findings. Moreover, the research design is purely observational (there is no experimental or quasi-experimental component). This makes causal identification impossible—observed associations could run in either direction, or they could be spurious. This study does not account for longer term (i.e. pre-2010) trends in crime frequency or neighborhood characteristics, a problem that could be corrected by future research that incorporates longitudinal data. If, for example, the crime data obtained for this study (i.e. by category, date, and precise location) could also be obtained for 1990 and 2000—years in which

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MCDs were nonexistent and virtually non-existent, respectively—then a "before and after" analysis could be conducted for San Francisco and other cities.

The neighborhood data examined in this study also have their own limitations. While census tracts are convenient units of analysis, they are not perfect. They are imagined boundaries. The demographic data provided by the ACS provide a reasonably accurate picture of the people who live in a census tract, but do not account for the fact that people—and criminals in particular—tend to move from tract to tract. Nor do they account for tourists, transients, or anyone else unlikely to respond to census surveys.

The MCD data are also limited. It is possible that some of the MCDs included in this analysis were not open for the entire calendar year in 2010, or that there were some additional MCDs operating in 2010 without an official permit (in which case they would not have been included in this analysis). There is also the question of other cannabis distributors not classified as MCDs. These include illicit dealers, medical cannabis delivery services, and small patient collectives without storefront locations. Whatever effect these groups may have on crime is not captured by the present study.

The crime data suffer from limitations as well. This study inherits all of the imperfections that accrue in reporting, recording, and transmitting data within and from police departments. Furthermore, because they are reported by approximate location (city block or nearest intersection), these crime data suffer from a lack of precision. Furthermore, because this study limits its analysis to a subset of crimes classified as Part I offenses by the FBI, it is not a very broad measure of crime. Policymakers might also be interested in less serious categories of crime when making decisions related to MCD regulation.

FINAL CONCLUSIONS

In this paper I have sought to contribute towards a more informed understanding of the spatial relationship between MCDs and crime. Preliminary findings suggest that there may be a relationship between the density of MCDs within a census tract and the rate of reported crime (see Maps 4.1 and 4.2), but this link is confounded by the fact that many MCDs are clustered in downtown San Francisco. Do MCDs cause crime, or do they simply tend to locate in higher crime areas?

Results from a more sophisticated regression analysis—which considers important factors related to crime including socioeconomic disadvantage, family stability, and residential turnover—paint a more nuanced picture of urban crime. Findings cast doubt on the claim that MCDs are magnets for crime by suggesting that certain neighborhood characteristics are better predictors of crime than MCD density. The best predictors of high property crime rates are, in descending order of strength and significance: family instability, poverty, percent of housing units that are vacant, and percent of individuals between the ages of 18 and 29. The best predictors of violent crime rates are poverty and family instability. In many cases the relationship between one or more of these factors and crime is stronger than the relationship between MCDs and crime. Thus it may be the case that certain neighborhoods would have even *higher* rates of crime if not for the presence of MCDs—ongoing longitudinal research should test whether this is the case. And generally speaking, future research should address the uncertainty in these findings by collecting larger bodies of data across longer periods of time. As more thorough and better-controlled analyses are conducted across the many jurisdictions currently grappling with MCD regulation, a clearer picture will emerge of the relationship between MCDs and crime. Eventually, policymakers may be able to break free of the "smoke and mirrors" that plague the current debate surrounding medical cannabis in California and other states.

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