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Abstract

Although massage parlors have been associated with illicit activities including prostitution, less is known about their association with neighborhood crime. Employing the Computer Automated Dispatch/Record Management System (CAD/RMS), online user review, licensing, Census, and zoning data, we examine the impact of massage parlors on crime in their surrounding neighborhoods. Using spatial autoregressive models, our results indicate the total number of massage parlors was associated with increased social disorder. The presence of illicit massage parlors in adjacent neighborhoods was associated with crime and physical disorder in the focal neighborhoods. This study has consequences for how police address crime associated with massage parlors. Specifically, the use of online user review forums could be an effective way to identify illicit massage parlors. Recommendations for policing and code enforcement are discussed.

Keywords

massage parlors, neighborhood crime, prostitution, online forums, policing

The idea that sexually oriented businesses increase crime in surrounding neighborhoods has been long held, though research evaluating this claim has met with mixed findings. One potential explanation for the disparate results is that prior research aggregates a wide range of adult entertainment venues together for analysis (e.g., adult dance clubs, adult video/bookstores, escort services, etc.) or examines only adult clubs. This is problematic given wide variation in the people and activities taking place at different types of adult entertainment venues. Although research attention has been given to the potential criminogenic impacts of many of these businesses, relatively little research has addressed massage parlors specifically.

Due to the unique nature of massage parlors, these establishments might have differing impacts on their surrounding neighborhoods compared with other sexually oriented businesses. Unlike other types of adult venues, which blatantly sell sexually explicit materials legally and are often relegated to industrial areas, massage parlors are

not explicitly associated with the commercial sex industry and are often located within traditional retail spaces. This is further complicated by the fact that many (if not most) massage parlors do not offer sexual services. As such, there are two types of massage parlors: (a) licit businesses providing legal massage services, and (b) illicit massage parlors, which provide illegal sexual services under the guise of providing legal massage services (Bouché & Crotty, 2017). Although prostitution may occur in both illicit massage parlors and other types of commercial sex establishments (e.g., adult clubs), prostitution occurring in illicit massage parlors could be more hidden given the nonsexual orientation of these businesses overall. This unique nature of illicit massage parlors contributes to difficulty identifying and intervening in these establishments compared with street prostitution or explicitly sexually oriented businesses. Thus, the distinction between types of massage parlors (all massage parlors and illicit massage parlors) should also be examined for further understanding of the impact of massage parlors on crime in their surrounding neighborhoods.

The current study uses data from a variety of sources to evaluate the impact of massage parlors on neighborhood crime levels in Mesa, Arizona. Official licensing data were used to identify all licensed massage parlors. To distinguish between licit (massage establishments that do not provide sexual services) and illicit massage parlors (massage establishments that do provide sexual services), online web forums that enable users to rate sexual services provided in illicit massage parlors were used. Some of these illicit massage parlors were unlicensed. As preventing and intervening in commercial sex activities can be difficult for the police, especially when these activities occur indoors and are advertised online (Linz, Land, Williams, Bryant, & Ezell, 2004; Ryder, 2003), our study develops a methodology for identifying illicit massage parlors. This methodology will be useful in determining whether these establishments impact neighborhood crime and facilitate law enforcement identification of both illicit massage parlors providing sexual services and unlicensed massage parlors that are violating municipal operating codes.

Why Massage Parlors?

Illicit massage parlors are distinct from street prostitution and other sex establishments in the nature of these businesses, their patrons, and the workers who staff them. Although other sex establishments have been associated with prostitution (e.g., adult clubs and video stores; Raphael & Shapiro, 2004), illicit massage parlors differ in that they are not explicitly sexually oriented in nature. The lack of an explicit sexual orientation facilitates the hidden nature of sexual services occurring on-site, creating fewer public problems. Those involved in illicit massage parlors often do not report crime due to the illegal activities taking place in these establishments (Nemoto, Iwamoto, Wong, Le, & Operario, 2004; Stanko, 2006), rendering the identification of illicit massage parlors and associated crime challenging. As the police are often not notified of crime occurring at illicit massage parlors, there are limited enforcement

concerns for owners, and the customers get what they want in a private and innocuous setting, allowing these locations to persist.

The patrons of illicit massage parlors are inherently distinct from those who obtain commercial sex in other ways, particularly because they seek sex in businesses that are not outwardly sexually oriented. Those with lower financial resources are more likely to utilize street prostitution than masseuses (Adriaenssens & Hendrickx, 2012; Jeal & Salisbury, 2007). Adult clubs often provide alcohol to customers, which can create additional issues in these establishments (Jarrett, Kellison, Busch-Armendariz, & Kim, 2013; Lavin, 2014). Theaters and adult video stores have been associated with patrons who are poor, homosexual, or sexually deviant (Douglas & Tewksbury, 2007; Tewksbury, 2008). It would appear that as the nature of the sexually oriented business moves on a continuum from the street to hidden venues such as illicit massage parlors, the social class of the customers increases as well. This increasing class of clientele is also associated with increasing prices to obtain sexual services (Adriaenssens & Hendrickx, 2012). Therefore, those who utilize illicit massage parlors, which are not explicitly sexually oriented in nature, to obtain commercial sex likely differ from users of other commercial sex establishments. These differences in the clientele of various commercial sex establishments could result in distinct impacts of these businesses on crime in their surrounding areas. Thus, illicit massage parlors could impact their neighborhoods in different ways than adult clubs or other forms of commercial sex establishments.

Crime Related to Massage Parlors

Evaluating the impact of illicit massage parlors on crime should naturally begin with a discussion of those offenses that occur within illicit massage parlors themselves, as these offenses could impact the surrounding neighborhoods in important ways. Aside from prostitution and human trafficking, crimes committed in illicit massage parlors fall into several categories: offenses committed against massage parlor employees, offenses committed by massage parlor employees, offenses committed by massage parlor owners/managers, and offenses relating to criminal networks.

It is widely recognized that women engaged in commercial sex work are vulnerable to violent offenses and financial exploitation (Bungay, Halpin, Halpin, Johnston, & Patrick, 2012; Nemoto et al., 2004). Sex workers in illicit massage parlors are especially vulnerable to victimization due to the illegal nature of their services, the immigration status of many of these employees, and language barriers between masseuses, the police, and service providers (Bungay et al., 2012; Nemoto et al., 2004; Stanko, 2006). These factors result in hidden victimization of masseuses, which goes largely unreported to police (Stanko, 2006). A total of 62% of Asian masseuses in a study conducted in San Francisco reported being assaulted by customers (Nemoto et al., 2004). In a study of 32 massage parlors, among other indoor sex venues in Canada, sexual assault, verbal assault, the deceptive removal of condoms, and financial exploitation were the most common forms of victimization (Bungay et al., 2012). These

findings reveal that massage parlor clients can be violent, and could potentially commit violent acts in areas surrounding massage parlors as well. Although massage parlor employees tend to be victims as opposed to offenders for violent and financial offenses, these employees can fall into the role of offenders when it comes to drug crimes, as research has found a high correlation between sex workers and drug abuse (Hughes, Chon, & Ellerman, 2007; Lavin, 2014).

Owners and managers of illicit massage parlors can also be involved in a range of criminal activity, including both nonviolent and violent offenses, which substantially impacts the experiences of their employees. An evaluation of indoor commercial sex establishments in Sri Lanka found that women were often forced to take clients by their managers, even when the client was violent or abusive (Miller, 2002). That said, some managers support masseuses in reducing opportunities for violence and reporting violent patrons (Bungay et al., 2012). One manager even suggested that threatening violence against customers who abuse their staff is the most effective method to prevent assaults on their employees (Bungay et al., 2012). Illicit massage parlor managers are sometimes also involved in human trafficking, with human traffickers perpetrating a wide range of offenses against their victims, including rape, assault, extortion, and homicide (Bales & Lize, 2005), which could lead to further victimization of trafficked massage parlor employees by their employers.

Some massage parlor owners are related to Asian crime networks, with members of these networks being attracted to the massage parlor industry for both sexual gratification and financial benefit (Hughes et al., 2007; Miller, 2002; Nemoto et al., 2004). Not all Asian gang members are direct recipients of money earned in illicit massage parlors, though they often rob or extort money from masseuses (Nemoto et al., 2004). These criminal networks are also engaged in a range of nonviolent offenses, including drug trafficking, extortion, home invasion offenses, and gambling (Hughes et al., 2007), which could impact areas surrounding massage parlors.

The Impact of Massage Parlors on Surrounding Neighborhoods

Research examining the neighborhood impact of sexually oriented businesses has largely focused on resident attitudes and crime associated with establishments that are overtly sexual in nature. Less research has examined the impact of illicit massage parlors, which are not overtly sexual. Residents living in neighborhoods near proposed sites for explicitly sexually oriented businesses (such as adult clubs, escort services, etc.) often oppose these businesses because of concerns surrounding immorality and criminality (Hanna, 2005; Prior & Croft, 2012). Due to these resident objections, sexually oriented businesses are generally located in industrial areas away from residential neighborhoods, or in neighborhoods characterized by poverty and high levels of residential instability (Edwards, 2010; Prior & Croft, 2012; Ryder, 2003). However, as illicit massage parlors are not explicitly sexual, these concerns may not apply to these establishments, which are often located in high-traffic commercial areas (Bouché & Crotty, 2017; Polaris, 2018).

A study of attitudes toward sexually oriented businesses in Australia indicated that more than 98% of residents near proposed sex establishments responded that the business would have a negative effect on their neighborhood; however, surveys of residents living near existing sexually oriented businesses were largely unaware of the presence of these locations (Prior & Croft, 2012). Of the respondents who were aware of the existing sex premises in their area, 72% of residents living within a 400-meter radius of a sexually oriented business stated that it did not have any negative effects on their neighborhood (Prior & Croft, 2012). This reveals that the perceived impacts of these sexually oriented businesses outweighed the lived reality, suggesting that discrete, indoor commercial sex establishments are less of a concern for community residents than uncontrolled street prostitution (Prior & Croft, 2012).

The idea that the perceived impact of commercial sex establishments on crime outweighs the true impact of these establishments has been supported by other research finding that sex establishments do not increase crime in their surrounding neighborhoods (see Hanna, 2005; Linz et al., 2004; Linz, Paul, & Yao, 2006). Conversely, some research has found a significant relationship between sexually oriented businesses and crime (McCord & Tewksbury, 2012). Although these findings are important for commercial sex establishments operating overtly, they might not hold for illicit massage parlors. As sexual services are provided behind closed doors under a legal façade, it distances illicit massage parlors from law enforcement. Thus, illicit massage parlors could be attractive targets for criminal activity that might spill out into the surrounding neighborhood.

Violent, financial, and drug crimes occurring within illicit massage parlors could serve as an invisible criminogenic threat to surrounding neighborhoods. In addition, organized crime networks linked to the illicit massage parlor industry might also impact neighborhoods (Hughes et al., 2007; Nemoto et al., 2004), as individuals in communities surrounding illicit massage parlors could be more exposed to the presence of these networks. However, as discussed above, many offenses occur within the illicit massage parlors themselves, thus, crime in neighboring areas may be the same or even lower than crime in general, rendering the relationship between neighborhood crime and illicit massage parlors distinct from the relationship between neighborhood crime and commercial sex establishments explicitly promoting sexual services.

One widely noted concern with illicit massage parlors is the potential for these establishments to serve as hubs of human trafficking, which impacts illicit massage parlor employees and could impact surrounding neighborhoods as well. Human trafficking specifically has been associated with drug sales (Shelley, 2012), which could occur within and/or around illicit massage parlors associated with human trafficking. One study examining the relationship between the presence of undesirable businesses, desirable businesses, and the visibility of drug sales found that neighborhoods with the highest reported levels of visible drug sales had the fewest massage parlors and escort services (Ford & Beveridge, 2004). They, furthermore, found that the tracts with the

lowest rates of visible drug sales had the largest number of massage parlors (Ford & Beveridge, 2004). This, again, may be explained by the notion that high numbers of drug sales are occurring inside these businesses and, thus, are not represented in data evaluating visible drug sales.

Current Study

The current study examines the relationship between massage parlors and crime and disorder in neighborhoods, and the spillover effects of massage parlors in the primary neighborhood. Utilizing Computer Automated Dispatch/Record Management System data (CAD/RMS), along with U.S. Census data, city land-use data, business-licensing information, and data compiled from online illicit massage parlor user forums, we examine the relationship between the presence and spillover effects of massage parlors within neighborhoods and crime in Mesa, Arizona, a large diversely populated suburb of Phoenix. Although some research has addressed crime—namely, sex and violent crime—that occurs inside illicit massage parlors, we do not have a good sense of how massage parlors impact the immediate and adjacent social dynamics in neighborhoods. By understanding the spatial relationship between massage parlors and crime, this study seeks to better understand the social context in which massage parlors operate and the problems illicit massage parlors specifically contribute (or do not contribute) to their surrounding communities in regard to crime and disorder. Thus, the results of the present study will reveal any potential need (or lack thereof) of policies and interventions that could be used to address all massage parlors and illicit massage parlors in particular.

Method

Setting

Human trafficking in illicit massage parlors is pervasive with documented incidents occurring in every state (Polaris, 2018). Although some research has addressed illicit massage parlors in widely recognized trafficking hubs (for example, Houston, Texas; see Bouché & Crotty, 2017), research has yet to address the impact of illicit massage parlors in cities that do not have a reputation as human trafficking centers. The current study addresses this limitation through examining the impact of illicit massage parlors in the city of Mesa, Arizona. The impetus for this work stems from a collaborative project with the Mesa Police Department (MPD) regarding the relationship between massage parlors and crime, as part of an initiative in the reduction of human trafficking in Mesa, Arizona.

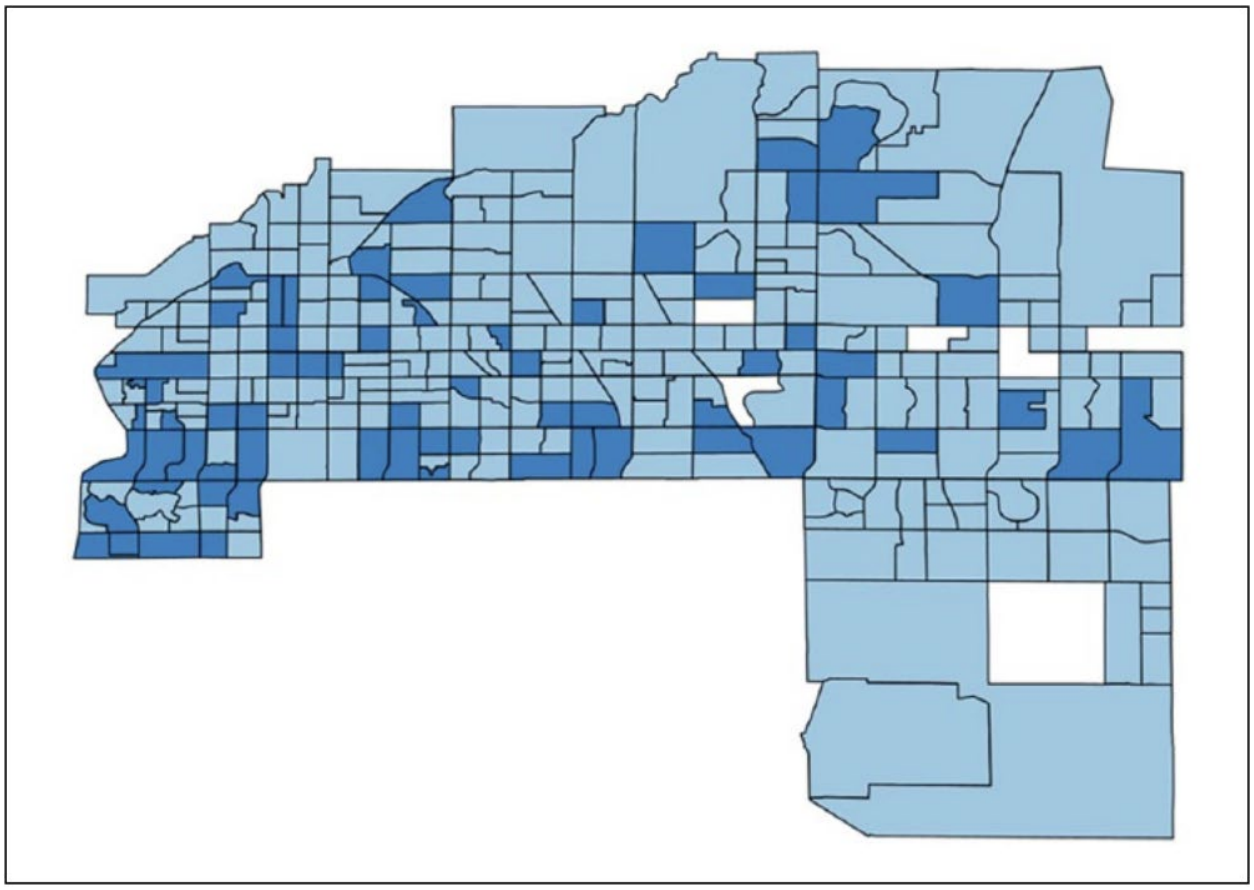
Mesa is an exurb of Phoenix, bordered by the cities of Tempe, Chandler, and Gilbert, Arizona, as well as the Salt River Pima-Maricopa Indian Community. Mesa is the third largest city in the state, following Phoenix and Tucson. According to the 2010 Decennial Census, the city has a population of 439,041 and is largely non-Hispanic White (63.4%); the next largest population in the city is Hispanics, at 26.5% (U.S. Census Bureau, 2010b). In 2013, Mesa reported experiencing approximately 14,724

Part 1 Uniform Crime Reporting (UCR) Crimes, with only 23 of those being homicides (see City of Mesa, 2015, 2016). Indeed, Mesa was ranked by the FBI as the third lowest city (for cities with a population of more than 400,000) in the nation for violent and property crimes (Mungenast, 2014), making Mesa a rather safe community.

Data

The present study uses data obtained from five sources: (a) online public user review forums, (b) official establishment licensing data, (c) the 2007-2011 American Community Survey, (d) land-use data from the City of Mesa, and (e) CAD/RMS data from the MPD. First, data were collected through user reviews obtained from the nation's largest massage parlor web forums. User reviews posted on web forums are increasingly being used to collect data from hard-to-reach populations such as john's (Holt & Blevins, 2007), those who visit adult clubs (Soothill & Sanders, 2005), gangs (Pyrooz, Decker, & Moule, 2013), and hate groups (Chau & Xu, 2007). Online forum users are required to complete surveys that prompt users to answer questions using standardized survey item response categories, resulting in reduced error and inconsistency between users (Rhodes, Bowie, & Hergenrather, 2003).

Massage parlor web forums cost users approximately US$30 a month for the opportunity to review and rate women who provide sexual services in illicit massage parlors. These forums allow the user to rate—through closed and open response options—the quality, content, and cost of services based on their experience in an illicit massage parlor. This includes graphic details of the user's perceptions of the attractiveness of the masseuses, the ethnicity and age of the masseuses, the services available and their respective costs, the name and address of the massage parlor, its cleanliness, the name of the masseuse, as well as a variety of other information about the parlor and masseuse. After a user has provided a review, other users are permitted to comment and ask questions. These web forums are categorized by state, metropolitan area, and city. For our purposes, we collected user review data from the nation's two largest massage parlor web forums—Erotic MP and Rub Maps for massage parlors located in Mesa, Arizona. This required paying a membership fee to each of the web forums. Following the attainment of memberships, we manually downloaded all archived user review data in November 2012. A total of 48 illicit massage establishments were identified in Mesa. Specifically, users of Erotic MP identified 37 illicit massage parlors and users of Rub Maps identified 39 illicit massage parlors. In all, 28 of the illicit massage parlors were identified on both websites.



FIGIURE 1. Massage parlors in Mesa, Arizona

Next, we collected publicly available massage establishment licensing data from the MPD, including all 103 licensed massage establishments in the city. All establishments that practice massage are required by city ordinance (section 5-12-1) to obtain a business license prior to operating. Coupling these data from the web user forums enabled us to triangulate which massage parlors were licensed and which were unlicensed. Of the 48 illicit massage parlors identified through illicit massage parlor web forums, 12 (25%) were unlicensed and were not captured in the licensing data obtained from the MPD. Figures 1 and 2 show the locations of all massage parlors and illicit massage parlors in Mesa; the light blue neighborhoods are those with no massage parlors, while the darker blue neighborhoods have at least one massage parlor.

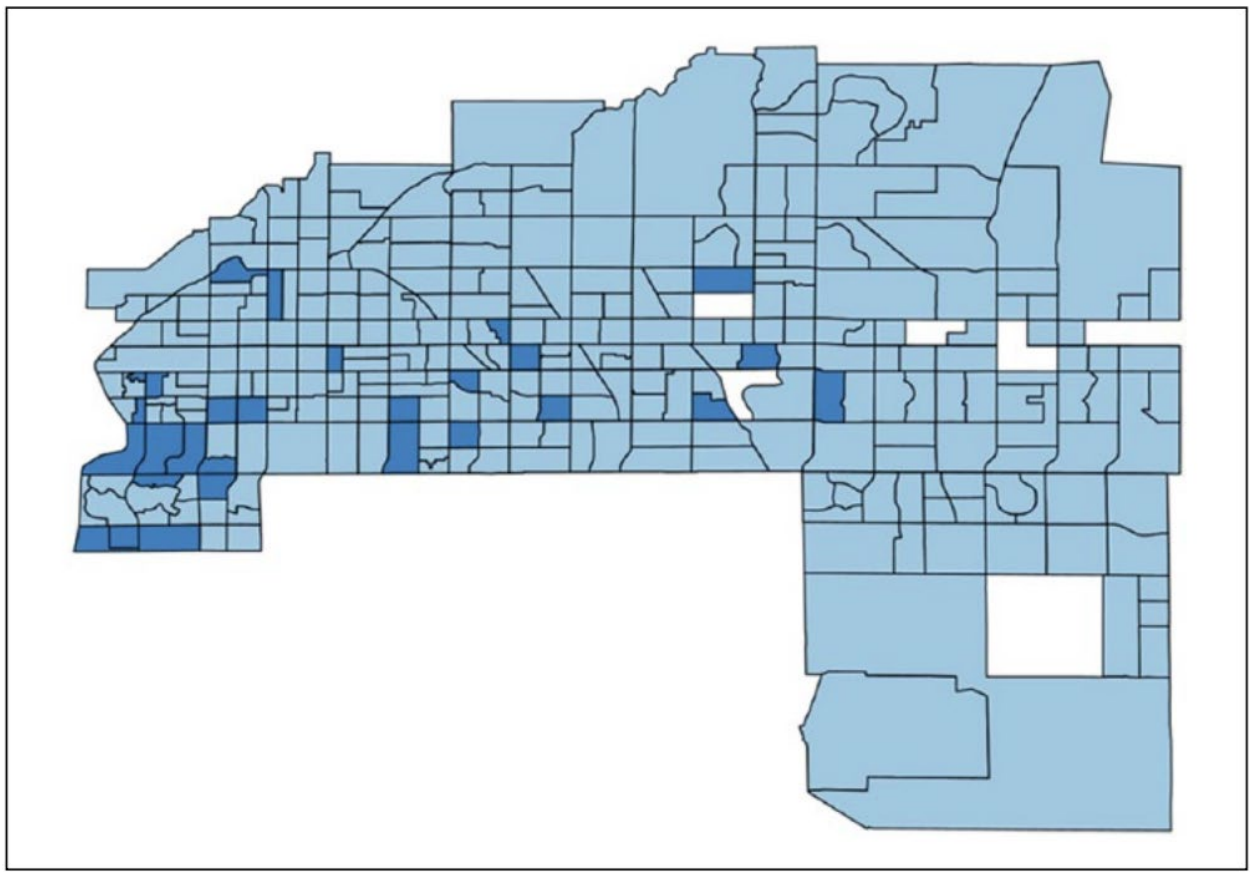


FIGURE 2. Illicit massage parlors in Mesa, Arizona

Our geographic unit of analysis is the Census block group, which originate from the 2010 U.S. Census Tiger/Line Shapefiles (U.S. Census Bureau, 2010a), accounting for a total of 312 block groups in the city of Mesa. Massage parlors and City of Mesa calls for service were then spatially joined with each Census block. The massage parlor user forums, licensing, CAD/RMS, Census, and land-use data were geocoded and attached to the Census block groups. There are six block groups with missing information and are, therefore, not included in the analyses.Land-use data for the City of Mesa was broken down into three categories, residential, commercial, and mixed land use. The percentage of land use for each category was calculated in ArcGIS 10.0 by intersecting the block group Shapefile with the land-use Shapefile and calculating the new area for each land-use type within the block groups.

CAD/RMS data include all calls for service to emergency dispatch, as well as citizen- and police-initiated activity in Mesa from June 1, 2012 to May 31, 2013. These data were used to determine the crime measure for each block group by aggregating this point-level data up to the block-group level. All duplicate incidents and incidents with locations that fell outside of the Mesa block groups were removed. Measurements of neighborhood crime have been traditionally limited to official crime reports, even though several researchers argue that official crime data are inappropriate for such studies (Mazerolle, Price, & Roehl, 2000; Sherman, Gartin, & Buerger, 1989; Sherman

& Weisburd, 1995) due to substantial underreporting of less serious crimes, which the police often handle informally (Skogan, 1990). In addition, because of underreporting, official crime data often do not have enough cases to produce statistical power (Mazerolle et al., 2000; Sherman & Weisburd, 1995). By using CAD/RMS data, we obtain a more accurate and statistically powerful view of neighborhood-level problems, such as prostitution, disorder, and domestic violence, through the inclusion of both citizen- and police-initiated contacts.

Data from the 2007 to 2011 American Community Survey from the 2010 U.S. Census were used to calculate neighborhood-level variables. Dependent Variables Our dependent variables (DV) include the logged calls for service rate (per 1,000) by call type per block group in Mesa. From the CAD/RMS data, the following measures were constructed: total crime, violent crime, property crime, domestic violence, drug crime, prostitution, social disorder, physical disorder, and other crime. Violent crime constitutes incidents labeled as fighting, homicide, kidnapping, shooting, shots fired, strong armed robbery, subject with a gun, subject with a knife, threat, armed robbery, assault, aggravated assault, stabbing, armed robbery alarm, harassment, and child molestation. Property crime constitutes forgery, credit card fraud, burglary business, burglary residence, theft from a business, theft from a residence, theft from a vehicle, shoplifting, stolen vehicle, stolen bait car, trespassing, recovered stolen vehicle, and prowler. Domestic violence crimes include those labeled as either custodial interference or family fight. Drug crime consists of the incidents labeled drugs. Prostitution consists of the incidents labeled prostitution. Social disorder incidents include those labeled welfare check, dog barking, dog bite, dog pickup, insane persona, intoxicated person, juveniles disturbing, loose dogs, loud music/noise, neighbor trouble, order of protection, indecent exposure, and subjects disturbing. Physical disorder incidents are those labeled as either abandoned vehicle or city code violation. Finally, other crimes include Driving Under the Influence (DUI) citations, suspicious activity, suspicious person, suspicious vehicle, and warrant arrest. Each crime variable was aggregated into a count per block group, then turned into a rate (per 1,000) and then logged (+1) due to the skewed nature of the variables.

Independent Variables and Controls

Our independent variables are constructed by typifying and counting massage parlors in Mesa. Our two data sources—user review data and massage parlor licensing data—enable us to determine if massage parlors provide illicit sexual services and are operating without a valid license. As such, we have two independent variables (IV): the count of massage parlors (licit or illicit) in a neighborhood and the count of *illicit massage parlors* in a neighborhood.

Next, a land-use variable is included in the models to account for the known relationship between crime and types of land use (Browning et al., 2010; Katz, Wallace, & Hedberg, 2013). We control for the effects of commercial land because massage

parlors are often located in commercial areas. *Commercial land use* is the percent of the area within the block group that is zoned for commercial use.

We include additional neighborhood controls that likely relate to crime in Mesa. First, from the Census data, we include the *percent young male* (15-24 *years old*); this measure is standardized. Second, *economic disadvantage* is a factor score constructed using principal components factor scoring of three Census variables, specifically the percent unemployment, percent of the population on public assistance, and the percent of the population under 150% of the poverty line. Economic disadvantage has an eigenvalue of 1.38, with factor loadings of 0.69 for percent unemployment, 0.54 for public assistance, and 0.80 for the population under the 150% poverty line. Third, *social disorganization* is also a factor score using two Census variables: percent renter and the percent of households that are headed by females with children. Social disorganization has an eigenvalue of 1.53, with factor loadings of 0.87 for both percent renter and percent of female-headed households with children. Typically, the variables used to construct the social disorganization and economic disadvantage factor variables would be used to generate one factor of concentrated disadvantage (see Sampson & Raudenbush, 1999). When these variables are factored together, they generate two factors; as such, we separated them in the model. Last, *population density* is the number of people within a Census block group per square mile. Descriptive statistics for all variables are in Table 1.

Analysis Plan

We conduct spatial autoregressive (SAR) models to understand the direct and spillover effects of massage parlors—both licit and illicit—on a variety of neighborhood crime types. We first construct a spatial weights matrix. We employ a contiguity spatial weights matrix, where each contiguous spatial unit (i.e., the directly adjacent units or the queen version of defining neighbors) has the same spatial weight, and all other units have a weight of zero. We employ the “spmatrix” and “spregress” commands in Stata 15 to construct the spatial weights matrix and conduct the SAR analyses.

Table 1. Summary Statistics.

	M	*SD*
All Calls for Service Rate	303.161	426.203
Violent Crime Rate	19.839	26.985
Property Crime Rate	19.839	26.985
Domestic Violence Crime Rate	19.839	26.985
Drug Crime Rate	11.596	13.064
Other Crime Rate	19.839	26.985
Prostitution Rate	10.115	16.523
Social Disorder Rate	7.743	9.502
Physical Disorder Rate	65.477	141.840
Total Massage Parlors	0.313	0.683
Total Number of Illegal Massage Parlors	0.105	0.357
Social Disorganization	0.000	1.000
Economic Disadvantage	0.000	1.000
Population Density	961.241	2,727.619
Percent Commercial Land Area	10.613	13.893

Next, we ascertain whether spatial dependence is present for the crime type outcomes. We do this by using the Moran's I statistic[1]; if the Moran's I is significant, then spatial dependence should be accounted for in the models. Next, we conduct the spatial autoregressive models that take into consideration the spatial dependence of the outcome (i.e., crime in the neighborhoods adjacent to the focal neighborhood impact crime in the focal neighborhood). These models include a spatial lag of the dependent variable and the count of massage parlors (or illicit massage parlors, depending on the model). This modeling strategy enables us to identify the direct effects of massage parlors on neighborhood crime and any indirect spillover effects *from massage parlors in adjacent neighborhoods.* The equation for the model is,

$$y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 Wy + \beta_4 Wx_1 + \varepsilon$$

where β_0 represents the intercept, $\beta_1 x_1$ represents the vector of control variables and their corresponding effects, $\beta_3 W_y$ represents the spatially lagged DV (crime rates) and its effects, and $\beta_4 Wx_1$ represents the spatially lagged IV (count of massage parlors) and its effects.[2]

Table 2. The Moran's I Test of Spatial Dependence for Each Logged Outcome.

Logged outcome	Moran's I	*p* Value
Total Crime Rate	205.776	.000
Violent Crime Rate	176.540	.000
Property Crime Rate	176.540	.000
Domestic Violence Rate	176.540	.000
Drug Crime Rate	144.621	.000
Other Crime Rate	176.540	.000
Prostitution Rate	211.186	.000
Social Disorder Rate	16.942	.000
Physical Disorder Rate	192.551	.000

Results

Table 2 shows the results for the Moran's I tests on the DV. For all outcomes, the Moran's I is significant, indicating spatial dependency in the crime outcome measures. This test confirms that SAR models should be used to account for spatial patterning in these data.

Next, we proceed with the SAR models. Remember, in these models, we include a spatial lag of the DV as well as the massage parlor variable. Moreover, SAR models cannot be interpreted like traditional ordinary least squares (OLS) regression given that the coefficients represent a recursive relationship between the DV and IV that is related to the spillover of those effects into surrounding neighborhoods. Thus, while we show the results of the models, we interpret the average effects of the recursive process by showing the direct effects (i.e., the IV on the DV in the focal neighborhood), the indirect effects (i.e., the effect of the IV from the adjacent neighborhoods on the DV in the focal neighborhood), and the total effects (i.e., the direct and indirect effects combined).[3]

All Massage Parlors

In Table 3, we show the results of the SAR models for the logged outcomes of the total crime rate, violent crime rate, and property crime rate. Beginning with the first model for the total crime rate in the model section of the table, the count of all massage parlors does not have a significant effect on the total crime outcome. The spatial lag of all massage parlors also has no effect. This shows that massage parlors in the focal neighborhood have no effect on crime and neither do massage parlors in the adjacent neighborhoods. Other controls impact crime in the focal neighborhoods: the % male aged 15 to 24, economic disadvantage, social disorganization, logged % commercial land use, and the spatial lag of the dependent variable, total crime. Most of these variables have both direct and indirect effects on the amount of total crime in the focal neighborhood. For instance, as shown in the direct effects section of the model for total crime, economic disadvantage has a positive relationship with total crime; put another way, as economic disadvantage in the focal neighborhood increases, the amount of logged total crime in the focal neighborhood also increases. Interpreting the same effect in the indirect section of the table for the total crime outcome, we see that as economic disadvantage in the adjacent neighborhoods increases, the amount of logged total crime in the focal neighborhood also increases. Given that these findings are similar across most models, to reduce redundancy, we limit our discussion to the effects of the IVs on the DVs for the coming models.

Also in Table 3 are the results for the logged violent crime rate. Like total crime, we see that the count of massage parlors does not have a significant effect on the violent crime outcome, nor does the spatial lag of massage parlors. This shows that massage parlors in the focal neighborhood have no effect on violent crime and neither do massage parlors in the surrounding neighborhoods. The same results are found for the logged property crime outcome.

Table 4 shows the results of the SAR models for the logged domestic violence rate, drug crime rate, and other crime rate. For the first model—domestic violence—massage parlors, again, have no direct or indirect effect on domestic violence. We find the same effects for both the drug crime and other crime outcomes. Note though, that for the logged drug crime rate, the count of massage parlors is significant at $p < .1$. When examining the direct and indirect effects of massage parlors on drug crime, the direct effect of massage parlors on drug crime has a $p = .053$, which is on the cusp of significance. Thus, the count of massage parlors in the focal neighborhood is associated with the logged drug crime rate at 0.13, demonstrating that higher numbers of massage parlors, regardless of being licit or illicit, increase drug crime in the focal neighborhood. In sum, the count of massage parlors in the focal neighborhood has no effect on domestic violence or other crimes, and neither does the count of massage parlors in the surrounding neighborhoods. Counts of massage parlors, regardless of type, have a positive relationship with the logged drug crime rate, though this is a weak relationship.

Table 3. Spatial Autoregressive Models Predicting the Logged Rates of Total, Violent, and Property Crime With Spatial Lags for the Dependent Variable (DV) and Massage Parlors.

	Logged Total crime rate		Logged Violent crime rate		Logged Property crime rate	
	Effect	*p* Value	Effect	*p* Value	Effect	*p* Value
Model						
Count of Massage Parlors	0.092	.252	0.044	.538	0.044	.538
% of Male Population Ages 15-24, Standardized	−0.144	.005	−0.091	.048	−0.091	.048
Economic Disadvantage	0.183	.002	0.135	.012	0.135	.012
Social Disorganization	0.272	.000	0.194	.000	0.194	.000
Population Density, Standardized	−0.097	.052	−0.035	.429	−0.035	.429
Logged % Commercial Land Use	0.078	.001	0.060	.003	0.060	.003
Constant	4.099	.000	1.518	.000	1.518	.000
Spatial Lag: Count of Massage Parlors	0.241	.211	0.189	.275	0.189	.275
Spatial Lag: DV	0.198	.000	0.396	.000	0.396	.000
Direct Effects						
Count of Massage Parlors	0.099	.214	0.056	.430	0.056	.430
% of Male Population Ages 15-24, Standardized	−0.145	.005	−0.093	.048	−0.093	.048
Economic Disadvantage	0.184	.002	0.138	.012	0.138	.012
Social Disorganization	0.274	.000	0.198	.000	0.198	.000
Population Density, Standardized	−0.098	.052	−0.036	.429	−0.036	.429
Logged % Commercial Land Use	0.079	.001	0.061	.003	0.061	.003
Indirect Effects						
Count of Massage Parlors	0.272	0.163	0.276	.206	0.276	.206
% of Male Population Ages 15-24, Standardized	−0.030	.020	−0.048	.071	−0.048	.071
Economic Disadvantage	0.038	.005	0.072	.013	0.072	.013
Social Disorganization	0.057	.001	0.103	.003	0.103	.003
Population Density, Standardized	−0.020	.073	−0.019	.431	−0.019	.431
Logged % Commercial Land Use	0.016	.007	0.032	.016	0.032	.016

(continued)

Table 3. (continued)

	Logged Total crime rate		Logged Violent crime rate		Logged Property crime rate	
	Effect	*p* Value	Effect	*p* Value	Effect	*p* Value
Total Effects						
Count of Massage Parlors	0.371	.066	0.332	.153	0.332	.153
% of Male Population Ages 15-24, Standardized	−0.175	.006	−0.141	.051	−0.141	.051
Economic Disadvantage	0.222	.002	0.209	.009	0.209	.009
Social Disorganization	0.330	.000	0.301	.000	0.301	.000
Population Density, Standardized	−0.118	.053	−0.055	.428	−0.055	.428
Logged % Commercial Land Use	0.095	.001	0.093	.005	0.093	.005

Table 4. Spatial Autoregressive Models Predicting the Logged Rates of Domestic Violence, Drug, and Other Crime With Spatial Lags for the Dependent Variable (DV) and Massage Parlors.

	Logged Domestic violence rate		Logged Drug crime rate		Logged Other crime rate	
	Effect	*p* Value	Effect	*p* Value	Effect	*p* Value
Model						
Count of Massage Parlors	0.044	.538	0.121	.079	0.044	.538
% of Male Population Ages 15-24, Standardized	−0.091	.048	−0.069	.119	−0.091	.048
Economic Disadvantage	0.135	.012	0.101	.049	0.135	.012
Social Disorganization	0.194	.000	0.039	.452	0.194	.000
Population Density, Standardized	−0.035	.429	−0.065	.131	−0.035	.429
Logged % Commercial Land Use	0.060	.003	0.041	.039	0.060	.003
Constant	1.518	.000	1.263	.000	1.518	.000
Spatial Lag: Count of Massage Parlors	0.189	.275	0.142	.400	0.189	.275
Spatial Lag: DV	0.396	.000	0.406	.000	0.396	.000
Direct Effects						
Count of Massage Parlors	0.056	.430	0.132	.053	0.056	.430
% of Male Population Ages 15-24, Standardized	−0.093	.048	−0.071	.119	−0.093	.048
Economic Disadvantage	0.138	.012	0.103	.049	0.138	.012
Social Disorganization	0.198	.000	0.040	.452	0.198	.000
Population Density, Standardized	−0.036	.429	−0.066	.131	−0.036	.429
Logged % Commercial Land Use	0.061	.003	0.042	.040	0.061	.003
Indirect Effects						
Count of Massage Parlors	0.276	.206	0.260	.223	0.276	.206
% of Male Population Ages 15-24, Standardized	−0.048	.071	−0.038	.155	−0.048	.071
Economic Disadvantage	0.072	.013	0.055	.053	0.072	.013
Social Disorganization	0.103	.003	0.022	.450	0.103	.003
Population Density, Standardized	−0.019	.431	−0.036	.156	−0.019	.431
Logged % Commercial Land Use	0.032	.016	0.022	.073	0.032	.016
Total Effects						
Count of Massage Parlors	0.332	.153	0.392	.084	0.332	.153
% of Male Population Ages 15-24, Standardized	−0.141	.051	−0.109	.126	−0.141	.051

(continued)

Table 4. (continued)

	Logged Domestic violence rate		Logged Drug crime rate		Logged Other crime rate	
	Effect	*p* Value	Effect	*p* Value	Effect	*p* Value
Economic Disadvantage	0.209	.009	0.159	.044	0.209	.009
Social Disorganization	0.301	.000	0.062	.449	0.301	.000
Population Density, Standardized	−0.055	.428	−0.102	.134	−0.055	.428
Logged % Commercial Land Use	0.093	.005	0.064	.045	0.093	.005

Table 5 shows the results of the SAR models for the logged prostitution rate, social disorder rate, and physical disorder rate. Like before, we find that the count of massage parlors in the focal neighborhood has no effect on prostitution or physical disorder, and neither does the count of massage parlors in the surrounding neighborhoods. However, massage parlors do have an effect on social disorder. In the second model of Table 5, the main effect and spatial lag for social disorder are both significant. The direct and indirect effects below show how this relationship is structured. The direct effect of the count of massage parlors on logged social disorder is 1.54, showing that for each additional massage parlor in the focal neighborhood, the logged social disorder rate increases by a factor of 1.54 in the focal neighborhood. There is not a significant indirect effect of massage parlors on social disorder, meaning that massage parlors in the adjacent neighborhoods do not impact social disorder in the focal neighborhood.

Illicit Massage Parlors

Tables 6 through 8 show the same models as above, only with the count of all massage parlors now being the count of illicit massage parlors. We differentiate between all massage parlors and illicit massage parlors because previous research has demonstrated that sexually oriented businesses are problematic for the local community in regard to both crime and disorder (Hanna, 2005; McCord & Tewksbury, 2012; Prior & Croft, 2012). These differentiated models enable us to ascertain whether all massage parlors, or just illicit massage parlors, have a spatial relationship with local crime and disorder.

Beginning with Table 6, which shows the logged outcomes of the total crime rate, violent crime rate, and the property crime rate, an interesting pattern emerges. While only significant at the $p < .1$ level, the spatial lag of the count of illicit massage parlors is significant across all outcomes. This suggests that illicit massage parlors in adjacent neighborhoods are impacting the logged crime rates of the focal neighborhood. To further examine this, we turn to the direct and indirect effects below. For all outcomes, we see an indirect effect of the count of illicit massage parlors on the outcome, again at $p < .1$. Put simply, this shows that there is a positive relationship between the number of illicit massage parlors in the adjacent neighborhoods and the logged outcomes of total, violent, and property crime: the higher the count of illicit massage parlors in the adjacent neighborhoods, the higher the logged total, violent, and property crime rates in the focal neighborhood.

In Table 7, for the outcomes of the logged domestic violence and other crime rate, the spatial lag of illicit massage parlors is significant at $p < .1$. The main effects for illicit massage parlors are nonsignificant for these three outcomes. While there is no direct effect of illicit massage parlors on the logged domestic violence and other crime rates, there is a positive indirect effect that is significant at $p < .1$. In sum, the higher the

Table 5. Spatial Autoregressive Models Predicting the Logged Rates of Prostitution, Social Disorder, and Physical Disorder With Spatial Lags for the Dependent Variable (DV) and Massage Parlors.

	Logged Prostitution rate		Logged Social disorder rate		Logged Physical disorder rate	
	Effect	*p* Value	Effect	*p* Value	Effect	*p* Value
Model						
Count of Massage Parlors	−0.003	.969	1.548	.000	0.081	.299
% of Male Population Ages 15-24, Standardized	−0.091	.063	−0.054	.348	−0.115	.022
Economic Disadvantage	0.159	.007	−0.016	.823	0.180	.002
Social Disorganization	0.162	.006	−0.011	.869	0.201	.001
Population Density, Standardized	−0.052	.274	−0.001	.984	−0.044	.362
Logged % Commercial Land Use	0.070	.001	0.040	.119	0.063	.005
Constant	0.725	.000	−0.032	.737	2.532	.000
Spatial Lag: Count of Massage Parlors	−0.006	.974	−1.579	.002	0.219	.243
Spatial Lag: DV	0.606	.000	1.013	.000	0.285	.000
Direct Effects						
Count of Massage Parlors	−0.004	.961	1.545	.000	0.090	.241
% of Male Population Ages 15-24, Standardized	−0.096	.062	−0.068	.859	−0.116	.022
Economic Disadvantage	0.169	.006	−0.020	.909	0.182	.002
Social Disorganization	0.172	.005	−0.014	.914	0.203	.001
Population Density, Standardized	−0.055	.272	−0.001	.984	−0.045	.362
Logged % Commercial Land Use	0.075	.001	0.051	.867	0.063	.005
Indirect Effects						
Count of Massage Parlors	−0.015	.965	0.226	.975	0.280	.176
% of Male Population Ages 15-24, Standardized	−0.107	.086	1.064	.977	−0.038	.043
Economic Disadvantage	0.188	.007	0.314	.975	0.059	.004
Social Disorganization	0.191	.012	0.219	.976	0.066	.005
Population Density, Standardized	−0.061	.277	0.021	.988	−0.015	.369

(continued)

Table 5. (continued)

	Logged Prostitution rate		Logged Social disorder rate		Logged Physical disorder rate	
	Effect	*p* Value	Effect	*p* Value	Effect	*p* Value
Logged % Commercial Land Use	0.083	.016	−0.792	.977	0.021	.019
Total Effects						
Count of Massage Parlors	−0.019	.959	1.771	.809	0.370	.088
% of Male Population Ages 15-24, Standardized	−0.204	.067	0.996	.979	−0.154	.023
Economic Disadvantage	0.357	.004	0.294	.977	0.242	.001
Social Disorganization	0.363	.005	0.205	.978	0.269	.001
Population Density, Standardized	−0.117	.270	0.020	.988	−0.059	.362
Logged % Commercial Land Use	0.158	.004	−0.741	.978	0.084	.006

Table 6. Spatial Autoregressive Models Predicting the Logged Rates of Total, Violent, and Property Crime With Spatial Lags for the Dependent Variable (DV) and Illicit Massage Parlors.

	Logged Total crime rate		Logged Violent crime rate		Logged Property crime rate	
	Effect	*p* Value	Effect	*p* Value	Effect	*p* Value
Model						
Count of Illicit Massage Parlors	0.006	.968	−0.011	.935	−0.011	.935
% of Male Population Ages 15-24, Standardized	−0.146	.005	−0.090	.049	−0.090	.049
Economic Disadvantage	0.164	.005	0.120	.022	0.120	.022
Social Disorganization	0.273	.000	0.192	.000	0.192	.000
Population Density, Standardized	−0.095	.058	−0.032	.467	−0.032	.467
Logged % Commercial Land Use	0.083	.000	0.061	.002	0.061	.002
Constant	4.069	.000	1.499	.000	1.499	.000
Spatial Lag: Count of Massage Illicit Parlors	0.637	.065	0.515	.096	0.515	.096
Spatial Lag: DV	0.212	.000	0.413	.000	0.413	.000
Direct Effects						
Count of Illicit Massage Parlors	0.024	.871	0.021	.874	0.021	.874
% of Male Population Ages 15-24, Standardized	−0.147	.005	−0.092	.049	−0.092	.049
Economic Disadvantage	0.165	.005	0.123	.021	0.123	.021
Social Disorganization	0.275	.000	0.197	.000	0.197	.000
Population Density, Standardized	−0.095	.058	−0.033	.467	−0.033	.467
Logged % Commercial Land Use	0.084	.000	0.063	.002	0.063	.002
Indirect Effects						
Count of Illicit Massage Parlors	0.680	.058	0.701	.085	0.701	.085
% of Male Population Ages 15-24, Standardized	−0.033	.016	−0.051	.070	−0.051	.070
Economic Disadvantage	0.037	.009	0.068	.024	0.068	.024

(continued)

Table 6. (continued)

	Logged Total crime rate		Logged Violent crime rate		Logged Property crime rate	
	Effect	*p* Value	Effect	*p* Value	Effect	*p* Value
Social Disorganization	0.062	.000	0.109	.002	0.109	.002
Population Density, Standardized	−0.021	.075	−0.018	.467	−0.018	.467
Logged % Commercial Land Use	0.019	.003	0.035	.010	0.035	.010
Total Effects						
Count of Illicit Massage Parlors	0.703	.064	0.722	.101	0.722	.101
% of Male Population Ages 15-24, Standardized	−0.180	.005	−0.143	.052	−0.143	.052
Economic Disadvantage	0.202	.005	0.192	.019	0.192	.019
Social Disorganization	0.337	.000	0.306	.000	0.306	.000
Population Density, Standardized	−0.117	.059	−0.052	.466	−0.052	.466
Logged % Commercial Land Use	0.102	.000	0.098	.003	0.098	.003

count of illicit massage parlors in the adjacent neighborhoods, the higher the logged domestic violence and other crime rates in the focal neighborhood. There are no main or indirect effects of illicit massage parlors on drug crime.

Last, in Table 8, we show the results of the SARs for the outcomes of logged prostitution rates, as well as logged social and physical disorder rates. First, for the logged social disorder model, both the main effect and the spatial lag of illicit massage parlors are significant (note that the spatial lag is only significant at $p < .1$). However, when examining the direct and indirect effects of illicit massage parlors on the logged social disorder rate, the effects are not significant. Next, for the logged physical disorder rate, the spatial lag of illicit massage parlors is significant at $p < .1$. When examining the direct and indirect effects, the majority of the effect of illicit massage parlors on the logged rate of physical disorder is indirect: here, the higher the count of illicit massage parlors in the adjacent neighborhoods, the higher the logged physical disorder rate in the focal neighborhood. There are no main or indirect effects of illicit massage parlors on prostitution.

Discussion

The current project expands on prior literature by introducing a categorization of massage parlors with a specific focus on the impact of illicit massage parlors on neighborhood crime, an important contribution given the discreet sexual nature of these establishments. Moreover, we examine the spillover effects massage parlors in other neighborhoods have on focal neighborhoods, which to our knowledge, has yet to be done (Chin, Kim, Takahashi, & Wiebe, 2015; Crotty & Bouché, 2018). Through these focuses, it is possible to effectively tailor policy responses to illicit massage parlors, which differ from other commercial sex establishments in important ways. The current study has identified several implications, which we discuss below.

Prior research suggests illicit massage parlors generate crimes, including human trafficking, forced prostitution, abuse, and financial exploitation of workers (Bungay et al., 2012; Hadjiyanni, Povlitzki, & Preble, 2014; Hughes et al., 2007; Nemoto et al., 2004). Furthermore, illicit massage parlors and other sexually oriented businesses are seen as detrimental to the local community, bringing crime and disorder with them (Hanna, 2005; McCord & Tewksbury, 2012; Prior & Croft, 2012). Our findings support this perception: The presence of massage parlors in both the focal and adjacent neighborhoods is associated with an increase in social disorder. There does not appear to be a more general relationship between the presence and count of all massage parlors and crime. Moreover, when differentiating between all massage parlors and illicit massage parlors, illicit massage parlors seemed to have more widespread detrimental effects. Illicit massage parlors in adjacent neighborhoods were positively associated with total, violent, property, domestic violence, other crime rates, as well as physical disorder. That said, these effects were only significant at $p < .1$.

Table 7. Spatial Autoregressive Models Predicting the Logged Rates of Domestic Violence, Drug, and Other Crime With Spatial Lags for the Dependent Variable (DV) and Illicit Massage Parlors.

	Logged Domestic violence rate		Logged Drug crime rate		Logged Other crime rate	
	Effect	*p* Value	Effect	*p* Value	Effect	*p* Value
Model						
Count of Illicit Massage Parlors	−0.011	.935	0.063	.616	−0.011	.935
% of Male Population Ages 15-24, Standardized	−0.090	.049	−0.073	.103	−0.090	.049
Economic Disadvantage	0.120	.022	0.086	.088	0.120	.022
Social Disorganization	0.192	.000	0.038	.469	0.192	.000
Population Density, Standardized	−0.032	.467	−0.062	.147	−0.032	.467
Logged % Commercial Land Use	0.061	.002	0.046	.018	0.061	.002
Constant	1.499	.000	1.243	.000	1.499	.000
Spatial Lag: Count of Massage Illicit Parlors	0.515	.096	0.437	.147	0.515	.096
Spatial Lag: DV	0.413	.000	0.430	.000	0.413	.000
Direct Effects						
Count of Illicit Massage Parlors	0.021	.874	0.093	.462	0.021	.874
% of Male Population Ages 15-24, Standardized	−0.092	.049	−0.075	.103	−0.092	.049
Economic Disadvantage	0.123	.021	0.088	.087	0.123	.021
Social Disorganization	0.197	.000	0.039	.469	0.197	.000
Population Density, Standardized	−0.033	.467	−0.064	.147	−0.033	.467
Logged % Commercial Land Use	0.063	.002	0.047	.018	0.063	.002
Indirect Effects						
Count of Illicit Massage Parlors	0.701	.085	0.653	.105	0.701	.085
% of Male Population Ages 15-24, Standardized	−0.051	.070	−0.044	.135	−0.051	.070
Economic Disadvantage	0.068	.024	0.052	.093	0.068	.024
Social Disorganization	0.109	.002	0.023	.464	0.109	.002
Population Density, Standardized	−0.018	.467	−0.038	.168	−0.018	.467
Logged % Commercial Land Use	0.035	.010	0.028	.040	0.035	.010

(continued)

Table 7. (continued)

	Logged Domestic violence rate		Logged Drug crime rate		Logged Other crime rate	
	Effect	*p* Value	Effect	*p* Value	Effect	*p* Value
Total Effects						
Count of Illicit Massage Parlors	0.722	.101	0.746	.088	0.722	.101
% of Male Population Ages 15-24, Standardized	−0.143	.052	−0.118	.109	−0.143	.052
Economic Disadvantage	0.192	.019	0.140	.084	0.192	.019
Social Disorganization	0.306	.000	0.062	.465	0.306	.000
Population Density, Standardized	−0.052	.466	−0.102	.150	−0.052	.466
Logged % Commercial Land Use	0.098	.003	0.075	.021	0.098	.003

Table 8. Spatial Autoregressive Models Predicting the Logged Rates of Prostitution, Social Disorder, and Physical Disorder With Spatial Lags for the Dependent Variable (DV) and Illicit Massage Parlors.

	Logged Prostitution rate		Logged Social disorder rate		Logged Physical disorder rate	
	Effect	*p* Value	Effect	*p* Value	Effect	*p* Value
Model						
Count of Illicit Massage Parlors	−0.137	.322	1.617	.000	−0.063	.660
% of Male Population Ages 15-24, Standardized	−0.090	.064	−0.112	.134	−0.116	.020
Economic Disadvantage	0.155	.007	0.000	.999	0.160	.005
Social Disorganization	0.152	.009	−0.063	.490	0.199	.001
Population Density, Standardized	−0.048	.306	0.018	.803	−0.042	.390
Logged % Commercial Land Use	0.069	.001	0.087	.008	0.068	.002
Constant	0.694	.000	−0.105	.479	2.494	.000
Spatial Lag: Count of Massage Illicit Parlors	0.387	.230	−1.458	.060	0.635	.057
Spatial Lag: DV	0.610	.000	1.029	.000	0.306	.000
Direct Effects						
Count of Illicit Massage Parlors	−0.104	.470	1.740	.179	−0.036	.797
% of Male Population Ages 15-24, Standardized	−0.096	.063	−0.181	.824	−0.118	.020
Economic Disadvantage	0.165	.006	0.000	.999	0.162	.005
Social Disorganization	0.162	.008	−0.102	.847	0.201	.001
Population Density, Standardized	−0.051	.305	0.029	.874	−0.042	.390
Logged % Commercial Land Use	0.073	.001	0.140	.826	0.069	.002
Indirect Effects						
Count of Illicit Massage Parlors	0.598	.330	1.393	.987	0.732	.057
% of Male Population Ages 15-24, Standardized	−0.108	.085	−0.780	.987	−0.042	.037
Economic Disadvantage	0.185	.008	−0.001	.999	0.058	.008
Social Disorganization	0.183	.013	−0.437	.987	0.072	.003
Population Density, Standardized	−0.058	.307	0.125	.987	−0.015	.394
Logged % Commercial Land Use	0.083	.013	0.605	.987	0.025	.008
Total Effects						
Count of Illicit Massage Parlors	0.494	.461	3.134	.971	0.696	.091
% of Male Population Ages 15-24, Standardized	−0.204	.068	−0.961	.985	−0.160	.021
Economic Disadvantage	0.350	.004	−0.001	.999	0.220	.004
Social Disorganization	0.345	.007	−0.539	.985	0.274	.001
Population Density, Standardized	−0.109	.303	0.155	.985	−0.057	.389
Logged % Commercial Land Use	0.156	.003	0.745	.985	0.094	.002

We did find that the presence of all massage parlors is associated with higher drug crime rates in focal neighborhoods—though this relationship is small and on the cusp of significance ($p < .1$). We anticipated the relationship between drug offenses and illicit massage parlors to be stronger, given noted associations between human trafficking, sex work, and drug offending (Hughes et al., 2007; Lavin, 2014; Shelley, 2012). The limited direct effects of illicit massage parlors on crime rates in focal neighborhoods could be due to the owners and operators of these establishments using protective measures to avoid detection—similar implications have been drawn in studies of adult clubs, which are increasingly becoming legitimized through protecting customer safety (Linz et al., 2004). This finding could also be caused by crime occurring inside illicit massage parlors, reducing the likelihood of reported offenses due to the illegality of the practices taking place in these establishments.

It has been noted that police intervention in massage parlors is minimal and often only occurs in response to a complaint, a response that could lead to the perception that these businesses are tolerated (Bell, 2001). Although masseuses commonly report high numbers of robberies and exploitation, they also mention that they are unlikely to report these occurrences to the police (Nemoto et al., 2004). The combination of crime occurring behind closed doors and the fact that victims are unlikely to report these incidents makes the detection of these offenses difficult. In addition, there have been cases of police officers who have used the discovery of these businesses for their personal gain. Some police officers have collected bribes from commercial sex businesses; treated street workers abusively; or used their status as officers to obtain sexual services for free (Miller, 2002; Raphael & Shapiro, 2004; Smith, 2011). Unfortunately, examining the potential for officers to identify and protect illicit massage parlors was not possible using our data.

The use of online user review forums did prove helpful in identifying illicit massage parlors. Given the noted difficulty associated with identifying and intervening in commercial sex acts that occur indoors and are advertised online (Hadjiyanni et al., 2014; Linz et al., 2004), the use of online forums such as those used in the current study could help the police identify illicit massage parlors. This is particularly important in cities such as Mesa, which are not traditionally thought of as prostitution or human trafficking hubs and have low crime rates in general. Similarly, the use of online illicit massage parlor review forums also revealed 12 illicit massage parlors that were violating municipal licensing codes.

A final potential intervention in the massage parlor industry implicated in the current study is the use of massage parlor licensing information. A study of 281 massage parlors actively advertising sex in Las Vegas found that only 32% of these parlors maintained valid licenses, indicating that many illicit massage parlors are unlicensed (Lok, 2008). Although our online user review data suggest that 25% of illicit massage parlors in Mesa are unlicensed, this could be an underestimate of the true number of unlicensed illicit massage parlors, given our reliance on web user reviews to

identify illicit and unlicensed massage parlors. Using licensing regulations to target illicit massage parlors is promising, as illicit massage parlors may not be amenable to other interventions used to address crime associated with the commercial sex industry, due to the hidden nature of sexual services occurring in illicit massage parlors.

Like all research, our study is not without limitations. First, our data are not longitudinal, which limits us to only showing associations between massage parlors and crime at one point in time. Next, the illicit massage parlor data are unique in their method of collection, as we are dependent upon users of illicit massage parlor web forums to identify illicit massage parlors. Illicit massage parlors might close and reopen with new names in the same location, with these changes often not being reflected in online user review forums (Bouché & Crotty, 2017). Thus, our data are an imprecise estimate—though likely a conservative one—of the number of illicit massage parlors in neighborhoods in Mesa. Similarly, given the nature of Mesa as a midsized city with relatively low crime rates, future research should examine the impact of illicit massage parlors on neighborhood crime in other locations. Next, the crime data used here are limited to CAD/RMS data. While we use these data to obtain a more accurate accounting of neighborhood-level problems through the inclusion of both citizen- and police-initiated incidents, even CAD/RMS data likely underestimate the totality of crime. These data also do not include offender information, so we are unable to examine whether crimes occurring within neighborhoods are committed by residents or those who live in other areas. Future research using interviews or observational methodologies could capture crimes related to massage parlors that are not reflected in CAD/RMS data. In addition, there is a possibility that the police protect sexually oriented businesses, such as massage parlors. If this is the case, crime in the neighborhood may be reduced because the police use their discretion to handle any problems over formally reporting them. Unfortunately, we have no means of ascertaining if this is the case, and this remains a problem in all calls for service incidents, not just those related to massage parlors. Last, because the CAD/RMS data were linked to the Census tract, we likely have issues related to the modifiable areal unit (see Fotheringham & Wong, 1991). More specifically, if we conducted this analysis at a different geographic unit, we may not have the same results. We encourage future research to look at more geographically specific indicators of crime and disorder.

In conclusion, research examining the true impact of sexually oriented businesses on neighborhood crime has not addressed illicit massage parlors specifically, and has revealed mixed findings. Although many studies have lumped commercial sex establishments together, or merely studied adult clubs, relatively little research has addressed the impact of illicit massage parlors on neighborhood crime. Thus, the current study is an important contribution through examining the neighborhood impact of establishments that provide illicit sexual services in locations that are not explicitly sexual in nature. Through finding that all massage parlors impact neighborhood crime and disorder, including licit and illicit parlors, it is justifiable to

include the distinct impact of massage parlors in urban planning discussions to address these effects.

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Notes

1. We estimate the Moran's I by first constructing the spatial weights matrix and then using the "estat moran, errorlag(x)" command in Stata. Here, the x represents the name of the spatial weights matrix.

2. Given that our outcome measure is a rate and our data are cross-sectional, spatial autoregressive (SAR) is the best modeling technique. Some scholars use negative binomial models to predict crime outcomes in their count form. We chose to linearize our outcome given that, to the best of our knowledge, SAR models do not yet support nonlinear outcomes. A negative binomial link function using conditional autoregressive models can be used for time-series models (see Chen, So, Li, & Sriboonchitta, 2016), but is not possible using SAR for cross-sectional data, which only support linear outcomes.

3. We estimate these through the spregress command followed by estat impact in Stata 15.

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