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Crime Attractors in Sin City? A Pre/Post Test of Crime Patterns and Police Enforcement Around Recreational Marijuana Facilities

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CRIME ATTRACTORS IN SIN CITY? A PRE/POST TEST OF CRIME PATTERNS AND POLICE ENFORCEMENT AROUND RECREATIONAL MARIJUANA FACILITIES

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Abstract

The federalist system in the United States has created criminal opportunities within jurisdictions that have approved recreational marijuana facilities (RMFs). These facilities have characteristics that are attractive for motivated offenders including marijuana and marijuana-related tangible goods. Through ArcGIS, this research examined the crime patterns and police enforcement patterns that occurred within a 288-meter street-network buffer around RMFs through a pre/post-test exploratory design in the Las Vegas area. The time periods examined were 2015 to 2016 (pre-legalization), and 2018 to 2019 (post-legalization). Calls for service data were used to demonstrate both crime and enforcement patterns. Furthermore, facilities were classified into "local facilities" and "tourist facilities" to examine any differences between groups. Findings demonstrate statistically significant increases in disorder aroud RMFs classified as tourist facilities (and not local facilities). Results also indicate increases police enforcement around RMFs in the post legalization period in local facilities (and not tourist facilities). Overall, crime tended to increase around tourist facilities more so than local facilities. Implications of these findings as they relate to policing, disorder, and crime opportunity are discussed.

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Dedication

The pursuit of my doctoral degree is dedicated to my mother and father, Desiree, and Bill (William) Donnelly. They both did everything in their power to make sure that I had a good life regardless of the adversities that they faced. It is because of them, their sacrifices, that I am able to engage in my pursuit of happiness. I would not have the perseverance to face life's hurdles, the will to keep pushing, nor the understanding that a good life is not simply gifted but earned through hard work and sacrifice if it would not have been for the example that they set for me and continue to show me throughout my life.

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Chapter 1 – Introduction, History, and Uniqueness of Study Area

Introduction

The unique nature of our federalist system in the United States has inadvertently contributed to the creation of criminal opportunity structures at the local level. Legalization of recreational marijuana at the state level (in select states) combined with the Schedule One classification at the federal level has helped to create micro cash economies (due to federal banking regulations) that are highly attractive for motivated offenders. Furthermore, recreational marijuana facilities (RMFs) have become high traffic activity nodes because of their sale and distribution of a product with high desirability – marijuana and marijuana-related tangible goods. This high traffic combined with high target suitability is the foundation for criminal opportunity that can—theoretically—lead to the creation of hot spots around RMFs. Las Vegas provides an excellent study area due to the large metropolitan backcloth that allows for RMFs to exist in a multitude of different settings; the transient population, high tourist industry, and the long history of regulatory practices in what many would refer to as "deviant" areas (legalized gambling, neighboring legalized prostitution, etc.), to name a few.

While crime and place is not a new phenomenon to be studied, RMFs are a relatively new type of place with minimal existing research addressing the direct and collateral consequences (if any) of crime on the areas they are built in. The research that has been done has yielded mixed results as to whether these facilities contribute to an increase in crime. These mixed findings may be attributed to the

different methodologies that were employed to measure crime at specific places. Specifically, when examining offender targeting patterns and the geometry of crime (how crime is distributed across places), it is important to examine it from a relatively smaller unit of analysis as opposed to larger units of analysis due to the offender processes that guide movement, target selection, and decisions to engage in crime. Research regarding crime concentration at RMFs should focus on the specific city-blocks that these facilities exist in, rather than examinations of crime within large geographical areas such as census tracts. This also moves in line with the central assertion within the field of geographical systems and science known as Tobler's Law. This law asserts that while everything is related to everything else, closer things are more related than distant things (Tobler, 1970).

Thus, this research examines: (1) whether crime patterns have changed around recreational marijuana dispensaries after recreational sales became legal (July of 2017), (2) whether or not police enforcement levels around these facilities have changed post-legalization, (3) an examination of the crime concentration within buffers between the two periods, and (4) a comparison between facilities designated as "tourist facilities" and "local facilities". This type of research is important because as more states move to legalize recreational marijuana usage, policy should be informed by the potential risks associated with these facilities.

History of Marijuana Legalization

With the passage of the control substance act in 1970 by congress in the United States (USA), marijuana (cannabis) became a Schedule One drug. The Drug Enforcement Agency—established by President Nixon in 1973 to combat the war on drugs—defines a Schedule One drug as substances or chemicals with no currently accepted medical use with a high potential for abuse. Marijuana is grouped under this schedule with other notable drugs such as Heroin, LSD, Ecstasy, and others.

From the 1960s to the 1980s the nation's war on drugs was constantly being fueled. This is largely due to the fact that in the 1960s, the nation's middle-class youth began to use marijuana. This sparked a moral panic across society since the criminal justice system was now becoming heavily involved with the middle-class youth (Smith, 2015). This panic resulted in severe legal ramifications for drug users during this time. Ultimately, this led to several decriminalization campaigns throughout the United States during the 1960s, 1970s, and 1980s—most of which failed due to the federal government's strong opposition to the drug. The drive to decriminalize was not because society did not view the drug as harmful, rather, it was because middle-class people were now being affected by the criminal justice system rather than just minorities or marginalized populations (DiChiara & Galliher, 1994).

In the late 1970s, Nevada was the only state that retained felony possession for marijuana usage. While the written law stated that felony-level punishments would be induced for those convicted of marijuana usage, this was not how it was

unfolding with the "spirit of the law". As noted by DiChiara and Galliher (1994), in legislative hearings in the late 1970s the president of Nevada's Peace Officers association voiced their concern over the legal penetration of the felonious laws:

> "Judges are not sending people to prison as the present law calls for due to smoking a joint of grass… As a consequence, the law as it stands is only being subverted. It is being met with a lot of cynical amusement by the young people today".

This statement highlights two processes: cultural change and legal penetration. The phrasing of marijuana as "joint of grass" shows how culturally it was not viewed as some extremely harmful chemical substance as it was portrayed throughout popular culture in the 1980s. The second process to note is that the legal penetration of felonious laws targeting marijuana usage were not being enforced. This began a paradigm shift in Nevada due to the laws being seen as ineffective and marijuana no longer being viewed as an extremely harmful substance.

It was not until the mid to late 1990s that certain states began to gain some real traction in the change of cultural views regarding marijuana. Up until this time, the views of marijuana were generally the same across all of America. In 1995, several states began to realize the medical capabilities of marijuana, which sparked a paradigm shift in the acceptance of this substance as more than just a Schedule One drug (Fisher, 2017). Once states began to see marijuana from a more medical perspective, they began to apply certain pressures to the laws and legal structures that explicitly prohibits the substance.

Interestingly enough, within the past two decades the medical community has lent support to the statement that marijuana does have certain medicinal properties which can be used to treat certain ailments, and popular culture has presented marijuana in a less negative and non-harmful manner which has led to a substantial decrease in marijuana usage enforcement. In the bigger picture, as of the year 2022, 39 of the states in the USA have laws that have decriminalized marijuana for medical usage, and 8 of those states have legalized recreational usage of the substance as well. While there is a push for decriminalization and legalization at the local and state level, the federal government has yet to change the classification of marijuana, thus making it federally illegal.

Friction of Federal Law and Target Suitability

As marijuana is classified as a Schedule One drug, this helps to establish criminal opportunity structure associated with cash economies. Due to the laws and regulations surrounding traditional banking in the United States, recreational marijuana dispensaries cannot use traditional banking services due to the illegal federal classification of the product that they are selling. According to technicalities within the law, to allow RMFs to use traditional banking services would be similar to allowing illegal drug enterprises to use the same services (credit cards, debit cards, traditional accounts, etc.).

Criminal opportunity is created through the following process: customers travel to these facilities largely with cash to participate in a recently deemed legal activity—but they also leave with a historically deviant, highly sought-after product

that is ideal for property offenders because it is concealable, easy to remove, valuable, enjoyable, and disposable (Clarke 1999; Wellsmith & Burrell, 2005; Bernasco & Block, 2007). This cash economy is directly due to the Schedule One classification of marijuana goods and related products.

Unique Nature of the Study Area – Las Vegas "Sin City"

The characteristics of the Las Vegas Valley (the general area comprised of multiple cities will be referred to as the general study area throughout this document) provide for an interesting "environmental backcloth" (Brantingham & Brantingham, 1993) to study crime concentration. Nicknamed and marketed as "Sin City", Las Vegas has a long reputation of "deviance". From legalized gambling, and socially acceptable public alcohol consumption in tourist areas, to neighboring counties offering legalized prostitution, Las Vegas provides ample historically perceived deviant activities for its population. In addition to the deviant nature the city is associated with, the population is constantly changing.

The general study area is a rather transient area, with just shy of 8% of the population being "native-born Nevadans" (Frazee-Bench, Salidino, & Brown, 2019). In addition to the high non-native population of individuals who live here, the general study area has a worldwide top tourist destination within its bounds, with millions of visitors every year. Thirty-two million people visited Las Vegas in 2021, this was approximately a 20% decrease from the year prior (largely due to decreased travel from COVID-19 pandemic). The year before the pandemic started (2019) there were approximately 42 million visitors who came to Las Vegas (Las

Vegas Convention and Visitors Authority, 2022). To put that into perspective, Las Vegas receives more visitors every year than 99% of entire individual city populations across the country (there are approximately 19,500 cities in the USA with only 10 of them having a population of over 1 million). With such a dynamic "demographic backcloth" it provides further criminal opportunity for motivated offenders.

Tourism is, in and of itself, an attractor of motivated offenders. Tourists are lucrative targets due to them carrying substantial sums of money and other values as they travel. Another factor that contributes to crimes against tourism is the general "carelessness" that often accompanies vacationers, leaving them off-guard and unknowing of victimization risk associated with certain places/activities that exist in their vacation spot. Lastly, tourists are less likely to report victimizations due to the unlikeness of returning to testify (Glensor & Peak, 2004). In addition to the increased likelihood of a tourist becoming the victim of a crime, there is also some credence that tourists are more likely to become offenders themselves due to the "tourist culture" which can mitigate a sense of personal responsibility and willingness to obey the law (Glensor & Peak, 2004). Legalized gambling combined with the open and encouraged consumption of copious amounts of alcohol in Las Vegas help to contribute to the "tourist culture" which can impact victimization and offending likelihood. As of 2017, recreational marijuana became another historically deviant activity that was legalized in our jurisdiction, further adding to the long list of factors that can lead to criminal opportunity.

In the summer of 2017 Nevada became the fifth state to legalize marijuana for recreational usage. Nearly a year after recreational usage was legalized, Nevada dispensaries sold approximately 425 million dollars worth of recreational marijuana (also known as "adult-use marijuana"), accounting for an approximate 80% of all marijuana sales (just shy of 530 million for recreational, marijuana-related tangible goods, and medicinal sales) in the state (Nevada Department of Taxation, 2018). Within the first six months, Nevada had 195 million in sales, outperforming Washington (67 million) and Colorado (114 million) when they legalized recreational marijuana in 2014. As demonstrated, the recreational marijuana business is extremely lucrative, and with this success, comes criminal opportunity structures.

Chapter 2 - Theoretical and Empirical Foundation

Crime opportunity presents itself throughout three different levels: micro, meso, and macro. As offenders move throughout their environments they are exposed to opportunity or drawn to it (Cohen & Felson, 1979; Brantingham & Brantingham, 1995; Bernasco & Nieuwbeerta, 2005). Within environmental criminology, there is a general assertion that offenders are rational thinkers who consider risk factors and potential rewards as they engage in their routine activities (Cohen & Felson, 1979; Clarke, 1980; Cornish & Clarke, 1986; Brantingham & Brantingham, 1980). Criminologists are aware that some locations are more crime prone than others (Weisburd, 2015; Wilcox & Eck, 2011), which can be explained through the concept of risk heterogeneity (Johnson, 2008) and how this is impacted throughout different theoretical levels. While understanding the criminal opportunity structure at all of the different levels helps to best explain the theoretical increased risk associated with recreational marijuana facilities, this research will have a special focus on the meso and macro level levels of crime opportunity – Routine Activities Theory and Crime Pattern Theory (Cohen & Felson, 1979; Brantingham & Brantingham, 1993). The following section details opportunity structure and its relationship to theory and recreational marijuana facilities.

Risk Heterogeneity

Risk heterogeneity is the assertion that risk is different and uneven across potential people, places, and targets. The assertion of risk heterogeneity helps to

explain the differences in victimization patterns across targets. Risk is measured through repeat victimization. It is demonstrated within empirical research that the most powerful predictor of future crime is past victimization (Farrell & Pease, 1993; Johnson, 2008). To help explain risk heterogeneity, Johnson (2008) explains that there are two popular explanations for repeat victimization which help to conceptualize the associated risk of targets, the flagged and boost effect (Johnson, 2008).

The flagged effect of risk heterogeneity helps to explain repeat victimization that is attributed to the characteristics of targets that help to attract motivated offenders (Johnson, 2008). Thus, making targets "marked" or "flagged" to offenders. This explanation of repeat victimization can assist in explaining crime occurrence at places that have been generally time stable over years and decades – despite complete turnover of the people who frequent the locations. The boosted effect of risk heterogeneity helps to explain repeat victimization through the assertion that it is the same offenders or known associates that return to re-victimize a target (Johnson, 2008). This lends support to the theoretical explanation of crime attractors, which asserts that offenders are aware of the criminal opportunity present at certain locations and seek to exploit said opportunities (Brantingham & Brantingham, 1995).

Different theories within crime science help to explain the associated risk of crime and each theory can be attributed to a certain level. Thus, this section will detail the theoretical risk associated with RMFs through the meso and macro level.

Risk Heterogeneity at RMFs- Meso Theoretical Explanation

At the meso level, risk heterogeneity is explained by what is present, and what is not present, in any given environment which influences the activities of both offenders and victims. Within the meso level lies the equation for crime opportunity—Routine Activities Theory, and a theory that helps to explain police enforcement and its relation to crime prevention – the Broken Windows Hypothesis. The meso level helps to establish the routines and situational characteristics that lead to suitable crime opportunities for offenders as well as ways to prevent crime within areas such as neighborhoods or city blocks.

Routine Activities Theory (RAT)

Routine Activities Theory (RAT [Cohen & Felson, 1979]) is a staple of crime science. This theory is often conceptualized as the "equation" for crime opportunities because of the concise explanation for what creates crime. Routine Activity Theory provides a heavy focus on the creation of criminal events and differs from traditional criminology in its main focus. The theory was created due to an observation of certain crimes increasing in the mid to late 1900s. The evolution of this theory led to the conceptualization of what is known as the crime triangle today.

Cohen and Felson began to examine the temporal changes in crimes from 1947 to the mid-1970s, and they noticed that there was an increase, especially in predatory crimes during the 1960s. The question that then followed was what was

causing this increase. Cohen and Felson (1979) made several connections to larger macro-level changes in the United States during this time. One of the major changes was the introduction of women into the workforce in a more mainstream manner. The other major change was involving the transformation of consumer goods during this time. They attributed these changes as having an impact on the increase of predatory crimes during this time.

Regarding changes in the workforce, Cohen and Felson (1979) noted that as more women joined the workforce, homes were often left un-guarded during the daytime. This was different than what we know of American history up until this time, which was that in two-person households, the men would often leave the home to go to work, while the women would generally stay home and take care of the home and/or children. Further, the theorists asserted that as women joined the workforce, household income also increased which helped families to participate in more leisure activities away from the home such as vacations or shopping.

In addition to the change in the workforce, they also noted a change in consumer electronics during this time. As time moved forward, technological advancements allowed for smaller electronics that had substantial value. Given the increase in household incomes, these valuable goods were now more accessible to the general public. As items got smaller and more expensive, Cohen and Felson (1979) began to explain a theoretical connection as to why this would lead to an increase in predatory crimes.

With the increase in predatory crimes, changes in the workforce, and the technological advancements, Cohen and Felson (1979) theorized an equation for crime. They asserted that in order for a crime to occur, three elements must converge in time and space: motivated offenders, suitable targets, and a lack of capable guardians. When these three elements come together at a specific place, crime is created. Each element is essential to crime scientists as they provide intervention points for many crime prevention techniques.

Motivated offenders are individuals who have the intent to commit crime. These individuals are rational thinkers (Cornish & Clarke, 1986) who move throughout their environment weighing risk v. reward to maximize their benefits through criminal engagement. These motivated offenders can be enticed and further motivated through suitable targets. The suitability of targets is the subject of many empirical tests. The suitability of targets can be demonstrated through many influences, such as the conceptualized success of committing the crime, the possible gain associated with obtaining an item (Clarke & Cornish, 1985), accessibility to the target (Bernasco & Nieubeerta, 2005), as well as the value of the target. Lastly, offenders can be deterred or enticed through the level of guardianship associated with targets (Miethe & Meier, 1990; Cohen & Felson, 1979). Routine Activities Theory (RAT) was later expanded to include what is now referred to as controllers, which in conjunction with the original elements, lead to the creation of the crime triangle. The crime triangle is the conceptualization that in order for a crime to

occur, all sides of the triangle must converge in time and space; while the outer triangle (controllers) impacts the risk of a criminal event occurring (see figure 1).

In 1986 Marcus Felson sought to connect Routine Activity Theory to other criminological theories that helped to explain the criminal rather than just the criminal event. Felson introduced the idea of handlers to the theory and sought to connect this to the control paradigm – specifically Hirschi's criminological theory on social bonds (Eck & Weisburd, 1995). For Felson, it was important to make the connection between handlers and motivated offenders. Within this dichotomy, he asserts that intimate handlers help to control offenders in the same fashion as described within Social Bonds Theory (Hirschi, 1969). According to Felson, if an offender is in the presence of a handler, they are likely to be less motivated and unwilling to attack the target no matter how suitable.

The theory then received another extension in 1994 with the introduction of the controller known as a manager. This extension is attributed to Eck (1994) in which he states that places are supervised by managers. Explained further, the capability of a place manager will help to determine the suitability of the places as a potential target. For example, ineffective place managers will likely have higher risks associated with their premises than effective place managers who help to control access and create a safer environment.

With these two extensions the crime triangle was formed (see figure one), which is a common symbol of criminological theory in the world today. With the

crime triangle comes an equation for crime and, according to theory, if one "side" can be disrupted or removed, a crime is far less likely to occur.

Figure 1: RAT Triangle

With the inception of Routine Activity Theory, also came the inception of the VIVA model, or Value, Inertia, Visibility, and Accessibility (Cohen & Felson, 1979). The VIVA model helped to explain the suitability of targets or why offenders selected targets. There have been many criticisms of the VIVA model as there was not a clear distinction between target types such as human victims and/or property as well as not taking offender motivation into account (Clarke, 1999). Thus, a new model was conceptualized to further explain target suitability – CRAVED (Clarke, 1999). CRAVED is comprised of six components: Concealable, Removable, Available, Valuable, Enjoyable, and Disposable. For concealable, Routine Activity Theory would assert that items that are not easy to conceal will not be a suitable target for

criminals (favoring smaller items that are easy to hide). For removable, Routine Activity Theory would assert that easily mobile items would be suitable for criminals as they could pick them up and move them without much trouble. Available is the principle that items that are more readily available to the general public will have a criminal market that is often attached to it (such as jewelry, mobile phones, etc.). Valuable speaks to the worth of the item, especially in cases where a thief may go to sell the item. For Routine Activity Theory, valuable items are much more suitable as there is a market and demand for them. Enjoyable focuses on the desirability of the product, and helps to explain why items such as alcohol, tobacco, and other leisurely objects (such as condoms) are stolen. Lastly, disposable speaks to the idea that items that are easier to sell will have more suitability than those that are more difficult. With CRAVED, offender motivations are considered when assessing target suitability, which addresses the increased associated risk of criminal opportunity throughout time and space.

Risk Heterogeneity – Routine Activities Theory and RMFs

Routine Activity Theory has been used to explain the risk of victimization of targets, along with macro-level changes of crime rates in the USA, and temporal-spatial patterns of crime. Empirically, Routine Activity Theory helps to explain why commercial businesses are victimized at nighttime due to the lower guardianship and higher target suitability at night when businesses are closed (Bernasco & Nieuwbeerta, 2005; Bernasco & Luykx, 2003). Or why residential burglaries are likely to occur during the day when residents are typically away engaging in their

routine activities such as work or school (Wilk, Miethe, & Hart, 2009; Donnelly, 2018). Routine Activity Theory can be especially useful in developing a theoretical explanation for crime opportunity at RMFs, which is a central test in this current study.

Thus, as applied to the current study, risk heterogeneity is impacted by what is present (large volumes of offenders, attractive targets) and not present in certain locations (effective place managers, potential crime controllers, capable guardians). As applied to RMFs, Routine Activity Theory can help to explain the spatial-temporal patterns of crime at RMFs and their relation to victimization patterns associated with the facilities. Furthermore, marijuana is a substance that does well to meet all of the requirements of CRAVED. For example, marijuana is easily concealable, it is small and easy to hide on one's person. Marijuana is removeable, as it is extremely mobile and easy to transport. Marijuana is available and valuable, as it is sought after by both criminals and marijuana users, leaving a market for the drug. Marijuana is enjoyable, as people generally receive a mind-altering high from using this substance. Lastly, it is disposable, meaning it would be easy to sell due to its mind-altering value and economic value.

Broken Windows Hypothesis

One of the more practical theories that allows for more feasible solutions to addressing crime problems is Broken Windows. The Broken Windows hypothesis, developed by Wilson and Kelling (1982) focuses on the controlling of disorder within communities to prevent more serious crime from flourishing. Specifically, the

Broken Windows hypothesis seeks to address the proximate effects of disorder amongst neighborhoods by focusing on physical and social disorder. Physical disorder is examined through occurrences such as graffiti, trash-ridden neighborhoods, the presence of alcohol and drug paraphernalia, or abandoned and dilapidated structures. Social disorder can be seen through instances of aggressive panhandling, prostitution, vagrancy, and other social situations. The logical process is that when disorder begins to flourish, it leads to the breakdown in formal and informal social controls which can be demonstrated through the lack of use of public spaces by pro-social individuals. According to the Broken Windows hypothesis, fear is the byproduct of disorder, which helps to explain the decisions of residents to avoid public spaces. This notion also falls in line with the research of Jane Jacobs (1961), who describes the causal connection between the use of public space and criminal opportunity afforded when public areas are not used in the ways that they were intended. Thus, when disorder flourishes and pro-social individuals stop using public spaces, the social controls associated with these areas are removed, leading to a "criminal invasion" as termed by Wilson and Kelling (1982).

This process is then echoed through enforcement practices by the police. On one hand, if residents are tolerating disorder, it is then likely that police will also develop a certain tolerance of behavior within certain areas. However, upon further examination of the hypothesis, it provides a tool for police with a central focus on preventing and managing disorder –disorder policing. If police can successfully manage disorder, then they are likely to maintain the social controls of areas both

directly and indirectly. Directly, research shows that the increase of police within an area provides a deterrent effect for criminals in these areas (Nagin, 2013). Indirectly, it allows the residents to feel more comfortable that police are proactively involved in the community in an attempt to decrease crime (Wilson & Kelling, 1982). This hypothesis has been a focus of criminological research over the past 30 years.

Critics of the Broken Windows hypothesis suggest that there is no substantial evidence that this type of policing helps to reduce crime (Harcourt, 2001). However, in a systematic review and meta-analysis of disorder policing strategies conducted by Braga, Welsh, and Schnell (2015), results demonstrated that disorder policing strategies do in fact generate noteworthy crime control gains. Furthermore, the strategies show positive results across a variety of different outcome measures (property, drug, disorder, violent crime). Therefore, results do demonstrate that when police take into consideration and seek to improve social and physical disorder, they are likely to reduce more serious crimes in these areas. It is important to note that disorder policing is not zero-tolerance policing. Broken Windows does not suggest that disorder should be enforced in a zero-tolerance manner, rather – it should be a central focus of prevention for an agency while leaving officer discretion intact. Zero-tolerance policing strips officers of their discretionary decision making and mandates strict enforcement practices throughout a jurisdiction. Research demonstrates that aggressive order maintenance strategies targeted at individuals are not beneficial (Braga et al.,

2015). As zero-tolerance policing is shown to be rather ineffective, the Broken Windows hypothesis opens the door for a "community co-production model" or involving community partners in the monitoring, prevention, and management of disorder (Taylor, 2001; Braga et al., 2015).

Thus, the Broken Windows Hypothesis has become a center focus of crime prevention strategies for police (Kelling & Coles, 1996; Kelling & Sousa, 2001). Through strategies that implement order maintenance, community policing, and problem-oriented policing, police can address disorder, thus helping to restore both formal and informal social control back to the residents and occupants of certain areas. One method that police can use to address disorder is through increases in regular enforcement, such as traffic enforcement, walking beats, and foot stops, which additoanlly help provide a deterrent factor as well. According to this perspective, if disorder can be prevented,the causal mechanism which helps to combat crime—social control—will remain in place, thus leading to more serious crimes being avoided altogether.

Meso Theory and Hypothesized Relation to RMFs

Routine Activity Theory is often conceptualized as the "equation" for crime opportunities because of the concise explanation for what creates crime while the Broken Windows hypothesis helps to detail the role of police in eliminating crime opportunity within areas. Thus, risk heterogeneity is impacted by what is present (large volumes of offenders, attractive targets, levels of police) and not present in certain locations (effective place managers, potential crime controllers, capable

guardians). As applied to RMFs, Routine Activity Theory can help to explain the differences in the spatial-temporal patterns of those who frequent these facilities, the characteristics of operations, and their relation to victimization patterns associated with the areas that these facilities exist in; while the Broken Windows hypothesis helps to explain the levels of crime around RMFs as related to police enforcement in the areas. The table below represents these theories application to RMFs.

Table 1: Risk Heterogeneity at RMFs – Meso Theory

Theory	*Impact to Risk Heterogeneity of RMF*
Routine Activities (RAT)	• Offenders will be drawn to RMFs through the (1) micro cash economies (suitable target, motivation for offender), (2) desired product (marijuana) (suitable target, motivation for offender) (3) high volumes of people traveling to and from facilities (creates a suitable place and macro levels of increased opportunity), (4) the tourist population associated with certain facilities (tourists are suitable targets). • Marijuana is CRAVED.
Broken Windows Hypothesis (BWH)	• The introduction of RMFs provides an opportunity for increases in disorder through disorderly activities such as loitering, vagrancy, and public intoxication and consumption. This can lead to pro-social people avoiding these areas, allowing criminals to further target these areas – this is the micro component as it explains why a criminal might choose an area to commit crime. • The BWH explains how increasing police enforcement within certain areas can have an impact on the crime rates present in these areas.

Risk Heterogeneity at RMFs - Macro Theoretical Explanation

At the macro level, risk heterogeneity is explained by large geographical associated characteristics that can influence offending. The macro level allows crime

scientists the ability to assess crime patterns across much larger units of analysis, which helps to establish valuable information about the spatial decision-making processes of offenders and areas most conducive to crime. The macro theory of focus for this current study is Crime Pattern Theory (Brantingham & Brantingham, 1993).

Crime Pattern Theory

Crime Pattern Theory was developed by Paul and Patricia Brantingham (1993). Crime Pattern Theory seeks to explain crime distribution patterns at the macro-level and spatial decision-making process of offenders. This theoretical assertion seeks to combine rational choice and routine activity to help to explain the distribution of crime events across places on a more macro scale (Eck & Weisburd, 2015).

Crime pattern theory explains that there is a strong geographical pattern associated with criminal offenses and victimization. Crime Pattern Theory provides a theoretical assumption on how offenders find their suitable targets. This process is as follows. "Action Spaces" are areas where offenders spend a lot of their time. These action spaces can be bars, liquor stores, parks, schools, malls, homes, gyms, as well other places for leisure and work activities and, for the purposes of the current study, RMFs. Throughout everyday movement to these action spaces, offenders form awareness spaces—which are cognitive maps of the areas that they most frequently travel. The main assertion of this theory is that within awareness spaces are where suitable targets are most likely to be victimized, which explains

why there are higher crime rates in areas where there is a high concentration of offenders (Brantingham & Brantingham, 1993; Hirschfield & Bowers, 1997). This is in line with the notion that criminals do not travel far from home to commit crime, because it is nearby their home where their awareness spaces are likely to be. If one is to assume that these action spaces, or nodes, are apparent across multiple extents of land usage, one is to assume that offenders' awareness spaces are spread out across the city in which they reside (Brantingham & Brantingham, 1981). Thus, crime risk in areas that have specific types of land usage (clubs, bars, liquor stores, or other related areas) theoretically will have higher crime. This was important for the current research because the resort corridor was examined, which has high concentrations of tourist attractors such as clubs, bars, liquor stores, and other related places.

There is much support for crime pattern theory amongst empirical research (Groff & McCord, 2012; Hart & Miethe, 2014; Blair, Wilcox, & Eck 2017). Most crime occurs in areas with a high concentration of offenders (Hirschfield & Bowers, 1998), thus high crime areas. Criminals do not travel far from home to commit burglaries, thus areas that have higher concentrations of offenders will theoretically have higher burglary crime rates (Snook, 2004).

In environmental criminology, when examining the intersection of crime and place, environmental criminologists often categorize these abovementioned spaces as different types of criminogenic facilities. These facilities are commonly referred to in the literature as crime attractors or crime generators. Crime attractors are

places that are likely to either be targeted by offenders due to the suitable targets that are frequent at those places, or areas that are possibly hosting illegitimate activities (Brantingham & Brantingham, 1995; Bernasco & Block, 2011). Crime attractors do not necessarily have to attract large crowds of people, rather they attract specific people, for specific reasons, which leads to them becoming specific targets by offenders. Crime attractors are places, areas, or neighborhoods where criminal opportunities are known to exist (Brantingham & Brantingham, 1995). Examples of these can be drug markets, "red light" districts or prostitution areas, bar districts, or unsecured parking lots. As such, when an offender is successful in criminal activity at a crime attractor, this becomes part of their action space, they know that they can utilize this space for that type of crime. Attractors are fundamentally different from crime generators.

Crime generators are areas that have a higher amount of crime due to the ease of access to the public in addition to the legitimate activities that they host (Bowers, 2011). The motivation for the public to go to these areas is unrelated to any criminal motivation (Brantingham & Brantingham, 1995). Examples of these places can include hospitals, public transportation stations, sports stadiums, or colleges. Crime generators generate crime by creating a "perfect storm", a convergence of large concentrations of people in a certain place at certain times. Within these concentrations of people are potential offenders that have a sufficient level of underlying and even subconscious criminal motivation (being present at the generator allows for lucrative opportunities for them).

Crime attractors and crime generators differ in one main aspect—offender motivation. For crime attractors, these are areas that criminals actively exploit for criminal gain. For crime generators, these are areas in which criminal activity is created through the convergence of suitable targets and offenders in places that may afford a criminal opportunity that may trigger a subconscious crime script (a mental checklist of how an offender might commit a crime) of an offender (such as noticing a lucrative pick-pocket opportunity at a football stadium and taking advantage of this, even though they only came to watch the game).

Macro Theory and Hypothesized Relation to RMFs

Crime Pattern Theory allows for the basis to classify RMFs as crime attractors or crime generators and to separate certain facilities into theorized high and low traffic facilities due to the opportunity associated with these areas. In sum, RMFs that are exposed to more nearby offenders are far more suitable for criminal engagement, and these are likely to be in inner-city areas, next to high traffic activity nodes, pathways, and spaces. The table below depicts the relationship between macro level theories and risk heterogeneity at RMFs.

Table 2: Risk Heterogeneity at RMFs – Macro Level Theories

Theory	***Impact to Risk Heterogeneity of RMF***
Crime Pattern Theory	• RMFs are lucrative targets for criminals as they are often located along major pathways that draw many people to and from these facilities. • RMFs can be classified as a crime attractor due to the underlying motivation that offenders use to select these facilities as a target. • RMFs that are located in close proximity to high tourist traffic areas will have an increased risk of criminal opportunity.

Crime Pattern Theory and Routine Activities Relation to RMFs

While crime science provides a strong theoretical explanation for why crime may increase as a result of RMF operations, this research will have a strong focus on Routine Activity Theory and Crime Pattern Theory. Due to the limitations of data, this research is unable to establish the rationale behind offender motivation without interviews with the offenders. This makes it difficult to test and provide empirical support for theories that focus on offender perceptions and target selection. However, Routine Activity Theory and Crime Pattern Theory provide a more general focus on crime at and around places, which is what this research seeks to examine. While Routine Activity Theory and Crime Pattern Theory are related, they have differing explanations for the occurrence of crime. Routine Activity Theory explains the occurrence of crime through the convergence of three necessary circumstances: targets, motivated offenders, and a place (Eck & Weisburd, 1995). Crime Pattern Theory helps to explain the distribution of crime across places and does this by focusing on the Rational Choice and Routine Activities theories. Thus, Crime Pattern Theory asserts that crime patterns are made through the distribution of offenders, targets, handlers, guardians, and managers over time (Eck & Weisburd, 1995).

As stated, Routine Activities provides the basic equation for crime: motivated offenders, suitable targets, and a place. As such, Routine Activity Theory can be used to explain the theoretical increase of opportunity at RMFs. For target suitability, there are patrons of RMFs who are carrying cash (as RMFs are

generally cash only businesses) and leaving with an easily concealable and desired product (Freisthler, Ponicki, Gaidus, & Gruenewald, 2014). Motivated offenders are drawn to these facilities due to the opportunity structure that is associated with cash economies and desirable products. The places in which these crimes occur will be in proximity to the opportunity structure associated with recreational marijuana facilities. Furthermore, research has demonstrated that these facilities are likely to be operating in areas that are typically of less desirability (Kepple & Freisthler, 2012; Hughes, Schaible, & Jimmerson, 2020) which often lends to the creation of highly suitable targets in areas absent of effective and capable controllers. There is ample empirical support for the assertions of Routine Activity Theory (Clare, Garis, & Maxim, 2017; Eck & Weisburd, 1995; Eck, 1994; Felson, 1995; Bernasco & Nieuwbeerta, 2005; Bernasco & Luykx, 2003; Miethe & Hart, 2009; Donnelly, 2018). As Routine Activity Theory helps to explain the occurrence of crime at places absent certain characteristics (capable controllers, place managers, environmental design factors that prevent crime), Crime Pattern Theory helps to establish the importance of spatial relationships.

Crime Pattern Theory explains the distribution of offenders, targets, and capable controllers across time and space. Summarized, offenders and victims (targets) are networked in the spaces they travel most. Just as the person reading this has a defined awareness space of the places they frequent most and pathways they travel most, offenders do as well. It is within these awareness spaces that offenders will commit crime just as potential victims complete their daily activities.

Observing these occurrences in an aggregate manner helps to describe crime patterns as they are occurring across spaces.Crime Pattern Theory allows for a connection to be made on both the importance of location and RMF establishments themselves. The current study examines crime patterns around each RMF in the census of facilities gathered. Some of these facilities are located in close proximity to the resort corridor in the general study area. As mentioned in the introduction, tourists are often a target for motivated offenders due to the unfamiliarity of the area they are traveling, the valuables carried on their person (cash, jewelry, electronics, etc.), as well as the unwillingness to report crime which professional criminals may exploit (Glensor & Peak, 2004). Using Crime Pattern Theory, a reasonable assumption can be made that RMFs that have higher tourist populations as patrons will likely have higher crime opportunities for motivated offenders, making these facilities crime attractors. Furthermore, based on Crime Pattern Theory, these facilities are likely to be within the network and major pathways that tourists frequent most, which would be the Las Vegas Strip, Downtown Fremont, and the immediate surrounding area.

In sum, for Routine Activity Theory, this can help to explain the individual differences of crime at certain RMFs due to the behaviors of the patrons, offenders, and controllers who are present or not present at each RMF. Crime Pattern Theory can help to explain the differences in crime occurrences across geographic locations and comparisons to be made between facilities that fall within the tourist network and those that do not. Summarized, while all the theories within crime science can

help to explain the creation of suitable opportunities for offenders, without certain data, these assertions cannot be tested, therefore the current study utilizes a special focus on Routine Activity Theory and Crime Pattern Theory to help explain the crime patterns around RMFs within the Las Vegas area.

Empirical Support – Crime Patterning Around Facilities

Crime at Place

Criminologists and crime prevention practitioners have long examined the impact of specific places on crime. Plenty of research has supported the "Iron Law of Troublesome Places" (Wilcox & Eck, 2011) or the "Law of Crime Concentration" (Weisburd, 2015) which suggest that there are a small number of places that account for most crime, and these places are often certain types of facilities that sustain criminal opportunity (Sherman, Gartin, & Buerger, 1989: Weisburd, Groff, & Yang, 2012; Wilcox & Eck, 2011; Eck, Clarke, & Guerette 2007; Duru, 2010). In addition to the types of facilities, research has suggested that public use facilities that are present in high traffic pathways such as major public roads or highways are more vulnerable to criminal activity (Wright & Decker, 1997; Bowers, 2011; Wilcox & Eck, 2011). Furthermore, research has shown that between comparisons of high crime and low crime neighborhoods (Greenberg & Rohe, 1984; White, 1990) and studies of street segments (Frisbie et. al, 1977), high crime areas are associated with area accessibility– or the more people who frequent a place, the higher likelihood of crime events (Eck & Weisburd, 1995).

Past research has provided evidence that there are fluctuations in crime rates of micro areas depending on the type of facility and its impact on deviance, its impact on the block, and the ability to draw people to the area (Weisburd et al., 1994). Spelman (1992) found that there was a positive association between the presence of an abandoned residential home and burglary crime on the same block. Weisburd and Green (1994) found an association between higher calls for service for certain crime categories in areas that were identified as drug markets (demonstrating the relationship between crime and place type). Additionally, research has suggested that while relatively small amounts of crime occur at schools, industrial facilities, shopping centers, and taverns (where offenders congregate), crime increases more nearby and around them (Felson, 1987). Empirical research that has examined repeat victimization has also demonstrated that areas near dwellings that have experienced victimization are at an elevated risk (Farrell & Pease, 1995; Lammers, Menting, Ruiter, & Bernasco, 2015).

Policing Crime at Place

Place-based policing (hot-spot policing) of crime, which is mostly non-random in nature, often creates significant clustering in small geographic places – these are referred to as "hot-spots", which are responsible for half of all crime events (Sherman, Gartin, & Buerger, 1989). Hot-spots can exist within larger hot-spots, for example, if there is a problematic neighborhood or census block, by increasing magnification to a smaller unit of analysis such as street segments or address locations one might reveal more micro clustering of crime (Weisburd, Groff, & Yang,

2010). Sherman and Weisburd (1995) conducted the first large-scale experiment in hot-spot policing, they argued that one of the key failures of traditional policing was that it was dispersed across the entire beat and did not focus on the most problematic areas. Per the findings of this study, it is suggested that police should put more focus on the most problematic crime areas and less focus throughout the entire beat. These findings have been supported in many other hot-spot analyses examining the concentration of crime across space (Brantingham & Brantingham, 1999; Braga, Papachristos, & Hureau, 2010; Weisburd, Morris, & Groff, 2009; Weisburd, Groff, & Yang, 2012)

Place-based policing is based largely on its ability to promote crime control using law enforcement. It is supported by two main criminological perspectives: crime opportunity reduction and general deterrence. Increasing levels of guardianship is especially important when trying to reduce criminal opportunity (Cohen & Felson, 1979; Cornish & Clarke, 1986; Brantingham & Brantingham, 1984). Nagin (2013) described hot-spot policing as a way of making police "sentinels" in their patrol and surveillance activities to increase guardianship. While deterrence theory is a difficult one to prove and validate, the assertion behind it relies on the assumption that most individuals are rational thinkers and potential offenders will calculate the risk v. reward of committing their offense. For general deterrence, it is also important to note that punishment avoidance can do as much to encourage crime as punishment does to prevent it (Stafford &Warr, 1993). Increasing guardianship through police presence may aid in trying to minimize

punishment avoidance, which could lead to an increase in general deterrence and a decrease in crime. By increasing the magnitude of certainty, swiftness, and severity of sanctions associated with criminal acts, general deterrence can be achieved in which potential offenders will be dissuaded from committing a crime (Apel & Nagin, 2011). A study in Kansas City, MO reduced gun crimes in one area by 50% in six months through hot-spot policing (Research Forum, 1995). This was done by increasing patrol teams to combat illegal firearms within a certain neighborhood. Through computer analysis, they identified an 80-block neighborhood that was assigned one patrol vehicle traditionally, this area had a homicide rate 20 times higher than the national average. There was an increase of about 1,200 patrol hours added to this area, which was dedicated to the proactive enforcement, detection, and apprehension of illegal firearms. Within the area, there was a significant drop in gun crimes (49%). Hot-spot policing is especially effective in cases of increased dosage of police activity; a study by Wiesburd, Braga, Groff, and Wooditch (2017) found that when half of a patrol force is devoted to hot-spot policing, robberies declined by more than 10 percent. The same study also demonstrated that hot-spot policing strategies have effects on crime at larger units of analysis, such as the larger urban areas where hotspots exist. It is important to note that hot-spot policing may not provide a lasting impact on persistent crime problems. Most studies show that this type of policing is modest and effective at reducing crime problems but only for a certain duration of time with limited benefits (Sherman, Rogan, Edwards, & Whipple, 1995; Kelling & Sousa, 2001).

Defining "Near"

As empirical evidence has demonstrated that crime is likely to increase around certain places (Felson, 1987: Roman, 2005: Roncek, 2000), it is important to define the extent of "near". A study involving crime around bars has shown that crime is likely to increase within two blocks of these facilities (Groff, 2011). It can be argued that bars are of a similar nature as RMFs because people frequent these facilities for pleasure and consumption of substances (it is noted that RMFs do not allow for the consumption of marijuana on the premises, these would be recreational marijuana lounges, a direction for future research).

The research suggests that by creating spatial boundaries that represent two to three city blocks yields the best results in measuring crime around bars (Groff, 2011). The block distances were compared to general quarter-mile increments. Findings suggested that street blocks were the best option that captured the best data due to the micro explanations of crime and movement around the facilities. Groff (2011) established that 122-meter bands (1 city block in Seattle) were the best geographical buffer to use out of the 18 separate distances tested in the study jurisdiction. Furthermore, the evidence suggests that the buffers should be created around the street networks that allow access to and from the facility, as opposed to Euclidean distance which generates a buffer around the facility that neglects street patterns (usually accounts for non-functional and non-frequently used areas).

Crime and RMFs

The question of whether RMFs are criminogenic has concerned police practitioners, academics, the public, and policy makers alike. Research questions regarding violent/overall crime increases, calls for service increases, or disorder increases have been examined to determine these facilities' criminogenic characteristics. However, a clear answer to whether RMFs contribute to crime increases cannot be ascertained from these studies. There is a body of literature that suggests that the dispensing of medical and recreational marijuana provides a decrease in crime in the areas around the facilities (Brinkman & Mok-Lamme, 2017; Chang & Jacobson, 2017). When examining calls for service (CFS) in areas where dispensaries exist, a study conducted by Makin, et al. (2021) found that there was an increase in CFS in one of their two city study sample. A study done in Sacramento, California found that the prevalence of marijuana dispensaries within a census tract is not correlated with property and violent crime rates (based on a small sample in the early days of marijuana legalization) (Kepple & Freisthler, 2012).

On the contrary, other empirical evidence exists to suggest that there is indeed an increase in crime around RMFs. One study discovered that higher dispensary density is positively correlated with increases in property and violent crimes in nearby census blocks in Long Beach, California (Friesthler et al., 2016). Additional research has shown that recreational marijuana dispensaries provided a criminogenic increase spatially, whereas medical marijuana dispensaries did not demonstrate a significant impact on crime, which provides a theoretical justification

for the fundamental difference between recreational dispensaries and those for medical needs only (Connealy, Piza, & Hatton, 2020). Connealy, et al. (2020) demonstrated empirically that disorder crimes increased by 17% and drug crimes increased by 28% on streets adjacent to recreational dispensaries while Hughes and colleagues (2020) found that neighborhoods that had one or more recreational marijuana facilities had crime rates that were between 26% and 1,452% (average within unit increase for drug and alcohol offenses) higher than neighborhoods without any retail marijuana activity. Furthermore, findings generated from a study out of a city with well-established marijuana dispensing processes (Denver) have shown that dispensary types were associated with significant increases in disorder and crime (Hughes et al., 2019). Although the observed positive relationship between marijuana dispensaries and crime was relatively weak it is in contradiction to prior research showing that there was no effect on crime at larger units of observation (Hughes et al., 2019).

While there is a mix of findings surrounding the topic, the consensus observed is that recreational marijuana facilities *can* provide an increase in crime and disorder. It is important to note that the findings can be impacted by several key factors, such as the type of analysis being employed, the unit of observation, the aggregation of data, and policing practices at and around these facilities. Thus, there is an inclination to study crime increases at units of analysis that are smaller than the census block (i.e., city block) level to capture the smaller micro-level

spatial processes across space (Bernasco & Block, 2011; Hughes, Schaible, & Jimmerson, 2020).

Justification for Current Study

As mentioned in the section immediately above, a clear answer on whether RMFs provide for increases in crime cannot be ascertained. Some studies employed units of analysis in their studies that would not properly measure crime opportunity that can be solely attributed to marijuana facilities. The importance of using crime science theories to understand crime opportunity at the more micro level of analysis cannot be overstated. Theory asserts that crime opportunities are highly specific and dependent on environmental factors that change from place to place that will influence the likelihood of offending (Clarke, 1999; Cohen & Felson, 1979; Brantingham & Brantingham, 1993; Cornish & Clarke, 1986). Thus, this current study will use this theoretical basis to examine crime opportunities that exist at a smaller unit of analysis - the city blocks surrounding RMFs. This will provide better insight into the opportunity structure that exists in close proximity to the places that are the unit of analysis, RMFs.

Chapter 3 - Methods

General Research Design

This exploratory study employed a pre/post design from 2015-2019. The pretest period is 2015 and 2016, as recreational marijuana was legal for consumption and sale as of July 2017 in Nevada – 2017 was removed from the analysis to be safe and allow for the staggered opening of facilities in the census. The post-test period is 2018 and 2019. To avoid the impact of a historical effect, 2020 and 2021 were not selected as part of this study due to the COVID-19 pandemic and its impact on local travel, spending, and consumption patterns. This exploratory research seeks to identify whether crime patterns changed around these facilities after it was legalized for recreational purposes.

This research used a census of all RMFs that meet 3 qualifications: (1) facilities selling marijuana for adult use in Clark County in 2018, (2) that fall within the general study area, and (3) that fall within the Las Vegas Metropolitan Police Department's regular jurisdiction. Using a census helped to eliminate guesswork and reduce sampling bias that may be associated with a sampling process. In addition, it allowed for a better analysis of the "whole picture" and eliminated the risk of non-examination of a unique facility or case. Several research questions were addressed through this study which are listed in the table (Table 3) below.

Table 3: Research Questions

	Research Questions
1	Have crime patterns (property, violent, and disorder) changed within the defined geographical buffer around recreational marijuana facilities post-legalization?
2	Have enforcement patterns (vehicle and foot stops) of police changed within the defined geographical buffers around recreational marijuana facilities post-legalization?
3	How does the crime concentration within the set geographical buffers change over time (location quotient)?
4	Are there any differences in crime patterns between "tourist/resort corridor" and "non-tourist" RMFs"?

To answer the above stated research questions, ArcGIS was used as the main analytical and visual tool for this study. RMFs authorized to sell recreational marijuana in 2018 were plotted on a base map within ArcGIS. Geographic street network buffers were created around each RMF. A street network buffer is a buffer that is generated through a spatial boundary that examines the functional access to a facility (the streets associated with travel to and from a facility). This process was done in a similar fashion as a study that examined crime around bars (Groff, 2011).

Street distance buffers in ArcGIS were generated by defining two threshold distances of 144 meters and 288 meters (the average city block in the USA is 98 meters, so 1.5 city blocks to 3 respectively). Street distance buffers were selected due to: (1) street distance buffers are more useful than Euclidean buffers for identifying the portion of surrounding areas that may be functionally related to specific places and (2) most crime is associated with physical streets and the areas adjacent to streets, a buffer that utilizes the street network incorporates the area's most likely for a crime to occur while excluding less likely ones (Groff, 2011, p. 171). The distances of 144 meters and 288 meters were selected because: (1) when examining crime in its relation to a specific facility, smaller buffers should be

selected as these are theoretically based to explain crime incidents in relation to the proximity of the facility, (2) RMFs were not coded to the street centerline, so there were distance differences depending on where the facility was (off of a major roadway or located in a shopping center or business complex), (3) other studies have demonstrated that areas closest to a facility experience the highest crime increase and a distance decay effect is observed after two or three city blocks are examined (Groff, 2011).

The first research question was addressed through the following process. Once street network buffers are created and calculated for the RMFs in the sample, a spatial join was conducted to examine the (1) property crimes, (2) violent/predatory crimes, and (3) disorder-related crimes that fall within the street network buffers. Analysis and geo-visualization allowed for the comparison between the pre-test and post-test time periods to measure the differences between two periods where recreational marijuana had different legal classifications in the general study area.

The second research question was answered by examining the enforcement patterns of the LVMPD within the geographical boundary of each RMF within the sample. Enforcement patterns were assessed by using two different 400 codes for traffic stops and persons stopped on foot. Comparisons were made between the pre-test and post-test periods.

Location Quotients (LQ) were calculated for each individual RMF street network buffer to address the third question. The LQ is a common spatial statistic

used in conjunction with buffers (Groff, 2011; Brantingham & Brantingham, 1998). The LQ allows for a measure of how crime is concentrated within a defined buffer. This is beneficial in comparing the statistical crime concentrations near RMFs across the time periods being studied. LQ help to provide a relative measure of crime at place. LQs can also be helpful in establishing what attracts offenders to certain locations, helping to define crime attractors in a more empirical sense (Brantingham & Brantingham, 1998). According to the Brantinghams (1998), any value over 1 indicates a percentage increase in whatever variable that is being examined, so 1.2 would indicate a 20% increase of variable density within that area compared to the more macro comparison group.

The fourth research question was answered by examining crime patterns that exist at select RMFs that fall within the operationalization of tourist facilities located nearby the resort corridor which was compared to crime patterns that exist at facilities that are designated as local facilities. Differences were compared for crime patterns, enforcement patterns, and LQs between the pre and post time periods.

Census Description

Recreational Marijuana Facility Census Data

The data for the sample was gathered from the Nevada Department of Taxation. In Nevada, the legislature determined that taxes from the sale of recreational marijuana would be used to help benefit the public school system. Thus, the list provided from the Nevada Department of Taxation was the best

option to examine the facilities that were legally authorized to sell and distribute recreational marijuana and marijuana related goods to the public as of July 2017.

In order to ensure the best possible census, 2017 was not a year of analysis as there may have been different opening dates for different facilities. Attempts to gather the opening date of each facility were unsuccessful as the Nevada Cannabis Compliance Board was created in 2020 and does not have adequate records prior to its inception. Attempts were made to contact the Nevada Business Licensing Office to find a list of opening and closing dates, however, a representative responded and stated this was not within their jurisdiction. Online databases detailing the opening of small businesses were not reliable as there were many opening dates missing from the listings. Upon calling many facilities, staff and management had changed over the years or were operating under new management, making it difficult to determine the opening dates for the facilities. To address this, the list of facilities that were opening and selling adult marijuana in 2018 was compared to the Nevada Cannabis Compliance Board's list of active licenses in the general study area as of 2022. The assumption is then made that the facilities were up and running in 2018 and have remained designated marijuana facilities until the time of writing this current study. Facilities that fall outside the enforcement area boundary for the Las Vegas Metropolitan Police Department (LVMPD) were also dropped from the sample (i.e., Henderson area).

Thus, a total of 34 RMFs were used in this study out of the 47 originally on the list. These 34 facilities fall within the boundaries of regular LVMPD

enforcement, thus, the CFS data around these facilities was the most reliable for the study. The table below represents the final census distribution.

Table 4: Sample Qualifications

NUMBER OF FACILITIES	SPECIFIC AREA	KEPT OR REMOVED	REASON
5	Henderson	Removed	Outside of Regular LVMPD Enforcement
4	North Las Vegas	Removed	Outside of Regular LVMPD Enforcement
2	Las Vegas	Removed	Permanently Closed
1	Mesquite	Removed	Outside of Study Area
1	Laughlin	Removed	Outside of Study Area
34	Las Vegas	Kept	Fall within study region and regular enforcement area of LVMPD

Data Sources

The crime data that was used for this study is calls for service (CFS) data from the Las Vegas Metropolitan Police Department from 2015-2019. The data that was used for the street network analysis was street segment data generated by the Clark County GIS Management Office (GISMO). The data for the sample for RMFs was provided through the Nevada Department of Taxation and Cannabis Compliance Board of Nevada. Descriptions related to each data source are described below.

Calls For Service Data

CFS data have received notable attention from scholars regarding the degree of measurement validity that they provide. For a CFS to be responded to, it must be entered into the CAD system. In order to enter a CFS into the CAD system a 9-11 dispatcher must classify the CFS so that patrol officers may respond to it. This is where the attention is drawn to measurement validity. Most agencies require supplemental information to the original CFS in order to "clear" the call (this is typically done when the officer arrives on scene and assesses the situation in order to classify it more effectively).

Due to the vague nature of some codes (unknown trouble, suspicious circumstances, etc.), this presents some issues for police operations as well as researchers. For police operations, ambiguity can lead to the misclassification of some calls which could, in turn, impact officer response to specific scenarios (receiving a CFS about someone with a weapon, only to arrive and find that this was false, but the officers are more likely to use force upon arrival). In addition, as most large jurisdictions have a dispatch department with multiple dispatchers, there can be differences in training and how each dispatcher handles and classifies calls. From a researcher's perspective, this obscurity can lead to a misunderstanding of police functions and the public's demand for police services, as well as incorrect analysis of specific criminal hotspots. A recent research study has examined the measurement error for CFS which helps to provide insight into the reliability of CFS data (Simpson & Orosco, 2021).

Simpson and Orosco (2021) examine the differences among call types, cleared call types, and crime types documented in just over half a million CFS. In their research, while they did find some evidence of measurement error, they concluded that 85% of CFS accurately represented the nature of the original CFS. Stated plainly, 85% of the incidents were cleared under the same category that the dispatcher used to generate the CAD response.

This has important implications for this study as CFS data is the foundation for the exploratory analysis. CFS data was chosen due to the ease of access that LVMPD allows with this type of data, the policies which guide the structure of the data (address, time, day, crime type, correction for multiple calls), and the full range of years available for the temporal range of the study. After speaking with LVMPD management in regard to the data, they provided insight into the processes that help to make this data a viable option for this study. According to LVMPD, dispatchers generate CFS into the CAD and officers who arrive on scene are trained to clear the call in a uniform fashion, which LVMPD claimed that "most do". In addition, with empirical evidence suggesting that CFS do accurately reflect the nature of public requests, there is a certain degree of confidence that can be applied to the findings generated from this study that help to "paint a picture" of crime around RMFs.

Street Segment Data

The data for street segments was gathered from Clark County GISMO. The County is the legal authority for the roadways in the general study area. Street

segment data was essential for this study as crimes were plotted on the street networks surrounding RMF. Thus, it was important that the data for street segments was gathered from the official sources that have authority over the roadways. Thus, due to the accessibility, good quality, and official status of the data, this was the best option for the street segments.

Conceptualization and Operationalization of Group Variables

The following section will detail the differences between facilities that are likely to draw large volumes of tourists as opposed to those that generally cater to residents of the general study area. Given the research on crimes against tourists, there is a theoretical assumption that crime around these facilities is likely to be greater. Thus, it is important to establish two different groups for statistical comparisons.

Tourist Facilities Nearby Resort Corridor

In order to establish the groups for the analysis a distinction was made between RMFs that are near the resort corridor and those that are not. While there is plenty of research regarding the distance that tourists will travel to reach their destination, there is a lack of research on how far tourists are willing to travel once they are at their destination. For the purposes of this study, the area immediately located around Las Vegas Boulevard (AKA – "The Strip" - the main tourist attraction in Las Vegas) from the Mandalay Bay to the Strat (formerly the Stratosphere) was conceptualized as the resort corridor as well as the surrounding

area of Downtown Fremont – another high-volume tourist destination in Las Vegas. These areas generate the largest volume of visitors per year.

Much in line with the principle of least effort that we observe with how far criminals are willing to go to commit crime, there is research regarding how far general consumers are willing to travel to their routine activities. Thus, there is an inclination to use travel time instead of distance traveled. For example, traveling a mile in New York is vastly different than traveling a mile in Las Vegas. Considering urban traffic patterns, proximity to retail and entertainment venues, and other factors related to these, travel time is a more universal metric as it allows for a fair comparison across urban areas.

Research based on consumer habits demonstrates that urban consumers are predisposed to travel within a 15-minute time frame to make their everyday purchases. Additionally, a consumer survey through Access Developmenent (2017) demonstrates that proximity is often the central factor in decisions to patronize a certain establishment. In the breakdown of survey results consumers reported different travel times for different categories of travel-related activities, as demonstrated in the table below (table 5).

Table 5: Travel Time by Purchase Type

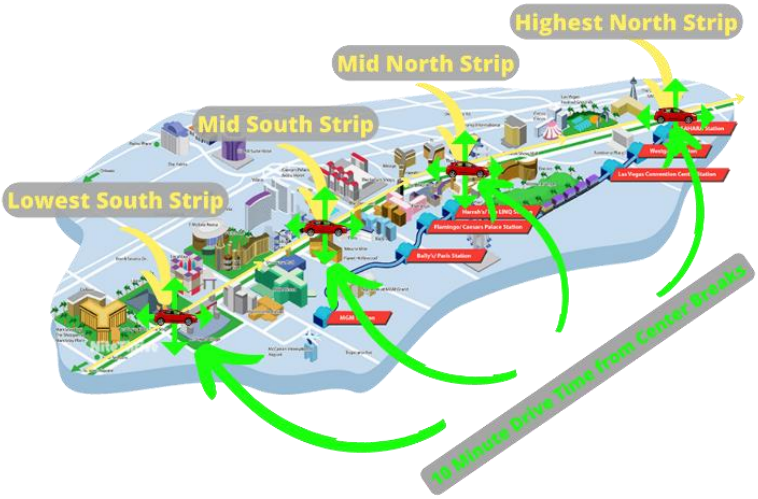
Purchase Category	*Avg. Minutes from Home*
Fuel	6.01
Groceries	8.03
Fast Food	8.40
Gym	9.31
Casual Dining	11.45
Oil Changes	13.14
Hair Cuts	13.37
Home & Garden	14.07
Auto Services	14.17
Movies	17.04
Clothing	19.84

As demonstrated by general consumer patterns and what is known about distance decay and offending (most criminals do not travel far from home to commit offenses), a safe assumption can be made that tourists would likely like to stay close to their temporary vacation residence. Furthermore, given the unique nature of Las Vegas, the tourist corridor is designed to keep tourists within this corridor by providing them with access to everything they need within walking distance.

Thus, it was safe to assume that tourists would generally like to stay close to the Las Vegas Blvd or Downtown Fremont (in relatively close proximity to one another). As tourists stay in many different hotels along the Strip, to operationalize the facilities that are closest to the largest volume of visitors, the Strip was broken into 4 separate 1-mile breaks. These breaks will represent (1) Lowest South Strip (near Mandalay Bay), (2) Middle South Strip, (3) Middle North Strip, and (4) Highest North Strip (Near the Strat). A drive time of 10-minutes was generated from the center point of each break as well as the center of the Downtown Experience on Fremont Street. It is important to note that an operationalization like what was done for Las Vegas Boulevard was not required for Freemont Street.

Since the Downtown Fremont Experience is a walkway, no traffic is allowed on the Experience, which is different from the Las Vegas Strip. In addition, there was only one facility that fell within a 10-minute drive time of the Fremont Experience. Thus, any facility that fell within the 10-minute drive-time from the center of the breaks, was counted as a tourist facility. If a facility fell on the border of being close to within a 10-minute drive time, an examination of any close-by facilities was made. If an RMF existed relatively close to one of these facilities and existed within the 10-minute drive time (through the use of google-maps drive time calculations), the facility on the border was excluded through a judgment call on behalf of the researcher. Splitting the Strip into four different breaks accounts for visitors who stay in different hotels, which may represent different drive times to and from certain geographical locations. The figure below demonstrates the conceptualization of this process.

Figure 2: Operationalization of Tourist Facilities



(Diagram does not depict direct measurements. Diagram modified from Las Vegas Visitor's Guide)

After generating the drive times from the center points within the four breaks, a total of 13 facilities were designated as tourist facilities. These facilities are located on and around the Las Vegas Strip and Downtown Fremont and arguably provide the easiest access for tourists who are staying in the resort corridor.

Non-Tourist or Local RMFs

Local RMFs were conceptualized as the facilities that are likely to be frequented by the local population of residents throughout the general study area. These facilities exist throughout the valley and are mainly zoned within commercial and industrial zoning areas. These facilities may be located near smaller hotels or motels but would still be classified as Local RMFs due to the relative number of tourists who will visit these locations compared to those nearby the Las Vegas

Strip. For the operationalization of these facilities, they were the remaining 21 facilities (remaining RMFs in the census excluding the tourist facilities). Due to research regarding crimes against tourists, there is likely to be a difference between crime patterns within the two groups.

Conceptualization and Operationalization of Crime and Enforcement Levels

The following section details the conceptualization of the variables that were used for the study. Crime and police enforcement were conceptualized and then operationalized to count the CFS or police-initiated stops that fell within a three-block buffer (288 feet) of each individual RMF within the sample. The following sections detail each variable's conceptualization and operationalization. It is important to note that this study utilized the same operationalization of 400 codes that the local policing agency uses, these operationalizations include "alarm"[1] codes.

Property Crimes

Property crimes were conceptualized as crimes in which a victim's property is stolen or damaged, usually without threat to the victim. To operationalize property crimes, this study used LVMPD's 400 codes which classify property crime in the calls for service data. The following table (Table 6) demonstrates how property crime is operationalized for this study.

[1] Research demonstrates that most alarm calls are typically "false alarms". Upon examination of the data, there were only a handful of these calls (less than 1%). This is likely due to the reclassification of CFS data by officers in the field once arriving on scene (responds to a burglary call, arrives on scene and enters it as an actually burglary).

Table 6: Property Crime Operationalization

CODE	DESCRIPTION
406	Burglary
406A	Burglary Alarm
406V	Auto Burglary
411	Stolen Vehicles
411B	Stolen Bait Car
414	Grand Larceny
414A	Petit Larceny
414C	Larceny from Person

Violent Crime

Violent crimes were conceptualized as crimes in which an offender uses (or threatens to use) violent force against the victim in the commission of some part of the act. To operationalize violent crime, LVMPD's 400 codes were used which classify violent crime in the calls for service throughout the general study area. It is important to note that the code 420 which LVMPD uses for "homicides" is not included in the data, due to clearance issues associated with this crime and the notion that most CFS will not come in as a homicide. The following table (Table 7) describes how violent crime is operationalized for this study.

Table 7: Violent Crime Operationalization

CODE	DESCRIPTION
407	Robbery
407A	Robbery Alarm
413	Person with a Gun
413A	Person with a Knife
413B	Person with Other Deadly Weapon
415	Assault / Battery
426	Sexual Assault
434	Illegal Shooting

Disorder

Disorder crimes are often most associated with Broken Windows Hypothesis (Wilson & Kelling, 1983). Conceptually, disorder was classified as more minor offenses (i.e., public intoxication, juvenile crimes, prostitution, and suspicious persons) that if left untreated, will lead to more serious crime or the creation of hotspots. LVMPD uses an internal measure to classify crimes into their disorder aggregation. To operationalize disorder, this study used the same classifications that LVMPD uses in order to align closely with the local measure. In addition, some traditional crimes often categorized as disorder (i.e., prostitution/solicitation) are absent from the 400 codes that LVMPD uses to classify and respond to crimes. The following table (Table 8) depicts the operationalization of disorder crime for this study.

Table 8: Disorder Crime Operationalization

CODE	DESCRIPTION
408	Drunk
410	Reckless Driver
416	Fight
416A	Juvenile Fight
416B	Other Disturbance
425	Suspicious Situation
425A	Suspicious Person
425B	Suspicious Vehicle
440	Wanted Suspects
441	Malicious Destruction of Property
446	Narcotics

Enforcement Levels

Enforcement levels were conceptualized as the police activity that will fall within the three-block geographical boundaries around the RMFs. LVMPD uses two codes in their CAD system which document every time an officer engages in a traffic stop or stops an individual who is traveling on foot. These measures are typically used to measure the "pro-active" levels of police enforcement within an area. The table below (Table 9) details the operationalization of enforcement levels.

Table 9: Police Enforcement Operationalization

CODE	DESCRIPTION
467	Vehicle Stop
468	Person on Foot

Chapter 4 - Analysis and Findings

Analytic Strategy

The analytic strategy is broken down into six steps. These steps help to answer the research questions defined for this current study. The steps are geocoding, creation of buffers, creation of comparison area, conducting spatial joins, observing patterns and concentrations, and comparisons across groups.

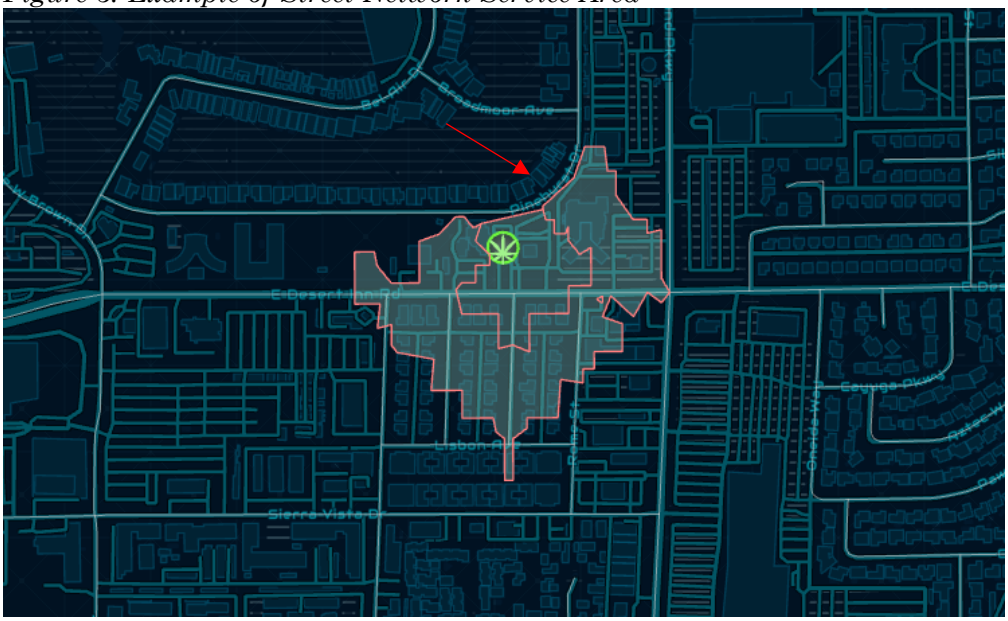
The first step of the analytic strategy is geocoding. The process of geocoding the RMFs in the census, CFS, and enforcement data was done through ArcGIS Pro. Geocoding data is the process of assigning each data point to a geographical location on the map. Regarding the spatial reference, the following coordinate system was used to geocode all data points: "NAD_1983_StatePlane_Nevada_East_FIPS_2701_Feet". This coordinate system was used because LVMPD regularly used this system for earlier data, 2018 and 2019 data had to be changed to the NAD_1983 system using the project tool in ArcGIS Pro. Through geocoding, crime data, enforcement data, and facilities were plotted onto a base map which helps to geo-visualize and conduct the spatial analyses necessary to answer the research questions in the current study.

It is important to note that the enforcement data provided by LVMPD is not as "clean" as these are officer-initiated stops with data entered by individual officers. Thus, missing, and incorrect addresses are common for these codes. Additionally, and especially for vehicle stops, data points that had an intersection as the address were left out of the analysis. This is consistent across all of the years

within the current study, where 60-70% of vehicle stops were able to be plotted on the map for analysis. This was not a problem with the crime data, in which 90+% was able to be mapped with ArcGIS. Thus, only data points that had a completed address were used in this analysis. Attempts to repair missing addresses or incomplete addresses were not made as to not make any incorrect assumptions that may place false points within the buffers.

The second step of the analytical process was to generate the buffers needed for the pattern and concentration analysis. As mentioned, street network buffers were used as they best represent the functional area around each facility which also allows for a strong theoretical connection to pathways and streets where crime is likely to occur (Groff, 2011). Street network buffers were created through the generate service areas function within ArcGIS Pro. This function allowed for the input of each RMF and the ability to set "break values" around the facilities. These break values represent the defined distances of the current study, 0-144 and 144-288 meters. The following graphic demonstrates the service area created around a RMF.

Figure 3: Example of Street Network Service Area



As can be seen in the above graphic, the street of "Pinehurst Dr." (red arrow in Figure 3) is not included in the service area. This is because that street does not have functional access to the facility within 288 meters of walking distance. This is a strength of street network buffers over Euclidean buffers (general circle with the facility at the center). If using a Euclidean buffer, "Pinehurst Dr." would likely fall within the service area despite it not being a pathway associated with the specific RMF being examined. This can lead to incorrect associations of crimes that may or may not be attributed to each facility.

The third step was to create a comparison area in which crime patterns were examined in order to provide a base comparison that will help to better contextualize and explain the significance of findings within the buffers around RMFs. Given the data provided, LVMPD has several areas that they respond to

outside of their main enforcement areas (these are smaller jurisdictions or responses to different cities outside of the general study area). So, in order to create the best possible comparison area, ArcGIS was used to create a polygon over the general study area. This decision was made for several reasons: (1) to have a comparison area that is most in line with the local policing agency's major enforcement area, (2) to have a comparison area that reflects the square meters that can be used in the denominator of the location quotient analysis, and (3) to be able to calculate the spatial join of all crime and enforcement variables that fell within the general study area.

In order to create the general study area, a polygon feature was created and overlayed over the disorder crime variable (most cases and most equal spread throughout the jurisdiction). This process can be seen in the following figures:

Figure 4: Creation of General Area Polygon (1)

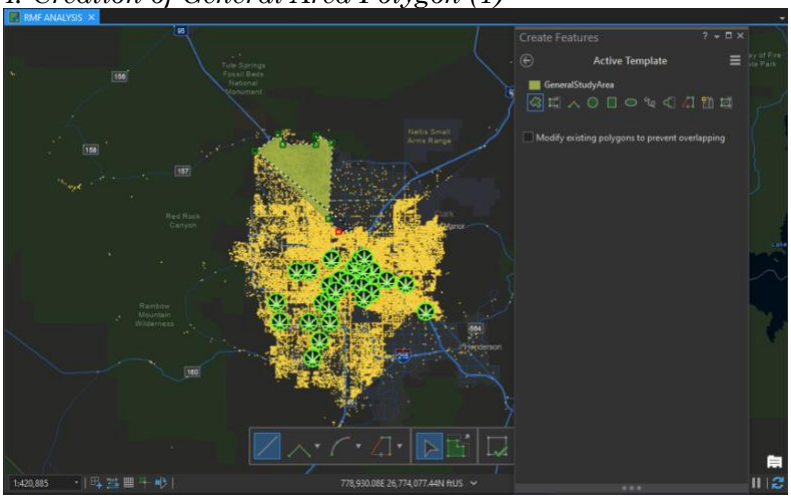
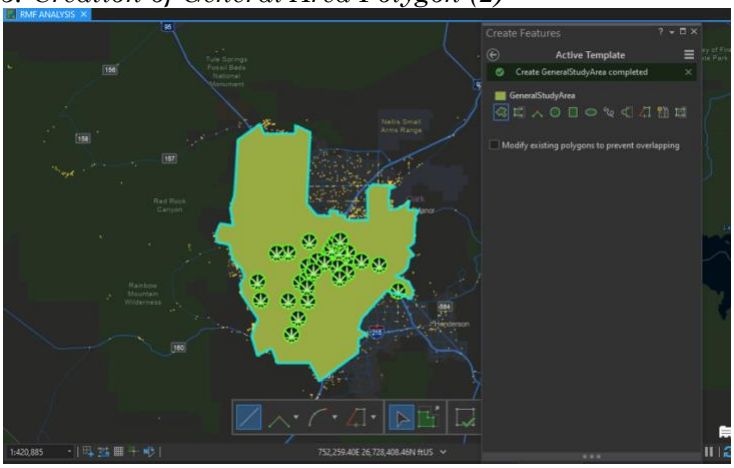
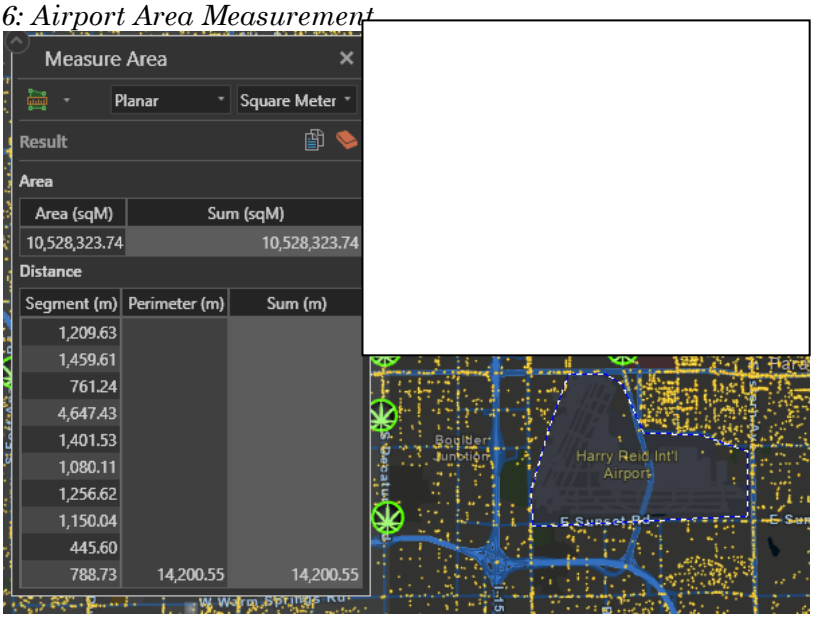


Figure 5: Creation of General Area Polygon (2)



As can be seen in the above figures, the general study area encompasses most of the space and crime and enforcement events within LVMPDs jurisdiction. It can also be seen that some crimes are occurring outside the general study area polygon, this is acceptable as these will not be counted in any analyses moving forward. For the comparison area, only the events that had complete addresses and x & y coordinates that were successfully mapped were counted in any analysis. To allow for a better comparison area when it comes to calculating location quotients, the area from the airport and RMFs was removed from the total area of the general study polygon, this was done by measuring the SqM of the airport and RMFs and subtracting them from the total SqM of the general study area. This process used to measure the airport can be seen in the below figure.

Figure 6: Airport Area Measurement



The fourth step of the analysis was to conduct a spatial join. This was done through the spatial join function within ArcGIS Pro. A spatial join is where features from one layer's attribute table (data) are joined to another layer. For example, for the current study, spatial joins were conducted for each facility's service area and the crime type and year (i.e., property crime 2015 joined to service areas). Doing this allows for the examination of the crimes and enforcement events that fall within each service area. It allows for tables such as the one depicted below to be created which display the variables that fall within the defined service area. Spatial joins were also conducted to gather total crime frequencies in disorder, violent, and property types across the general study area.

Figure 7: 2019 Violent Crime Spatial Join Results

2019 Violent Crimes	
Row Labels	Sum of Join_Count
[redacted]	8
[redacted]	26
Location 1 : 0 - 144	11
Location 1 : 144 - 288	15
[redacted]	35
Location 3 : 0 - 144	8
Location 3 : 144 - 288	27
[redacted]	6
Location 4 : 0 - 144	4
Location 4 : 144 - 288	2
[redacted]	25
Location 8 : 0 - 144	8
Location 8 : 144 - 288	17

The fifth step of the analysis was to examine the patterns and concentrations of crime across the years in the current study. Tables were created for each year and crime/enforcement category. Frequencies of the crimes and enforcements that fall within the defined geographic street networks were calculated and compared from the pre-test period to the post-test period. Patterns were examined over time to see if crime and/or enforcement increased or decreased in general around the facility. As this process was done for each crime type aggregate, the findings demonstrate changes in patterns for each crime type (disorder, violent, and property crime) and enforcement activity. Concentration and crime density was measured through the use of location quotients (LQs). LQs were calculated for each service area, which was done in two steps. The first step involves taking the total number of crimes within the buffer and dividing it by the total area of the buffer. The second step involves dividing the final calculation in the first step by the total of crimes

within the general study area which is divided by the total area of the general study area. This establishes a comparison of crime within the buffers compared to that of the general city (Groff, 2011; Brantingham & Brantingham, 1998).

The final step of the analytic process was to compare the findings from the tourist facilities group to those of the local facilities group. This was assessed by calculating the percentage differences in crime patterns, crime concentration, and police enforcement of each group. The reason for this is to assess if there are any notable differences between the facilities within the tourist network compared to those that are mainly frequented by residents of the general study area. This step in the analysis allowed for an answer to the last research question to be ascertained.

Findings

Research Question 1: Crime Patterns

To address the first research question crime pattern analyses were conducted during the pre-period (2015-2016) and post-period (2018-2019). ArcGIS provided the analytical tools to examine the crime that occurred within the 2 city-block street network buffers. Additionally, findings from the incidents occurring inside the buffers were compared to the general study area (by calculating the percent difference between pre and post periods in the general study area). The following section details the findings of the analyses for property, violent, and disorder crime around RMFs in the general study area.

Property Crime Findings

After examining the property crime around RMFs in the general study area, the analysis revealed that an average difference in the property crime between the two time periods was a decrease of 15%. While there were drastic increases in some RMFs (ID#: 7, 21, and 23) most properties experienced a decrease in property crimes. Compared to the 11% decrease in general, property crimes within the buffers decreased by 15%. A t-test of the overall property crime patterns revealed that this finding was not statistically significant at the 95% confidence interval.

Table 10: Property Crime Patterns

	PROPERTY PATTERNS				
Facility ID #	2015	2016	2018	2019	% Change Pre/Post
1	8	32	12	13	-38%
2	27	19	24	27	11%
3	31	53	29	36	-23%
4	11	15	16	8	-8%
5	17	21	31	19	32%
6	0	0	1	1	200%
7	57	57	81	178	127%
8	38	49	27	46	-16%
9	56	47	39	37	-26%
10	18	18	23	11	-6%
11	185	201	100	108	-46%
12	7	29	9	7	-56%
13	124	154	209	76	3%
14	94	42	51	32	-39%
15	37	47	54	95	77%
16	5	3	3	0	-63%
17	28	25	29	31	13%
18	90	33	51	10	-50%
19	23	26	14	19	-33%
20	62	89	85	53	-9%
21	11	7	14	16	67%
22	117	69	129	76	10%
23	1	1	3	9	500%
24	15	23	12	12	-37%
25	0	0	0	0	0%
26	73	57	98	71	30%
27	461	350	208	200	-50%
28	18	27	41	13	20%
29	62	53	70	46	1%
30	37	43	58	45	29%

31	14	17	13	13	-16%
32	4	6	6	5	10%
33	0	6	2	2	-33%
34	4	2	4	0	-33%
TOTALS	1735	1621	1546	1315	**-15%**

Table 11: Property Crime Change Vs. General Study Area

Area	**Percent Change**
RMF Buffer- Property	-15%
General Study Area	-11%

Violent Crime Findings

Analysis of violent crimes within the buffers demonstrated that there was a 13% increase in the post-period. The range between the percent changes is a decrease in 50% (ID 12) to an increase of around 400% (IDs 7 & 32) – detailed in the tables below. Compared to the general study area, while the general study area had an increase of 10% in violent crime, the areas within defined buffers experienced a 13% increase. Statistical testing between the means of the two periods revealed that the violent crime change was not statistically significant at the 95% confidence level.

Table 12: Violent Crime Patterns

VIOLENCE PATTERNS					
Facility ID #	2015	2016	2018	2019	% Change Pre/Post
1	6	9	14	13	80%
2	16	22	13	26	3%
3	30	35	48	36	29%
4	4	6	5	6	10%
5	17	23	27	23	25%
6	0	0	0	0	0%
7	9	19	41	92	375%
8	43	41	45	33	-7%
9	38	22	33	13	-23%
10	5	9	17	7	71%
11	79	81	36	56	-43%
12	4	16	3	7	-50%
13	51	105	105	78	17%
14	22	22	20	13	-25%
15	58	54	57	60	4%
16	1	1	4	2	200%
17	27	32	34	28	5%
18	11	9	20	3	15%
19	8	12	18	10	40%
20	86	68	122	98	43%
21	3	10	16	9	92%
22	22	22	51	37	100%
23	1	12	17	3	54%
24	8	10	16	13	61%
25	0	0	0	0	0%
26	34	38	38	37	4%
27	71	106	73	46	-33%
28	10	10	12	7	-5%
29	20	14	18	15	-3%
30	49	56	52	63	10%
31	19	12	16	16	3%
32	0	0	3	1	400%
33	0	3	5	2	133%
34	5	4	13	7	122%
TOTALS	757	883	992	860	**13%**

Table 13: Violent Crime Change Vs. General Study Area

Area	**Percent Change**
RMF Buffer - Violence	+13%
General Study Area	+10%

Disorder Crime Findings

An analysis of disorder around RMFs revealed that disorder had increased by 18% in the post-legalization period. With a demonstrated range of a decrease in 50%

(ID#16) to an increase of around 250% (ID#33). When disorder patterns were compared to that of the regular city, the analysis demonstrated that while there was a 7% decrease in disorder across the general study area, disorder within the defined buffers around RMFs more than doubled. A t-test of the means revealed that the change in disorder crimes around RMFs was statistically significant at the .05 confidence interval.

Table 14: Disorder Crime Patterns

	DISORDER PATTERNS				
Facility ID #	2015	2016	2018	2019	% Change Pre/Post
1	34	35	41	47	28%
2	72	64	89	113	49%
3	236	286	230	211	-16%
4	11	22	23	17	21%
5	194	168	263	218	33%
6	0	0	0	0	0%
7	159	90	184	395	133%
8	317	336	493	534	57%
9	167	165	165	141	-8%
10	38	40	47	60	37%
11	314	248	265	238	-10%
12	31	28	33	24	-3%
13	343	407	483	290	3%
14	110	89	77	100	-11%
15	372	474	645	607	48%
16	8	16	8	4	-50%
17	285	173	239	230	2%
18	42	46	66	26	5%
19	75	37	38	42	-29%
20	516	459	533	425	-2%
21	63	52	74	71	26%
22	185	136	296	272	77%
23	14	18	30	25	72%
24	83	57	106	105	51%
25	0	0	0	0	0%
26	190	163	267	276	54%
27	520	471	446	449	-10%
28	23	70	60	51	19%
29	92	94	116	108	20%
30	207	199	204	207	1%
31	79	83	81	70	-7%
32	3	4	14	7	200%
33	3	6	14	18	256%
34	13	5	7	9	-11%
TOTALS	4799	4541	5637	5390	**18%**

Table 15: Disorder Crime Change Vs. General Study Area

Area	**Percent Change**
RMF Buffer - Disorder	+18%
General Study Area	+7%

Research Question 2: Enforcement Patterns

In order to examine the second research question pattern analyses were conducted from the pre-period (2015-2016) and post-period (2018-2019) to examine the enforcement levels of police around the facilities. ArcGIS provided the analytical tools to examine the foot stops and vehicle stops that occurred within 288 meters from the facility. In addition to the frequency of enforcement events inside the buffers, comparisons were made to the rest of the general study area by calculating the percent difference between pre and post. The following section details the findings of the analyses for vehicle stops and person on foot stops around RMFs in the general study area.

Person on Foot Stops Enforcement Patterns

After conducting the geo-spatial analysis of foot stops around the RMFs, the analysis revealed that there was a 38% increase in police initiated stops of a pedestrian within 288 meters of an RMF. There is a demonstrated range from a decrease of 100% (an extreme outlier ID# 25) to increases of 290% (ID# 26). Further analysis revealed that while foot stops within these buffers around RMFs had increased by 38%, the general study area had an increase of 16%. So, while police

enforcement of persons on foot did increase in the general study area, there was more than double the increase within 288 meters of RMFs. A t-test of the means revealed that the difference between the periods was statistically significant at the .05 confidence interval. Findings for the overall foot stop patterns are presented in the tables (Tables 16 & 17) below.

Table 16: Person on Foot Enforcement Patterns

FOOT STOP PATTERNS

Facility ID #	2015	2016	2018	2019	% Change Pre/Post
1	5	6	7	14	91%
2	30	37	83	95	166%
3	34	51	89	62	78%
4	0	3	0	8	167%
5	80	55	132	201	147%
6	0	0	0	0	0%
7	45	38	47	226	229%
8	317	287	366	164	-12%
9	19	49	57	81	103%
10	6	4	4	2	-40%
11	53	92	97	161	78%
12	2	2	2	7	125%
13	159	110	136	198	24%
14	5	5	3	3	-40%
15	276	252	260	192	-14%
16	0	0	0	0	0%
17	45	26	47	15	-13%
18	4	11	24	5	93%
19	49	32	52	79	62%
20	264	218	215	210	-12%
21	21	10	22	36	87%
22	32	34	156	86	267%
23	7	6	10	8	38%
24	20	29	45	54	102%
25	1	0	0	0	-100%
26	19	41	79	155	290%
27	105	164	129	211	26%
28	7	20	28	35	133%
29	2	12	20	32	271%
30	41	41	28	58	5%
31	22	40	34	52	39%
32	1	1	5	0	150%
33	2	2	1	6	75%
34	0	0	0	0	0%
TOTALS	1673	1678	2178	2456	38%

Table 17: Person on Foot Change Vs. General Study Area

Area	**Percent Change**
RMF Buffer – Foot Stops	+38%
General Study Area	+16%

Vehicle Stop Enforcement Patterns

An examination of the police-initiated vehicle stops that around RMFs revealed a 20% increase in foot stops. A review of the range revealed as much as a 52% decrease (ID# 14) to a 120% increase (ID# 7). The comparison analysis revealed that while vehicle stops within RMF buffers increased by 13%, the general study area had a 3% decrease in vehicle stops. A t-test of the means revealed that the change in vehicle stops was statistically significant from the pre- to post-period.

Table 18: Vehicle Stop Enforcement Patterns

VEHICLE STOP PATTERNS					
Facility ID #	2015	2016	2018	2019	% Change Pre/Post
1	19	7	12	21	27%
2	252	469	584	460	45%
3	114	180	174	194	25%
4	14	24	15	33	26%
5	32	40	51	51	42%
6	0	0	0	0	0%
7	253	130	195	647	120%
8	487	517	568	124	-31%
9	36	72	68	91	47%
10	30	51	21	56	-5%
11	311	356	354	527	32%
12	4	7	4	7	0%
13	324	338	363	439	21%
14	16	15	6	9	-52%
15	672	709	802	333	-18%
16	1	4	3	6	80%
17	53	47	46	39	-15%
18	9	13	17	26	95%
19	79	105	148	199	89%

20	460	462	506	612	21%
21	21	23	24	54	77%
22	34	50	47	53	19%
23	66	59	66	121	50%
24	119	149	167	119	7%
25	0	0	0	0	0%
26	46	89	73	188	93%
27	303	400	353	509	23%
28	112	261	246	246	32%
29	52	108	109	114	39%
30	102	125	115	124	5%
31	204	349	346	419	38%
32	2	4	5	8	117%
33	8	21	5	13	-38%
34	0	0	0	0	0%
TOTALS	4235	5184	5493	5842	**20%**

Table 19: Vehicle Stop Change Vs. General Study Area

Area	**Percent Change**
RMF Buffer – Vehicle Stops	20%
General Study Area	4%

Research Question 3: Location Quotients

In order to examine the concentration of crime around RMFs, location quotients are used to compare the concentration within smaller units to the rest of the study area. Location quotients (LQs) are calculated using the following formula:

$$\frac{\textit{Total Crime within Buffer / Buffer Area}}{\textit{Total Crime within Study Area/ Study Area}}$$

Location values of 1 indicate that the buffer is demonstrating the same concentration as the rest of the study area while a LQ of 2 or more is interpreted as having more than double the density of the rest of the study area (Groff, 2011). Groff (2011) also notes that while there is no test for significance of location

quotients, values above one are considered higher concentration, and can be designated as noteworthy (Groff, 2011; Brantingham & Brantingham, 1998). When examining the location quotient with variables that have relatively small numbers of occurrences (such as property crime within a certain buffer) small differences can account for substantial increases in the location quotient. In addition, many of the LQ for the RMFs may be noteworthy due to the areas that they are built in, as prior research has demonstrated that marijuana facilities are typically built in less desirable areas to begin with. Therefore, to provide a more stable LQ, for each variable averages were calculated for the pre and post period. Additionally, a general LQ was calculated using the two-year averages of crime within buffers and the two-year average of crime across the city – this suggestion was based on the Brantinghams' (1998) assertion that using a 3-year average for smaller frequency variables will help to stabilize the LQ. These tables are identified as "General LQ – Variable Examined". The formula detailing this process is as follows:

2015 Total Crime Within Buffer + 2016 Total Crime Within Buffer / 2 = Average Crime within Buffer ***Pre-Period***

2015 Total Crime in Study Area + 2016 Total Crime Within Study Area / 2 = Average Crime within Study Area ***Pre-Period***

2018 Total Crime Within Buffer + 2019 Total Crime Within Buffer / 2 = Average Crime within Buffer ***Post-Period***

2018 Total Crime in Study Area + 2018 Total Crime Within Study Area / 2 = Average Crime within Study Area ***Post-Period***

Then the following formula is used for both Pre- and Post-Periods

$$\frac{\text{Average Crime Within Buffer / RMF Buffer Total Area (SqM)}}{\text{Average Crime Within Study Are / Entire Study Area (SqM)}} = \text{General Location Quotient}$$

** *This formula is calculated with each crime variable separately (disorder, property, and violent).*

Property Crime Location Quotient

An analysis of the location quotients for each facility revealed that there are noteworthy facilities that are experiencing at minimum double the density compared to the general study area, these facilities can be seen in the table below (Table 20). Upon examination, one can identify drastic changes in the property crime density between the pre and post-test periods (facilities 7, 8, 11, 13, 14, 15, 18, 26, 27).

Table 20: Individual LQs – Property Crime at RMFs

Facility ID	*2015 (Pre)*	*2016 (Pre)*	*2018 (Post)*	*2019 (Post)*
1	0.79	3.08	1.25	1.48
2	4.38	3.02	4.13	5.09
3	3.28	5.50	3.26	4.43
4	1.09	1.45	1.68	0.92
5	2.01	2.43	3.88	2.60
6	0.00	0.00	0.63	0.69
7	6.48	6.35	9.77	23.50
8	7.31	9.24	5.51	10.28
9	6.01	4.94	4.44	4.61
10	1.88	1.84	2.54	1.33
11	22.53	23.98	12.92	15.27
12	0.94	3.83	1.29	1.09
13	15.75	19.16	28.16	11.21
14	20.39	8.93	11.74	8.06
15	6.41	7.97	9.92	19.10
16	0.73	0.43	0.46	0.00
17	2.33	2.04	2.56	3.00
18	13.95	5.01	8.38	1.80
19	3.29	3.64	2.12	3.15
20	9.49	13.35	13.80	9.42
21	1.54	0.96	2.08	2.60
22	16.84	9.73	19.70	12.70
23	0.25	0.25	0.80	2.64
24	1.79	2.69	1.52	1.66
25	0.00	0.00	0.00	0.00
26	8.89	6.80	12.66	10.03
27	55.86	41.55	26.74	28.14
28	1.96	2.88	4.73	1.64
29	8.23	6.90	9.86	7.09
30	4.59	5.23	7.63	6.48
31	4.12	4.91	4.06	4.45
32	2.22	3.26	3.53	3.22
33	0.00	1.00	0.36	0.40
34	0.39	0.19	0.41	0.00

Table 21: General LQ – Property Crime

	Pre-Period	*Post-Period*	*Increase or Decrease*
General LQ- Property Crimes at RMFs	6.85	6.54	Decrease

As demonstrated in table 21, overall, there was a decrease in the density of property crimes within RMF buffers compared to the rest of the general study area between the pre- and post-periods. This provides further context explaining the decrease of property crimes within 288 meters of RMF facilities as shown in the pattern analysis. Stated plainly, this finding suggests that within 288 meters of RMFs, property crime was not as concentrated in the post-period, suggesting that there is something associated with RMF facilities in general that may have an ability to decrease property crimes in the environments in which they exist.

Violent Crime Location Quotient

As displayed in the following LQ table -which examined violence in the RMF buffers—some facilities experienced drastic increases in crime density within 288 meters (Facility IDs: 1, 7, 22, 32) while others experienced substantial decreases (Facility IDs: 8, 11, 14, 27). Each facility's LQ across the study years is detailed in the table below (Table 22) followed by the general LQ for violent crime at RMFs (Table 23).

Table 22: Individual LQs – Violent Crime at RMFs

Facility ID	*2015 (Pre)*	*2016 (Pre)*	*2018 (Post)*	*2019 (Post)*
1	0.00	1.96	2.86	2.76
2	6.33	7.91	4.39	9.11
3	7.75	8.22	10.58	8.24
4	0.96	1.32	1.03	1.28
5	4.89	6.02	6.63	5.86
6	0.00	0.00	0.00	0.00
7	2.49	4.79	9.70	22.59
8	20.17	17.49	18.02	13.72
9	9.94	5.23	7.37	3.01
10	1.27	2.08	3.69	1.58
11	23.45	21.86	9.12	14.73
12	1.31	4.78	0.84	2.04
13	15.79	29.56	27.75	21.40
14	11.63	10.58	9.03	6.09
15	24.49	20.73	20.54	22.44
16	0.35	0.32	1.21	0.63
17	5.48	5.91	5.89	5.04
18	4.16	3.09	6.45	1.00
19	2.79	3.80	5.36	3.09
20	32.09	23.07	38.86	32.40
21	1.02	3.10	4.65	2.72
22	7.72	7.02	15.27	11.50
23	0.62	6.72	8.94	1.64
24	2.33	2.64	3.97	3.35
25	0.00	0.00	0.00	0.00
26	10.09	10.25	9.63	9.73
27	20.98	28.47	18.41	12.04
28	2.65	2.41	2.72	1.65
29	6.48	4.12	4.97	4.30
30	14.82	15.40	13.42	16.88
31	13.64	7.83	9.81	10.18
32	0.00	0.00	3.46	1.20
33	0.00	1.13	1.77	0.74
34	1.18	0.86	2.62	1.46

Table 23: General LQ – Violent Crime

	Pre-Period	*Post-Period*	*Increase or Decrease*
General LQ- Property Crimes at RMFs	7.85	8.10	Increase

As shown in table 23, the LQ for violent crime at RMFs did in fact increase within the 288-meter buffers. This suggests that violent crime in the areas around RMFs was denser in the post period than that of the pre period as well as being denser than the rest of the general study area. This lends further support to the

crime pattern analysis that violent crime does tend to increase within 288 meters of an RMF in the study area.

Disorder Location Quotient

Table 24 examines the LQs for each facility as applied to disorder crimes over the study period. Upon examination, facility numbers: 7, 8, 15, 22, 26, 28, and 32 had the most pronounced increase in disorder density. On the contrary, facilities 11 and 20 appear to have had the largest decrease in disorder density around the RMF. It is also important to note that the following facilities have a disorder LQ that aligns with the general study area's density of disorder: 4, 16, 33, and 34.

Table 24: Individual LQs – Disorder Crime at RMFs

Facility ID	*2015 (Pre)*	*2016 (Pre)*	*2018 (Post)*	*2019 (Post)*
1	1.28	1.41	1.48	1.73
2	4.49	4.26	5.30	6.88
3	9.62	12.42	8.95	8.39
4	0.42	0.89	0.84	0.63
5	8.81	8.13	11.40	9.66
6	0.00	0.00	0.00	0.00
7	6.95	4.19	7.68	16.86
8	23.47	26.50	34.84	38.57
9	6.89	7.25	6.50	5.68
10	1.52	1.71	1.80	2.35
11	14.71	12.37	11.85	10.88
12	1.61	1.55	1.63	1.21
13	16.76	21.18	22.53	13.82
14	9.18	7.91	6.13	8.14
15	24.78	33.64	41.03	39.45
16	0.45	0.95	0.43	0.22
17	9.13	5.90	7.31	7.19
18	2.50	2.92	3.76	1.51
19	4.12	2.17	2.00	2.25
20	30.38	28.79	29.96	24.41
21	3.39	2.98	3.80	3.72
22	10.24	8.02	15.65	14.69
23	1.36	1.86	2.78	2.37
24	3.81	2.79	4.65	4.70
25	0.00	0.00	0.00	0.00
26	8.90	8.13	11.94	12.61

27	24.24	23.39	19.85	20.42
28	0.96	3.12	2.40	2.08
29	4.70	5.12	5.66	5.38
30	9.88	10.12	9.29	9.64
31	8.95	10.02	8.76	7.74
32	0.64	0.91	2.85	1.46
33	0.20	0.42	0.88	1.15
34	0.48	0.20	0.25	0.33

Table 25: General LQ – Disorder Crime

	Pre-Period	*Post-Period*	*Increase or Decrease*
General LQ- Property Crimes at RMFs	7.65	8.44	Increase

Out of all the calculated general LQs, disorder had the most pronounced change from the pre-period to the post-period. However, values suggest that disorder around these facilities is prevalent in both periods. This can possibly be explained by the nature of where these facilities are typically allowed to be built. For example, if we examine the building of facility 34, we see that it is in an area that is well maintained, and is connected to a Health Center. When we examine the LQ, we see that for this facility, it is not noteworthy when it comes to disorder around it (the LQ value shows that it has lower/ normal disorder as compared to the rest of the city).

Figure 8 Facility with Low Disorder LQ

However, when compared to facility number 20, it is seen that this facility has a high disorder LQ, demonstrating that the disorder (and associated disorder crimes) within 288 meters of this facility is higher than in the rest of the city comparatively. Upon visualization of facility number 20, it can be seen that this is a facility on a busy pathway, located next to temporary residences such as a Siegel Suites, which can help to explain the high LQ for disorder around facility number 20. It is also interesting to note that the LQ for this facility did begin to drop in the post period, suggesting that this facility may have had an impact on decreasing disorder within this buffer.

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Figure 9: Facility with High Disorder LQ

Research Question 4: Tourist Facilities Vs. Local Facilities

The fourth and final research question sought to address any differences between the two different operationalizations of facility type: tourist facilities (facilities within the resort corridor - TFs) and local facilities (LFs). Comparisons of the crime patterns, enforcement patterns, and LQs were compared between the two groups. The following sections will detail the findings of each variable.

Property Crime Comparison

To compare the groups regarding property crimes, pre and post totals of property crime were calculated, and then the percent change was calculated between the two periods. The following table (Table 26) demonstrates the percent difference of property crimes at TFs compared to local facilities.

Table 26: Property Crime Comparison Between Groups

	Pre	*Post*	*% Change*
Tourist Facilities	1057	1055	0%
Local Facilities	2299	1806	-21%

As can be seen in the above table, while property crime had a general decrease in the study area of 11%, it dropped by 21% in local facility buffers and there was a 0% change in property crimes within tourist facility buffers. This suggests a couple of points: (1) tourist facilities were still experiencing much higher property crimes within 288 meters of the facility compared to the rest of the study area and the local facility RMFs (2) the local facilities group was experiencing a higher decrease in property crime (10%) than the rest of the study area. A t-test in the difference in means revealed that there were no statistically significant differences in the changes in local facilities and tourist facilities at the 95% confidence level.

Disorder Crime Comparison

Disorder Crimes were compared on the same basis as the property crime group analysis. Averages between pre and post periods were calculated for both groups and compared by the percent changes in the frequencies of disorder occurrences within the buffers. The findings of disorder within the buffer groups are presented in the table below (Table 27).

Table 27: Disorder Crime Comparison Between Groups

	Pre	*Post*	*% Change*
Tourist Facilities	4527	5846	29%
Local Facilities	4813	5181	8%

As can be seen, even though disorder had only increased by 7% in the general study area, it increased by 29% in the tourist facilities and by 8% in the local ones. This finding suggests that disorder within tourist facility buffers was much higher than that of the city. While the local facilities had a similar percent change as the rest of the city, it is much lower than the aggregate increase of disorder across all RMF buffers in the census, 18% (refer back to Table 16). Statistical tests for the difference in means revealed that: the change for local facilities was not statistically significant (.05 confidence interval), the change in resort corridor facilities was statistically significant (.05 confidence interval), and that the effect change in resort corridor facilities was statistically more significant than that of local facilities (.05 confidence interval).

Violent Crime Comparison

Violent crime comparisons between the groups were also based on percent changes from the averages of the pre and post periods of the study. The findings for violent crime are presented in the below table (Table 28).

Table 28: Violent Crime Comparison Between Groups

	Pre	*Post*	*% Change*
Tourist Facilities	716	867	21%
Local Facilities	924	985	7%

As shown above, violent crime within tourist facility buffers increased by 21% and increased by 7% in local facilities. Compared to the general study area which had a 10% overall increase in violent crime, the tourist facility group had doubled in percent change from the pre to post period. While the local facilities group experienced a bit of a drop compared to the general study area. When examining the aggregate increase at all RMF buffers (13%), it appears that local facilities had a much lower percent change, thus they were experiencing less violent crime as a group. Statistical analyses in the difference in means revealed no statistically significant results between the groups at the 95% confidence level.

Person on Foot Comparison

For the enforcement type of "persons on foot", averages were calculated between the pre and post period in order to assess the percent change. The findings are demonstrated in the table below (Table 29).

Table 29: Foot Stop Enforcement Comparison Between Groups

	Pre	*Post*	*% Change*
Tourist Facilities	2158	2543	18%
Local Facilities	1193	2091	75%

This analysis revealed one of the most dramatic changes in the pre and post periods. For the tourist facilities, there was an 18% increase in enforcement for persons on foot, while the local facilities had a whopping 75% increase within 288 meters of RMFs. Compared to the general study area's increase of person on foot

enforcement (16%), tourist facilities had a similar percent change, but local facilities had a much higher increase. Statistical analyses in the difference in means revealed statistical significance (.05 level) in the local facility group and no statistical significance for the tourist facilities and the effect change between the group differences. This finding suggests that LRMFs were a priority of enforcement for LVMPD.

Vehicle Stop Comparison

The vehicle stop comparison was also completed by calculating percent changes based on the averages between the pre and post study period. The findings show that while the general study area had an increase of vehicle stops by 4%, tourist facilities experienced a 9% increase and local facilities experienced a 33% increase. This finding, much like that of the person on foot enforcement, suggests that the local facilities were likely a priority for enforcement for LVMPD after RMFs began operations. Additionally, statistical analyses in the difference in means revealed statistical significance (.05 level) in the local facility group and no statistical significance for the tourist facilities and the effect change between the group differences.

Table 30: Vehicle Stop Enforcement Comparison Between Groups

	Pre	*Post*	*% Change*
Tourist Facilities	5009	5463	9%
Local Facilities	4410	5872	33%

General Location Quotient Comparison

The last comparison analysis was completed by examining the general location quotients (LQs) of both groups between the pre and post period. This was done using the same calculation for the generalized LQs from the third research question. The general location quotient was used to compare the aggregate differences in the crime types between the local facilities and tourist facilities between both periods. This LQ allows examination of the crime density between the two groups using two-year averages of the crime data. The equation for the base of this comparison is as follows:

Tourist Facilities General LQs Formula

*2015 Total Crime Within **Tourist Facility Buffers** + 2016 Total Crime Within **Tourist Facility Buffers** / 2 = Average Crime within tourist facility Buffers **Pre-Period***

*2015 Total Crime in Study Area + 2016 Total Crime Within Study Area / 2 = Average Crime within Study Area **Pre-Period***

*2018 Total Crime Within Tourist Facility Buffers + 2019 Total Crime Within Tourist Facility Buffers / 2 = Average Crime within Tourist Facility Buffers **Post-Period***

*2018 Total Crime in Study Area + 2018 Total Crime Within Study Area / 2 = Average Crime within Study Area **Post-Period***

Then the following formula was used for both Pre- and Post-Periods

$$\frac{\text{Average Crime Within tourist facility Buffers / Tourist Facility Buffer Total Area (SqM)}}{\text{Average Crime Within Study Area / General Study Area (Excluding Airport and Buffer Areas [SqM])}} = \text{General LQ}$$

**** This formula was also used for the local facilities group, where tourist facilities were replaced with the local facility averages and areas.**
*** This formula is calculated with each crime variable separately (disorder, property, and violent).*

Using this formula, comparisons were made across each crime type for both tourist facilities and local facilities. Findings are presented in the table below (Table 31).

Table 31: Tourist Facility LQs Vs. Local Facility LQs

	Pre-Period General LQ	*Post-Period General LQ*
Local RMFs		
Property Crime LQ	7.66	6.74
Violent Crime LQ	7.22	7.03
Disorder Crime LQ	6.43	6.48
Tourist RMFs		
Property Crime LQ	5.57	6.23
Violent Crime LQ	8.85	9.79
Disorder Crime LQ	9.57	11.56

As shown in the above table, for local facilities, there was a decrease in both property crime and violent crime, with a small increase in disorder. For the tourist facilities, there were increases in every variable. These findings suggest that even though there were fewer tourist facilities in the sample, there were increases in crime density across all crime types within 288 meters of them. All the numbers are noteworthy, showing that within 288 meters of any RMF, there is a higher density of each type of crime. However, in the post period, for tourist facilities, there were substantial increases in the crime density, lending support to the notion that these facilities are more attractive in terms of criminal opportunities than their local counterparts.

Findings for the LQs lend support to the notions of prior research that marijuana facilities are typically built in less desirable areas (hence the high LQ values in the pre-period). Values of more than 2 for LQs suggest—at minimum—double the density (and more as the value increases) of the variable that is being examined, and all of the variables within this analysis demonstrate high levels of crime density. Through the findings presented here, given the high values of individual LQs and the general LQs, it can be concluded that tourist facility buffers

(in general) attract all crime types listed in this study. In addition, there is also evidence to suggest that some of these facilities (especially in the local facilities group) can lead to reductions in crime around them as well.

Chapter 5 – Discussion and Conclusion

After an examination of crime around RMFs, a few issues are apparent: (1) RMFs *can* certainly lead to an increase in criminal opportunity for violent and disorder crime and they often do (2) property crime did in fact reduce within 288 meters from these facilities in general (not including tourist facilities), (3) tourist facilities appear more attractive for criminal opportunity than local facilities, (4) enforcement practices around local facilities is far greater than that of the tourist facilities and general study area, (5) RMFs typically reside in areas where there are higher concentrations of crime, and (6) it is important to separate crime types for analyses as there are differences in crime patterns which are highly dependent on each environment. The findings from the analyses provide answers to all the research questions presented in this study and some findings are especially curious. Findings for each variable are discussed in detail in the following subsections.

Police Enforcement

The analysis of officer-initiated foot stops (when an officer stops a pedestrian on the streets) yielded that there was a 38% increase in foot stops within 288 meters of RMFs while the general study area had an overall increase of 16% from the pre- to post-period. This finding demonstrates that there were higher numbers of foot stop enforcements near RMFs which were over double that of the comparison area. Further analysis between the two groups revealed that tourist facilities had experienced an 18% increase in foot stops (not much higher than that of the general

study area) while local facilities had a drastic increase of 75% from the pre- to post-period. Similar findings were found for vehicle enforcement.

An analysis of the officer-initiated vehicle stops around RMFs revealed an increase of 20% compared to the general study area only having an increase of 4% from the pre- to post-period. This finding suggests that police enforcement of vehicle stops did increase at a much higher level than that of the rest of the study area. Further analysis between the two groups revealed that vehicle stops around tourist facilities increased by 9% while local facilities experienced a 33% increase from the pre- to post-period. This finding is similar to that of foot stop enforcement between the two groups as well. Stated plainly, this type of police enforcement increased overall at RMFs, but more so at local facilities than tourist facilities.

Statistically, t-tests revealed that there were statistically significant (.05 level) findings in the changes of enforcement for local facilities (research question 4) as well as the overall changes in police enforcement between the pre- and post-periods (research question #2). Given the small sample size and the variance between the groups, statistical significance was a surprising result. This is likely explained due to the dramatic increases of enforcement that occurred in the local facility RMF buffers.

These findings can most likely to be attributed to local police agencies prioritizing these areas as potentially problematic when they first began operating. As seen with the debate for the legalization of marijuana, one of the main arguments is that it can lead to an increase in crime in the areas where they are

built, an assumption which, considering the history of drug policies and perceptions surrounding marijuana in the U.S, makes a certain degree of sense. Thus, in order to be safe and help keep fear of crime down, the local policing agency more than likely deployed more officers into these areas. This increase in saturation, combined with CFS for these areas, likely explains the increase in police enforcement in these areas. Local facilities are largely going to be located in closer proximity to residential areas than most of the tourist facilities, suggesting that the populations of people surrounding the local facilities are likely to be residents of the general study area. We see through research that residents are more likely to report crime than tourists (as tourists do not generally want to be involved in report writing or returning back to the jurisdiction for court proceedings). In addition to the increased likelihood of reporting crime, locals are in a better position to judge "outsiders" or who does not belong in an area that may warrant a call for service. This is much different within the resort corridor where everyone is an outsider, and it is much more difficult to detect who might be there for criminal intent. Furthermore, the increased levels of police enforcement will help to explain the differences in the crime patterns between the groups.

Property Crime

Through an analysis of property crime around the RMFs, it is demonstrated that there is a decrease in these types of crimes. In the general study area, there was an overall decrease of 11% while RMFs, in general, experienced a 15% decrease. Yielding an overall 4% difference. Further analysis of LQs of property

crimes at RMFs revealed that while property crimes are dense in both the pre and post period, there was also a decrease in the density of property crimes within the buffers compared to the rest of the study area. Tourist facilities had an increase in the density of property crimes within 288 meters of the facilities, while the local facilities had a decrease. While property crime was on an overall decline in the buffers, the tourist facilities were still experiencing higher rates of property crime in the post-period, suggesting that these facilities are still attractive for property crime offenders – more so than local facilities.

T-tests revealed no statistically significant (.05 level) findings between the changes in property crimes overall and across the groups. This may be due to the high variation between each facility's mean and the small sample size. The changes in property crimes across facilities was not as dramatic as the enforcement changes and disorder changes.

In addition to the LQ comparison finding, analyses demonstrated that tourist facilities experienced a 0% drop in property crimes while local facilities experienced a 21% drop in property crimes compared to the general study area which had an 11% decrease. This is interesting, as it suggests that tourist facilities are still highly attractive for property crime even though there was a decrease in both the general study area as well as the local facilities group. This finding is likely to be explained by the large increase of police enforcement nearby local facilities, as officer-initiated person on-foot stops increased by 75% and vehicle stops increased by 33% within the buffers in the post period. This suggests that an increase in the presence of

police is perhaps a deterrent for property offenders, more so than other types of offenders. This lends further support to the underlying assertion of crime science, crime opportunity is highly situational, therefore it can be seen that there is a decrease in one aggregate crime variable but not in others.

Violent Crime

Violence, as opposed to property crime, had a 13% overall increase within 288 meters of RMFs. The general study area saw a 10% increase in violent crime. In relation, there is not that big of a difference, however, when contextualized in terms of an examination of violent crime, this can be concerning. Findings suggest that within 288 meters of RMFs, there were approximately 200 more violent crimes in the post period occurring in a substantially small portion of the area of the city. An examination of the LQ at RMFs revealed that there was an increase in the density of violent crime.

Statistically, t-tests of the differences in means revealed no statistically significant (.05 level) findings in the overall changes in violent crime as well as differences between the groups. This may be explained due to the small sample size and large variance between the facilities.

Further analysis of the LQ for violent crime revealed that tourist facilities experienced an increase in the density (8.85 to 9.79) while the local facilities group experienced a decrease in violent crime density (7.22 to 7.03). Another interesting finding to note, is that while both local facilities and tourist facilities have high violent crime density in the pre-period, tourist facilities had a much higher LQ

(8.85) in the pre-period than local facilities (7.22). This suggests that while both groups have high violent crime concentrations, the tourist facilities existed in more violent areas to begin with. Thus, the LQ for violent crime provides a few implications: (1) that violence is denser around RMFs than the rest of the city, (2) tourist facilities experienced more violent crime in the post-period – suggesting that they were attractors for violent crime, and (3) local facilities experienced a decrease in the LQ, which may be attributed to the enforcement practices around them. As for the violent crime pattern differences between the tourist facilities and local facilities, tourist facilities had a 21% increase and local facilities had a 7% increase. This suggests that tourist facilities were more attractive for violent crime.

In sum, these findings suggest that RMFs do have an increase in violent crime within 288 meters of them. The differences between the local facilities group and the tourist facilities group can also be explained through the enforcement practices around each facility type. Through heavy enforcement at local facilities, there was only a 7% increase in violent crime, while the general study area saw a 10% increase, and the tourist facilities (which did not have as the same level of heavy enforcement practices) saw an increase in 21%. These findings demonstrate further that police enforcement of places can have an impact on violent crime at the city-block unit of analysis.

Disorder Crime

Disorder crimes had the most pronounced increase of 18% around RMFs compared to an overall 7% increase in the general study area. This comparison revealed that disorder (according to LVMPD's operationalization) increased 11% within 288 meters of RMFs as compared to the rest of the city.

Upon examination of the LQ for disorder around RMFs, it is revealed that there was an increase in the concentration of disorder around RMFs in the post-period (LQ of 8.44) than that of the pre-period (LQ of 7.65). Further analysis of the location quotient suggests that there was an increase in the local facilities (6.43 to 6.48 – minimal) and an increase at tourist facilities (9.57 to 11.56 – large). It is also of importance to note that density was higher at the tourist facilities in the pre-period (LQ of 9.57) compared to the local facilities in the pre-period (LQ of 6.43), suggesting that tourist facilities exist in places that had a higher density of disorder compared to the rest of the city. Furthermore, findings suggest that tourist facilities (LQ of 11.56) were more of an attractor of disorder in the post-period than the local facilities group (LQ of 6.48). These LQs were based on a two-year average of disorder crime at these areas for the pre-period and a two-year average for the post-period, suggesting that these numbers are relatively time stable.

When examining the percent change between disorder crimes between the two groups, there was a 29% increase at tourist facilities and an 8% increase at local facilities. This finding may suggest that tourist facilities can be considered as a crime attractor for disorder, as they experienced disorder at more than 4 times that

of the general study area (increase of 7%). Statistically, t-tests revealed that the overall disorder change was statistically significant (.05) between the pre- and post-period. Statistical significance (.05 level) was also detected in the tourist facility group change and the effect change examining the difference in means between local facilities and tourist facilities. These differences between groups can once again be possibly attributed to the enforcement tactics around local facilities compared to those around the tourist facilities. As seen through empirical research, it is apparent that policing does in fact have an impact on disorder. This is demonstrated through Broken Windows Policing.

As the Broken Windows hypothesis helps to provide practical suggestions for police in order to reduce crime. A reasonable assumption can be made between this theoretical assertion and the patterns that are displayed within the findings. The logical connection is as follows: (1) foot stops and vehicle stops increase at a much higher percentage (75% and 33%, respectively) for local facilities than they do at tourist facilities (18% and 9%, respectively) even though the study area in general only saw a 4% increase in vehicle stops and 16% in foot stops, (2) for the percent difference in crimes between pre and post for violent (local facilities: 7%; tourist facilities: 21%), disorder (local facilities: 8%; tourist facilities: 29%), and property crimes (local facilities:-21%; tourist facilities: 0%) are all lower in local facilities than they are in tourist facilities. Thus, a possible explanation is that the police activity in the local facility buffers resulted in lower disorder (relative to the tourist

facilities) which, in turn, reduced both violent and property crime within the buffers of local facilities, which is explained through the Broken Windows hypothesis.

Limitations

There are a few important limitations to address for this study. It is important to note that when a comparison is made to the "general study area" this is not "Las Vegas". As demonstrated in the analytical strategy section, a general polygon was created over the regular enforcement area. This general polygon was drawn over the general enforcement area, thus, there are some crimes and areas that are left out of the comparison area. So, when claims are made that there is an increase in violent crime within the general study area, that is not to state that there was an increase in violent crime within the City of Las Vegas, only an increase in the general study area(the polygon). Thus, for future research, a researcher may reveal different findings depending on the construction of the general study area polygon. The findings of this study may have better generalization to cities that have similarities such as high tourist destinations.

The next limitation lies within the data provided by LVMPD. While there were minimal occurrences of crimes that were omitted from the analysis for violent, property, and disorder crimes as a result of missing data and incomplete addresses, this was not the case for enforcement data. Due to the nature of officer-initiated stops, there is great variance in how these CFS are entered into the system. It is not as systematic as a dispatcher who collects the address within the first few seconds of a 911 call. Thus, due to the thousands of officers who enter these CFS into the

system, there are many errors with the data. In addition, many times an officer will input "Trop/Mar" as the place for the stop, which will not generate an appropriate address of where the stop occurred, thus intersections were omitted from the study. Furthermore, sometimes it is much easier for an officer to identify an address during a stop (i.e., stopping someone outside of the Bellagio on the Las Vegas Strip compared to some unknown smaller place) than other places, thus, sometimes the effort to locate the proper address for the stop outweighs the benefit of quickly finishing a report. This pattern of "unclean" and missing enforcement data was apparent throughout all 4 years of the data provided. Each year around 50% of the addresses of enforcement were successfully mapped for enforcement instances. Thus, if the missing or unclean data were to be addressed, and officers were to enter it correctly, this may display different patterns of enforcement. It is important to note that these data did not meet the recommended geo-coding threshold established in prior research (Ratcliffe, 2004). Although these data were not included, out of the successfully mapped data points, the patterns still hold true for the analysis. If all the data were cleaned and successfully geocoded, findings may reveal different patterns.

The last limitation to be addressed is the census selection for the study. The opening dates of these facilities could not be gathered through the Nevada Cannabis Compliance Board or the Nevada Business licensing office. However, the list of facilities that were operating in 2018 was compared to the current list of facilities that are operating in the study area which was found on the Nevada Cannabis

Compliance Board website. In sum, the addresses of facilities on the list of 2018 were cross ran to the list of current facilities on the website, meaning that the sample is comprised of the addresses that have remained RMFs from 2018 until the time of writing this paper. It is highly unlikely that a facility on the list from 2018 closed down, opened as a different type of facility sometime in 2019, 2020, or 2021 – which closed down and re-opened as an RMF in 2022 to make it on to the current list. Thus, it is a safe assumption that the facilities on the list from 2018 have remained RMFs throughout the post-period, regardless of whether a change in name or buy-out occurred.

Directions for Future Research

As mentioned in the theory introduction, crime opportunity (risk heterogeneity) is best explained through three levels: micro, meso, and macro. While the current study focuses on the meso and macro level, the micro level is equally important and a direction for future research. At the micro level, risk heterogeneity is explained by whether situational characteristics are present at potential targets. These characteristics help to dictate the mental process that goes on within an offender's mind on whether they decide to engage in crime (Cornish & Clarke, 1986) – which is extremely helpful in determining individual differences between the RMFs that are in any given census. As results have shown throughout the analyses, there is great within group variation between most RMFs, thus – a micro theoretical exploratory study would lend much support towards explaining the variation within the group. The theories that help to explain this process are

Defensible Space, Situational Crime Prevention, Risky Facilities, and Rational Choice Theory. Each of these theories can help to explain the differences in crime across facilities and have implications for crime at RMFs (Table 32).

Table 32 – Micro Theorized Explanations of Crime at RMFs

Theory	***Impact to Risk Heterogeneity of RMF***
Rational Choice	• Offenders will weigh the risk against benefits before deciding to engage in crime. • More attractive opportunities will have more frequent crime incidents at RMFs. • The higher the levels of police presence, the higher risk to weigh against reward.
Defensible Space / CPTED	• The physical design of the dispensary/immediate environment can attract certain offenders to RMFs depending on situational characteristics present in the micro-environments.
Situational Crime Prevention	• Each dispensary location may provide attractive target opportunity for offenders. • Some locations will be more susceptible to offenders' crime scripts than others. • Police can increase risk of offenders getting caught and deter criminality with their presence.
Risky Facilities	• A small number of dispensaries will account for more crime due to place management differences between them, which can lead to increased repeat victimization.

These micro-level theories provide insight into the offender processes for target selection. Based on these theories, risk heterogeneity is influenced by situational characteristics that may or may not be present in any given environment. Thus, the importance of examining the physical environments of these places cannot be overstated. Furthermore, although not explored by this study, examination at the micro-level would help to provide an empirical distinction as to whether RMFs are crime attractors or crime generators.

As demonstrated through the findings of this current study, there is great variation across each facility when it comes to crimes and enforcement around the area throughout the pre- and post-periods. This further emphasizes the importance of examining micro-level characteristics. Unfortunately, the author was unable to conduct "pre" observations of these places to be able to compare changes within the immediate environment in the post-period, which may help to explain the differences between the facilities. Thus, a future area of research would use current crime data and observational data that focuses on the environmental backcloth, physical build, and management of these places to explain the differences in crime at and around these facilities.

In addition, the legislature in the study area's jurisdiction has approved and is currently designing "marijuana lounges" where patrons can visit and indulge in the substance. This is an interesting area for future research as it will help to determine possible differences between the point of purchase and the point of consumption, which will likely have vastly different crime patterns.

Policy Implications

The policy implications derived from this study are clear. The first of which is for policymakers to consider carefully where these facilities are to be zoned and built. If they are to be built close to residential zones, then there should be a prioritization of the policing agency of that jurisdiction to employ proactive and problem-oriented models of policing in order to combat the increased criminal opportunity that accompanies these facilities. Through the findings of this study, it

can be assumed that if police enforcement levels around these local facilities were not to have increased as they did, that crime patterns around these facilities may have had a more dramatic increase such as the ones associated with the tourist facilities.

On a broader scale, as RMFs do provide sizeable tax revenues to local municipalities and states, creative solutions aimed at eliminating the criminogenic characteristics that are associated with RMFs should be explored. Rather than trying to recriminalize the drug and dismantle the facilities, there should be a focus on making the businesses themselves more secure and versatile in terms of the types of currency they can accept (which is why liquor stores may not have drastic increases in crime and disorder both in and around them). Eliminating the large cash economies associated with these facilities might help to reduce the target attractiveness of the patrons who frequent the facilities as well as the facilities themselves.

Lastly, as RMFs begin to be legalized across the country, it is essential that the governing bodies of the jurisdictions keep track of important statistics that will help to assess the collateral consequences of these facilities (if any). This is important, as seen with the current study, it is extremely difficult to track down the opening date of each facility without tracking down original corporate ownerships which are largely out-of-state corporations. By having the opening date of facilities, the year in which these facilities could have been selling recreational marijuana legally (2017) could have been analyzed to further measure whether there is a

drastic increase in crime with the opening of facilities that decreases over time. By keeping track of the dates of openings, closings, buy-outs, and other characteristics, a much cleaner analysis of conditions around the facilities would be possible.

Conclusion

This study examined the impact of RMFs on crime patterns at the city-block unit of analysis through an exploratory pre/post-test design. Findings suggest that RMFs should be of special concern to police, policymakers, and residents in jurisdictions where they are being built. Further research needs to be done to explain the individual differences within the groups of RMFs, which can only be achieved through observational analysis of the environmental backcloth, physical designs, and place management of RMFs. This study does not conclude that all RMFs will be crime attractors, rather, in general provide increases in crime opportunity within three blocks of the facilities. Without conducting research into the offender processes of target selection as well as data demonstrating the flow of customers to and from facilities, it is difficult to determine whether these facilities are crime attractors or crime generators. The study also shows the importance of proactive policing around facilities, as this can lead to a substantial reduction in all crime types, especially property crimes. Perhaps there is something different about property offenders that allow for a larger decrease in this crime type as opposed to the others at local facilities. While it was not a question of this study on whether these facilities are built in un-desirable areas, through an examination of the general pre-period LQs, it is apparent that there are heavy concentrations for all

crime types prior to recreational marijuana being sold in these areas. Table 33 summarizes the general findings of this study.

Table 33: Summation of Research

	Research Questions	*Answer*
1	Have crime patterns (property, violent, and disorder) changes within the defined geographical buffer around recreational marijuana facilities post-legalization?	Yes, there were general increases in violent crime (13%) and disorder (18%) and a decrease in property crimes (15%) in the post-legalization period. Disorder changes were statistically significant (.05 level).
2	Have enforcement patterns (vehicle and foot stops) of police changed within the defined geographical buffer around recreational marijuana facilities post-legalization?	Yes, there were general increases in foot stops (38%) and vehicle stops (20%) in the post-legalization period. Both enforcement types were statistically significant (.05 level).
3	How does the crime concentration within the set geographical buffers change over time (location quotient)?	Crime concentration increased for both violent crime (LQ of 7.85 to 8.10 in post-legalization period) and disorder (LQ of 7.65 to 8.44 in the post-legalization period) and a decrease in property crime density (LQ of 6.85 to 6.54 in the post-legalization period).
4	Are there any differences in crime patterns between "tourist/resort corridor" and "non-tourist" RMFs"?	Yes, there were substantial differences between groups in crime patterns around facilities. Furthermore, statistical significance (.05 level) was found for enforcement changes in the local facilities (not tourist facilities) and disorder changes in the tourist facilities (not local facilities). • Property crime at LFs declined by 21% and TFs had a 0% change in the post-period. • Violent crime at LFs increased by 7% and TFs had a 21% increase in the post-period. • Disorder crime at LFs increased by 8% and TFs had a 29% increase in the post-period. • Foot stops at LFs increased by 75% and TFs had an 18% increase in the post- period. • Vehicle stops at LFs increased by 33% and TFs had a 9% increase in the post-period. • LFs had an increase in the general LQ for only disorder (minimal) in the post-period. • TFs had an increase in all general LQs in the post-period.

This study concludes that criminal opportunity is associated with recreational marijuana facilities and more research should be done to address factors that help to create and sustain these criminal opportunities. Further, it

provides insight into the different crime patterns and enforcement patterns that occur across a new type of criminogenic facility – recreational marijuana facilities.

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Curriculum Vitae

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Policing scholar and environmental criminologist with a demonstrated record of successful, impactful, and innovative collegiate teaching. I am a progress driven professional who strives to better the human condition through influential research and effective teaching. My goals are to foster deep learning from my students and to conduct research which helps to: formulate police policy more closely with the fundamental principles of community-oriented and problem-oriented policing, bridge the gap between academia and practice, and dismantle criminal and dangerous opportunity structures.

EDUCATION:

- Ph.D., Criminology and Criminal Justice, University of Nevada, Las Vegas – 2022

  Concentrations: Policing (best practices - COP & POP) Crime Science (geographical distribution of crime, crime prevention, criminological theory), Tourism Safety and Crowd Science, and Best Teaching Practices (intrinsic motivation, deep learning, positive mentoring).

  GPA: 4.0

  Recipient of a University Outstanding Graduate Teaching Award 2021-2022

- M.A., Criminal Justice, University of Nevada, Las Vegas – 2018

  Concentrations: Policing and Crime Science. GPA: 3.95

- B.A, Criminal Justice, University of Nevada, Las Vegas – 2016

  (University of Nevada, Reno 2013-2014). GPA: 3.5

EXPERIENCE:

University of Nevada, Las Vegas Experience:

Instructor, 2021-2022

Courses Taught: Research Methods, Policing, Crime Prevention, Tourism Safety and Crowd Science.

Research Director - Tourism Safety and Crowd Science, 2019-2022:

Special Topics: Protest Violence and Dynamics, Spectator Violence, Mass Casualty Response, Emergency Management Response to COVID-19, and Crowd Safety at Music Festivals.

Job Function: My duties were to teach and coordinate / manage an active research agenda on best practices regarding tourism safety and crowd science. Each semester I would guide students in creating an actionable playbook that helped to assist practitioners in dealing with real world-problems through empirically backed best practices. I also managed lab personnel, mentored and instructed students on a variety of special topics, and delivered presentations of findings. My main goal was to provide students with a positive and impactful experience while simultaneously bridging the gap between academia and practice.

Center for Crime and Justice Policy, 2017-2019

Conducted research and program evaluations for grants awarded to the Department of Criminal Justice at the University of Nevada Las Vegas.

Teaching Assistant, 2016-2020 :

Courses: Introduction into Criminal Justice, Statistics, Policing, and Research Methods.

Research Associate, 2016-2019:

Conducted Research for:

- *Emergency Management Response* – Conducted research on emergency managers and their response to the COVID-19 pandemic.
- *VECTRS- Vegas E-Commerce Tracking and Reporting System* – Conducted evaluation research on a smart surveillance policing technology being tested by the Henderson Police Department.
- *SAKI – Sexual Assault Kit Initiative* – Conducted research on sexual assault kit collection and testing effort in Clark County Nevada.
- *NSF Grant #1625808.* Principal Investigators: Dr. Joel D. Lieberman & Dr. Terance D. Miethe. Duties: Field manager for surveys in the Las Vegas valley. Supervised students as they conducted quantitative surveys in regard to police use of drones and surveillance technologies.

PUBLICATIONS:

Crime Attractors in Sin City? A Pre/Post Test of Crime Patterns and Police Enforcement Around Recreational Marijuana Facilities. (2022) – Doctoral Dissertation – UNLV ProQuest

By: Donnelly, J.W.

Untangling the Complex Pathways to Confidence in the Police in South Korea: A Stepwise Multilevel Structural Equation Modeling Analysis. (2020) – Asian Journal of Criminology

By: Park, S., Lu, H., Donnelly, J.W., and Hong, Y.

Hotspot Homes: An Analysis of the Situational/Contextual Factors, Windows of Opportunity, and Attempted Burglaries on Repeatedly Burglarized Residential Homes (2018) (Thesis Published at University)

By: Donnelly, J.W.

PRESENTATIONS/ PROFESSIONAL DEVELOPMENT:

- Workshop Taught (UNLV Graduate MS Emergency Management Program): *Understanding Data: Practical Applications of Data Management for Emergency Managers – Use of GIS.*
  By: Joshua W. Donnelly
- *The Concentration of Gunshots Using ShotSpotter Data (2019)*
  By: Joshua W. Donnelly, Stacey Clouse, & William H. Sousa.
- *Assessing Perceptual Differences Between Police and Citizens (2019)*
  By: Stacey Clouse, Joshua W. Donnelly, & William H. Sousa.
- *Traffic Fatality Analysis (2019)*

By: Joshua W. Donnelly and William H. Sousa

COMMUNITY ENGAGEMENT/ SERVICE/ VOLUNTEERING:

- Create curriculum and content for Emergency Management Graduate Program
- Social Media Research Team at Las Vegas Metro Police Department (2019)
  Joshua W. Donnelly – Research and Development Liaison.
- Las Vegas Traffic Safety Symposium (2019)
  Presenters: William H. Sousa, and Joshua W. Donnelly.
- 360 Blueprint Reno Police Department / Washoe County School District
  Mentor at-risk youth within the school system.