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Title

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Authors

Chin, John J
Takahashi, Lois M
Wiebe, Douglas J

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John J. Chin,

Department of Urban Policy and Planning, Hunter College, City University of New York, New York, NY, USA

Lois M. Takahashi,

Sacramento Center at the University of Southern California Sol Price School of Public Policy, Sacramento, CA, USA

Douglas J. Wiebe

Department of Biostatistics, Epidemiology and Informatics, Perelman School of Medicine, University of Pennsylvania, Philadelphia, PA, USA

Abstract

Immigrant-run sexually oriented massage parlors embody the intersection of important planning issues, including inequitable distribution of controversial land uses and economic functions of illicit businesses. We analyzed geocoded data from a ratings website to examine sexually oriented massage parlor clustering in Los Angeles County (LAC) and New York City (NYC). In LAC, clustering occurred in areas with more Asian and Hispanic residents. In NYC, clustering occurred mostly in Manhattan and was negatively associated with household size. Local regulation did not appear to affect clustering. Study findings hold lessons about both more effective regulation and enabling economic development in immigrant populations.

Keywords

clustering; Los Angeles; massage parlors; New York City; sex work

Introduction

Sexually oriented massage parlors, which primarily employ Asian immigrant women workers (Bungay et al. 2013; Lever, Kanouse, and Berry 2005; Polaris Project 2011; Robbins 2014; Vives and Goffard 2017), embody the intersection of several important planning issues: potential negative secondary effects of controversial land uses, the possible inequitable distribution of controversial land uses, lack of awareness of the potentially productive economic function of illegal business activities, and enabling factors for legal immigrant business development. As such, studying how economic forces of customer

Corresponding Author: John J. Chin, Department of Urban Policy and Planning, Hunter College-CUNY, 695 Park Avenue, Room 1611 West, New York, NY, 10065, USA. john.chin@hunter.cuny.edu.

demand and labor supply, and local regulation, relate to the spatial clustering of sexually oriented massage parlors provides a way for planners, scholars, and advocates to better understand some key planning issues. Filling the gap in our understanding of massage parlor clustering is vitally important as planners work not only to regulate and control unwanted and controversial land uses but also to create enabling environments for formalized economic development and growth, especially for immigrant populations.

The first two issues noted above center on the inequitable distribution of controversial land uses and the regional impacts of local level planning efforts to push out such uses. If local planners and other government agencies design regulations to direct the location of sexually oriented massage parlors, they should also consider how to avoid reproducing inequitable distribution of controversial land uses. Technological innovations, such as the internet, have created conditions that promote dispersal of sexually oriented massage parlors and other sexually oriented businesses beyond traditional red light districts (Murphy and Venkatesh 2006). In a context already primed for dispersal, planning practices can have the unintended consequence of simply displacing sexually oriented massage parlors to neighboring communities. Research on the social ecology of sex-related businesses indicates that higher income and more socially organized communities have the political clout to prevent the siting of sex-related businesses and control the ways such businesses operate, ostensibly to mitigate negative secondary effects (Edwards 2010; Weitzer 2014). Consequently, uninformed attempts at regulation may shunt unwanted uses to neighborhoods with higher levels of social disorganization and less political clout, leading to an inequitable concentration of unwanted uses in vulnerable lower income, minority and immigrant communities.

Planners should also consider possible benefits of sexually oriented massage parlors in terms of immigrant livelihoods and urban economies in general. This is a complex and controversial issue, and remains highly debated in research about global sex work (Sanders, O'Neill, and Pitcher 2009). We are not referring here to trafficked women workers or coercive sex work. However, for many immigrant women working in this industry, sexually oriented massage parlor businesses, though illicit, provide income for them and thereby their families. Research has shown that immigrants play an essential, but often unacknowledged, role in servicing a wide range of needs in urban globalized financial centers, both in formal and informal economic spheres (Sassen 1990, 2001). Ashworth, et al. (1988, 201) argue further about sex work that "prostitution is a significant urban activity that relates to other economic and social functions of the city." We do not propose that planners should play an active role in promoting illegal businesses. Planning departments have, however, routinely sought to encourage specific forms of economic activity, such as promoting the siting of supermarkets in food deserts (NYC Department of City Planning 2018) and protecting urban manufacturing space, or conversely, deciding to re-zone urban manufacturing areas for evolving residential and commercial uses (Zukin 1982). Thus, if planners are to more fully understand the dynamics of local economies, and the impacts of economic development strategies, they should consider the economic function of sexually oriented massage parlor businesses, both for immigrant workers and owners and for the larger urban economy, and how such functions can be replicated through alternative legal and empowering business activities.

To illuminate the relative role of market forces and local regulation, this study examines clustering of sexually oriented massage parlors – that is, massage parlors where sexual services are provided – in Los Angeles County (LAC) and New York City (NYC). In particular, the study seeks to assess the factors associated with clustering and whether those factors indicate that massage parlors cluster to maximize customer access or labor access or for other reasons. The analysis tests the following hypotheses: (1) sexually oriented massage parlors cluster in LAC and NYC; (2) sexually oriented massage parlors in LAC and NYC cluster in proximity to Asian female work force (massage parlor workers); and (3) sexually oriented massage parlors in LAC and NYC cluster in proximity to male client population (demand).

This paper uses geocoded data on sexually oriented massage parlor location to analyze the degree of clustering in LAC and NYC, and to examine the influence of local jurisdictional boundaries (as a proxy for local regulations), demographic factors, and economic factors on clustering. The analysis seeks to examine, albeit in an indirect way, whether local land use ordinances and regulations affect sexually oriented massage parlor location decisions and clustering as much as market forces (e.g., demand and labor market supply). Although not conclusive, our analysis suggests that regulation may have very little to do with where massage parlors choose to locate and the degree to which they cluster. The differences we found in clustering patterns between LAC and NYC appear to be related more to their divergent patterns of economic activity, suggesting the primacy of market forces rather than regulatory constraints. In NYC, clustering appears to be related to proximity to male customers' work places, while in LAC, proximity to an Asian female labor force appears to be more important. A negative association of clustering with average household size in NYC suggests that sexually oriented massage parlors may be sensitive to potential community opposition. The non-significance of a location variable in LAC indicates that the county's various systems of local regulation have had limited differential effects on clustering. Divergent factors associated with clustering in LAC and NYC may call for different emphases in regulation in the two areas.

Our finding that regulation may be less important than market forces in explaining clustering may be unsurprising in light of the fact that sexually oriented massage parlors usually purport to operate as legitimate non-sexual businesses. As non-sexual businesses, they would be subject to zoning regulations that govern commercial activity but not by regulations imposed by local governments on sexually oriented businesses to mitigate their purported negative secondary effects (e.g., nuisance, crime, etc.) (Morehead 2017; Weinstein and McCleary 2011),[i] often through imposing minimum distances of such business from schools or residences and from each other (Kelly and Cooper 2000; Lyons, Schoolmaster, and Bobbitt 1999). Ironically, ordinances or local regulations that restrict the location of sexually oriented businesses may have a larger impact on legal but explicitly sexual businesses (e.g., strip clubs, porn shops) than on massage parlors where illegal sexual activity occurs

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[i]Note that the secondary effects of sexually oriented businesses remain in dispute. Some suggest that negative secondary effects of sexually oriented businesses have been clearly established (Weinstein and McCleary 2011). Others argue that attempts to curtail sex-related businesses are driven by moral sensibilities rather than actual experiences of increased nuisance (Hubbard et al. 2013; Papayanis 2000). One study suggested that the presence of sex-related businesses might actually curtail negative secondary effects, finding their presence to be associated with lower crime rates (Linz et al. 2004).

clandestinely. In this sense, planners and other local government officials interested in managing the location of sexually oriented massage parlor businesses may have a limited set of tools for doing so.

To provide more detail on current scholarly knowledge, the data source, and the analysis, the paper proceeds in the following way. First, the paper provides a brief overview of relevant literature on the operations of sexually oriented massage parlors, how such businesses are regulated at the local level, and whether and where such businesses cluster. The paper then provides details about the data source (an online ratings website) and the analytical approach. Results from the analysis testing the three hypotheses are presented. The paper concludes with a discussion of the results and their implications.

Background

Sexually Oriented Massage Parlor Operations

Research from the 1970s described the sexually oriented massage parlor industry as "booming" (Velarde and Warlick 1973). Around the same time, an inventory of massage parlors compiled using telephone books, the precursor to the internet web sites discussed later in the paper, found parlors throughout medium and large cities across the U.S. with "a name or logo suggestive of the exotic if not the erotic" (Bryant and Palmer 1975, 228).

The limited scholarship on the operations of sexually oriented massage parlors and other indoor sex work businesses tends to focus on their criminal dimensions. Haller (1990, 222) discusses a decentralized "partnership" model for illegal enterprises, which, in contrast to a more vertically integrated "organized crime" model, allows for independent operators performing specific functions. Syndicates, for example, comprise "a system of cooperation so that many retailers are backed by the same group of entrepreneurs" (Haller 1990, 224). However, Light (1977, 464) argues that this conceptualization "excludes small, illegal businesses," which may better characterize the contemporary pattern of stand-alone sexually oriented massage parlors. Although Chinese brothel syndicates were operated by gangs in the nineteenth and early twentieth centuries, demand declined after sex ratio normalization after WWI, and "industrial succession" resulted, closing brothels and contributing to the growth in restaurants and tourism in Chinatowns (Light 1977, 469). More recently, the Urban Institute released a study in medium-sized cities in the U.S. (Dank et al. 2014) finding that the underground commercial sex economy was not connected to weapons trafficking but in some cities was connected to sex trafficking, drug trafficking, and gang involvement. The scope and specific nature of these connections remain unclear.

As with other informal economic activity, the sexually oriented massage parlor industry has been dominated by immigrants, particularly Asian immigrants (Bungay et al. 2013; Lever, Kanouse, and Berry 2005; Polaris Project 2011; Robbins 2014; Vives and Goffard 2017), and anti-immigrant sentiment or prejudices can be difficult to disentangle from concerns about criminality. Light (1977, 465) critiqued two strands of theorizing about immigrant criminality: (1) import theory or the "transplantation of secret organizations, cultural forms and even biological strains native to benighted parts of the world," which was "a convenient vehicle for xenophobia and chauvinism;" and (2) functionalist theories of ethnic succession

(where newly arriving or different ethnic groups replaced former ethnic groups that had climbed the ladder of social mobility), which sometimes suggested a cultural proclivity towards criminality rather than "a structurally-engendered response to disadvantage." Both types of frameworks critiqued by Light (1977) continue to pervade community and law enforcement discourse on immigrants' role in sex work and human trafficking. Media coverage of immigrant sex work, for instance, has tended to focus on sensationalistic topics like immigrant-led criminal prostitution and human trafficking rings (Gonzales and Molina 2016) rather than on more mundane concerns, such as the regulatory factors that shape the industry's operations and locational decisions, structural factors that encourage immigrants to open sexually oriented massage parlors (rather than alternative formalized business enterprises), and the day-to-day labor conditions for massage parlor workers who may be engaged in the work by their own volition.

Although massage parlor workers have widely varying experiences, there is much evidence in the literature that many workers have experienced human trafficking, violence, and extremely negative working conditions. Nemoto et al. (2003; 2004) highlight the "physical and verbal abuse" experienced by Asian female massage parlor workers from customers. Raphael & Shapiro (2004, 126) find that "women in indoor venues were frequently victims of sexual violence and being threatened with weapons." Researchers have also shown that there are varying degrees of violence against female workers in the sex industry depending on where they work; Weitzer (2005) has argued that street sex workers are victimized at higher rates than indoor sex workers.

Regulating Sexually Oriented Massage Parlors

The use of overt spatial planning tools in regulating sexually oriented massage parlor location appears to be limited, in large part because they purport to operate as legal non-sexual businesses. Massage parlors tend not to be subject to the separation requirements or special zoning districts that are typically used to regulate the location of overt but legal sexually oriented businesses, such as strip clubs and porn shops (Kelly and Cooper 2000). Reliance on individual and business licenses and permits to regulate massage parlors appears to be more common.

Because local policy makers have been aware that massage businesses can be used as a cover for illicit sexual business activity, licensing or permitting regulations are sometimes designed with the assumption that sexual activity is likely to occur. Under this strategy, massage parlor operations in general are treated as businesses that might pose a societal risk or provoke community opposition. The City of Los Angeles for instance, requires a police permit for massage parlor businesses, along with firearms sellers and escort businesses. "Each Police Permit application … is investigated as to any criminal background of the applicant(s); that the business is being conducted in the proper zone; and, where applicable, that nearby residents and business people are notified of a public hearing at which they may voice their approval or disapproval of the activities of some of the intended businesses" (City of Los Angeles 2019).

Professional licensing or certification requirements for individual massage therapists have also been used to limit illicit sexual business activity in massage parlors by imposing

stringent training requirements for licensure as well as requirements that licensed massage therapists be on site at the massage establishment. In California, the California Massage Therapy Council (CAMTC), authorized by a 2009 state law, requires at least 250 hours of training at approved schools for professional massage certification . If all individuals in a massage parlor are certified, the business may be exempted from local restrictive zoning and high license fees that some cities have imposed. However, when not all of the practitioners in an establishment are certified through CAMTC, local laws prevail. Complaints from cities arguing that CAMTC had usurped local authority and allowed a proliferation of sexually oriented massage parlors led to passage of the California Massage Therapy Reform Act in September 2014, which reinstated much of localities' regulatory authority (Yee 2014).

Some cities, having experienced an uptick in sexually oriented massage parlor activity, have been more aggressive in enacting and enforcing anti-massage parlor ordinances. Within Los Angeles County, massage parlors located in unincorporated areas of the county are subject to county regulations, while massage parlors located in the 88 incorporated cities within the county (County of Los Angeles 2016) may be subject to those cities' local laws, resulting in a balkanized regulatory terrain. For example, the City of Los Angeles classifies all massage parlors as "adult entertainment" and requires massage parlor workers not certified through CAMTC to obtain a massage therapy license and the business to obtain a police permit, which requires fingerprinting and a background check (City of Los Angeles 2011, 2019; Linthicum 2011). The County of Los Angeles requires that both the business and the "massage technicians" have business licenses but does not appear to require a police permit (County of Los Angeles 2018), which might suggest that opening a sexually oriented massage parlor is easier in the unincorporated parts of the County of Los Angeles than in the City of Los Angeles.

In contrast to Los Angeles County's varied regulatory environment, New York City's (NYC) regulations apply to all five of the city's boroughs (Brooklyn, Bronx, Manhattan, Queens, Staten Island), except in the case of special zoning districts. Generally, it appears to be easier to open a massage parlor in NYC than in the City of Los Angeles. Unlike in the City of Los Angeles, where massage parlors are classified as "adult entertainment," massage parlors in NYC are regulated under NYC's "physical culture establishments" law, which also regulates health clubs (Pincus 2013). NYC also lacks a regulatory tool that is comparable to California's Red Light Abatement Act, which allows municipalities to react quickly to shut down illegal sex work businesses and fine landlords where the illegal activity is taking place (Meyer 1990; Prostitution Research and Education 2012). The act was recently used in 2018 to impose a $295,000 fine on the owner of a brothel in San Francisco's financial district (Wadsworth 2018).

The regulation of sexually oriented massage parlors in the US is shaped by the overarching context of commercial sex work being criminalized, except in parts of Nevada (Blithe and Wolfe 2017). Some of the methods used in the US to regulate sexually oriented massage parlors may be less relevant in countries where commercial sex businesses are legal since sexually oriented massage parlors in those countries can operate openly as sex businesses. Internationally, there are a wide variety of legal regimes governing commercial sex work, ranging from complete criminalization of sex work (South Africa), to criminalizing only the

purchase of sexual services (Sweden), to decriminalization of both selling and buying sexual services (Spain) (Kelly, Coy, and Davenport 2009). However, even under differing legal regimes, regulatory practices may be similar. For example, a comparative study of London and Sydney found that regulation of commercial sex businesses shifted to planning and licensing arms of local government, and away from law enforcement, despite commercial sex work's continuing criminalization in England while being legal in New South Wales (Prior and Hubbard 2017).

Spatial Distribution of Massage Parlors

The combination of policing, land use controls, business licensing, and community opposition created red light districts, where sexually oriented businesses have clustered. Red light districts formed in U.S. cities as early as the 1870s, providing a way for politicians and police to manage negative secondary effects and community opposition against "vice" activities while also profiting from them (Haller 1990). These districts were often historically located in central city skid row areas and depicted by some as being near "the local Chinatown" (Haller 1990, 212). Traditionally, red light districts were characterized by a conglomeration of illicit activities, including sex work, gambling, and other socially unconventional activities of the times.

Historically, politics and regulation were intertwined with these spaces, both to enable their continuation and to manage and control their impact on the larger society (via local ordinances meant to bound their possible growth and regular medical exams for sex workers aiming to stem negative public health outcomes of sexually transmitted infections) (Haller 1990). Since the 1970s, local governments have used zoning ordinances to restrict the location of legal sexually oriented businesses to areas removed from schools, religious institutions, and homes (Kelly and Cooper 2000), as well as to specific minimum distances from one another to prevent clustering and the creation of vice districts (Lyons, Schoolmaster, and Bobbitt 1999).

The recent apparent growth and spatial dispersion of the sexually oriented massage parlor industry since the 2000s has been traced in part to more aggressive policing of street-based sex workers (Murphy and Venkatesh 2006), driving sex work into indoor venues, and to the use of the internet to connect clients and sex workers (Venkatesh 2011). The internet's role in helping users locate sexual services is unsurprising given the extremely large numbers of users consuming sexual material online (Maginn and Steinmetz 2014). Through "online classifieds, social media, and networking websites" (Dank et al. 2014, 3), the internet has made finding sexually oriented massage parlors, and specific massage parlor workers, easier for potential customers. Online discussion groups of male clients also serve to exchange information about female workers and how they have avoided law enforcement agents (Holt, Blevins, and Kuhns 2008). These developments may have made locating massage parlors in existing red light districts less important for acquiring customers, and there is anecdotal evidence that indoor sex work venues have taken advantage of increased locational flexibility to move into higher income and suburban areas (Venkatesh 2011).

As Hubbard (1998) has argued, there remains scant understanding of the spaces where sex work occurs beyond designating them as "red light" districts (see also Hubbard & Sanders

2003). And further, we argue that there is even less understanding of the reasons for spatial clustering (or dispersion) of sexually oriented massage parlors. Sexually oriented massage parlor businesses may be dispersing from red light districts (traditional clusters) and clustering in new areas (higher income and suburban areas).

On the one hand, sexually oriented massage parlor clustering in these areas outside of red light districts may be driven by the same factors that incentivize business clustering more generally. Purporting to operate as legal businesses, sexually oriented massage parlors have located in a variety of commercial areas, following typical business incentives, such as locating along "main commercial arteries…convenient for both commuters and guests of near-by motels" (Bryant and Palmer 1975, 232). Other areas with potentially higher levels of demand for sexually oriented massage parlor services include locales characterized by high rates of male employment (Symanski 1981) and active nighttime and adult entertainment (Ashworth, White, and Winchester 1988). Labor supply also drives location decisions, where areas with larger pools of immigrant female workers with massage and sex work skills could lower costs of finding new employees (Dank et al. 2014). Location decisions may also be associated with proximity to approved massage therapy schools, which may reduce operational risk by facilitating workers' pursuit of professional massage certification. Massage parlor clustering may also allow for tighter control and monitoring of workers; in NYC's Manhattan Koreatown, a high concentration of indoor sex venues cluster in a one- or two-block area, supported by a complex network of managers, drivers and look-outs (Winters 2013).

On the other hand, there may be factors that drive sexually oriented massage parlors to avoid clustering. Business owners may seek out remote places where immigrant female workers are culturally and linguistically isolated in order to increase their vulnerability and thwart the development of social ties among workers across massage parlor venues (Chacón 2017; Polaris Project 2018). Dispersal may also help massage parlors to evade notice by residents and other businesses. A recent account of a sexually oriented massage parlor in Queens, New York, for example, described it as being located in a house, rather than a typical storefront business location (Robbins 2014).

Methods

Data

Using online searches and informal recommendations from sexually oriented massage parlor clients, we identified the most popular websites for rating sexually oriented massage parlors and their female workers. We selected one site for analysis (rubmaps.com) that had coverage of both LAC and NYC. The website clearly specialized in sexually oriented massage parlors, as indicated by suggestive taglines (i.e., "where fantasy meets reality" and "erotic massage parlor reviews and happy endings"); users are provided with categories for indicating in their reviews the sexual services they received. The website organizes its data geographically by a list of regions and cities within the U.S. Only massage parlors within LAC and the five boroughs of NYC were included in the analysis. Because sexually oriented massage parlors may open and close frequently, we limited data collection to include only businesses that had at least one user review posted within a one-year span that we treated as the study period

(August 11, 2012 through August 11, 2013). We also filtered our search to select only massage parlors with "Chinese," "Korean," and "Asian" workers, the most common user-reported ethnicities on this particular website (accounting for 84% of venues in LAC and 90% of venues in NYC). We chose to limit our analysis in this way because the literature suggests that sexually oriented massage parlors in the US are predominantly owned and staffed by Asian immigrants (Bungay et al. 2013; Lever, Kanouse, and Berry 2005; Polaris Project 2011; Robbins 2014; Vives and Goffard 2017); because different ethnic groups may have different approaches to managing massage parlors, including the relatively small number of massage parlors associated with other racial/ethnic groups would likely have muddled the analysis. For the sexually oriented massage parlors that met the inclusion criteria, we manually logged the business address and user-indicated characteristics (e.g., sexual services provided, cost, provider ethnicities, etc.).

Using this approach, we identified 441 massage parlors in LAC and 475 in NYC; of these, 397 and 413 massage parlors in LAC and NYC, respectively, had addresses that could be mapped. We used ArcMap 10.6 software (Esri, Redlands, CA) to manage the geographic data, create maps, and conduct geographic analyses. Because all data are user-reported, the website may not accurately represent venue locations. However, the website provides review guidelines, asking users to provide accurate, detailed descriptions of their experiences within 30 days of the encounter, and purports to vet reviews for accuracy.

Spatial Clustering Analysis

We paired the sexually oriented massage parlor data with data from the 2010 U.S. Census to examine socioeconomic factors associated with clustering. We chose to use 2010 Census data to provide a lag period between the socioeconomic data and the 2012-13 sexually oriented massage parlor data to allow for the time it might take for these businesses to respond in their locational decisions to socioeconomic changes. Any advantages of choosing a shorter lag period by using American Community Survey data from 2011 or 2012 were outweighed by the greater accuracy of the 2010 Census data.

Using the number of sexually oriented massage parlors per 2010 U.S. Census tract as the variable of interest, a global test of spatial autocorrelation – the Moran's I statistic – was calculated to test the null hypothesis that sexually oriented massage parlors were distributed randomly across tracts. Finding a statistically significant Moran's I ($p<.05$) would support hypothesis 1 that there is systematic, rather than random, distribution of massage parlors in the study area.

Our next step was to identify locations of hotspots or clustering of these sexually oriented massage parlors. A local indicator of spatial autocorrelation – the LISA statistic – was calculated to identify the locations where sexually oriented massage parlor businesses were clustering (Anselin 1995).

For both the global and local tests, we made comparisons between each tract and other tracts by calculating an inverse distance-weighted measure of proximity, which compares each tract to all other tracts in the study area and down-weights the influence of each tract on the index tract based on the distance between the two. This inverse distance-weighting approach

provides an efficient way to compare each tract to all other tracts in the study area, while still accounting for proximity of tracts to each other. We used this method as a way to measure whether similar types of tracts were located near one another, instead of comparing tracts based on being contiguous to other tracts, because of the diversity of scale and shape of Census tracts. Some tracts touch only a few other tracts, while other tracts touch many tracts, which makes the contiguity method an inferior approach to detecting clustering. Also, for the LISA statistic we used an empirical Bayes adjustment (using road miles in each Census tract as the denominator), which identified more cluster tracts than without the adjustment. Otherwise, the cluster patterns that were identified with adjustment were similar to the patterns identified without this adjustment. Note that we repeated each global and local test using rates of sexually oriented massage parlors per tract (per 10,000 population) rather than counts per tract and found similar results.

We used the LISA statistic to group Census tracts into four categories of clustering: high-high (Census tracts with more than the expected number of sexually oriented massage parlors surrounded by Census tracts with more than the expected number of sexually oriented massage parlors); high-low (tracts with more than the expected number of parlors surrounded by tracts with fewer than expected parlors); low-high (tracts with fewer than expected parlors surrounded by tracts with more than the expected number); and low-low (tracts with fewer than expected parlors surrounded by tracts with fewer than expected parlors). Means, standard deviations, medians, and interquartile ranges of Census tract characteristics were calculated for Los Angeles County and New York City overall, as well as for each of the four types of clustering.

Spatial Regression Analysis

A new variable was created in which high-high Census tracts were classified as 1 and other Census tracts were classified as 0. This dichotomous "hot spot" variable was used as the dependent variable in logistic regression modeling to identify characteristics of tracts associated with clustering of sexually oriented massage parlors to address hypotheses 2 and 3.

For each locale (LAC and NYC), independent variables were informed by findings from our previous research on similar data from Los Angeles (Chin et al. 2015) and by the literature discussed earlier regarding factors associated with clustering of sexually oriented businesses and more generally with business locational decisions. Independent variables included in the analysis were: proportion male (ages 25-64) in Census tract (a demand variable representing proximity of massage parlor to clients); proportion Asian (a demand and labor supply variable representing proximity of massage parlors to clients and workers); proportion Hispanic (proximity of massage parlors to clients; our previous research suggested that Hispanic workers are frequent clients at Asian massage parlors); average household size (our previous research suggested that areas with larger household and family sizes are associated with fewer sexually oriented massage parlors, possibly because of greater neighborhood resistance to sexually oriented businesses); median household income (indicator of potential clients' discretionary income); proportion below the poverty line in the last 12 months (indicator of affordability of rents for businesses); employees per capita (proximity to

clients); and number of transit stops (subways stops in NYC, bus stops in LAC). The model for LAC also included a "boundary" variable, which indicated whether the massage parlor was located in the City of Los Angeles (City, LA), other incorporated cities within Los Angeles County (City, Other), or in unincorporated areas of the county (Unincorporated). For NYC, which is composed of five boroughs/counties, a borough variable (Manhattan vs. Bronx, Brooklyn, Queens, Staten Island) was included. These locational variables allowed for a preliminary exploration of massage parlors' proclivity for seeking Central Business District locations (e.g., Manhattan) [ii] and whether varying regulatory approaches might affect locational decisions (e.g., County vs. City of Los Angeles vs. other incorporated cities in Los Angeles County). As discussed earlier in the paper, the governmental structure of LAC has created a balkanized regulatory environment where the incorporated cities and the unincorporated areas of the county may have substantially different policies regarding regulation of sexually oriented massage parlors. In NYC, where all five boroughs operate under the same municipal government, there is anecdotal evidence suggesting that strong community protests against sexually oriented massage parlors in Queens may inhibit massage parlor establishment (see for example Kern-Jedrychowska 2016), despite other factors that strongly encourage sexually oriented massage parlor growth (e.g., large Asian immigrant population providing a large labor pool).

Prior to modeling, each Census tract variable was converted to a z-score, which had a mean of 0 and standard deviation (SD) of 1, so that in the regression results each coefficient could be interpreted as the odds ratio (OR) associated with a 1 standard deviation unit increase in the independent variable. Given the geographic nature of the data, the logistic regression modeling was conducted while including in each model a variable equal to the lag of the dependent variable (calculated using inverse-distance weighting). Conventional diagnostics were conducted for each model, including testing the residuals for the presence of spatial autocorrelation, using variance inflation factors to test for multicollinearity, and generating plots of deviance versus leverage statistics to test for outliers (Hosmer, Taber, and Lemeshow 1991). The regression modeling and diagnostics were conducted using Stata (version MP 15, College Station, TX).

Results

Hypothesis 1: Do Sexually Oriented Massage Parlors Cluster in Los Angeles County and New York City?

Figures 1a and 1b show the distribution of the 397 sexually oriented massage parlors in LAC and 413 parlors in NYC, respectively, by Census tract, before conducting any spatial statistical analysis. The global test of spatial autocorrelation, calculated on the number of massage parlors per Census tract, found evidence that sexually oriented massage parlors cluster in LAC (Moran's I=0.31, p< 0.001) and in NYC (Moran's I=0.23, p<0.001).

[ii]At the borough/county level, Manhattan remains the job center for New York City, with more than 2.4 million jobs in March 2017, compared to 700,200 jobs in Brooklyn, the borough with the second highest number of jobs in New York City (U.S. Department of Labor 2017). Manhattan also has by far the highest number of jobs per capita, as Brooklyn's population is more than 1.5 times larger than Manhattan's population.

Where Do Massage Parlors Cluster?

The local test of spatial autocorrelation in LAC (Figure 2a) revealed significant clusters of low-low massage parlor density (i.e., "cold spots") in the northern portions of Los Angeles County (the Antelope Valley and Northwest County) and the county's southern portions (South Bay, the Harbor, and Southeast, near the border with Orange County). These cold spots include islands of high-low Census tracts. Hot spots where sexually oriented massage parlors were highly prevalent were located primarily in the central parts of Los Angeles County, in and around the City of Los Angeles, including the San Fernando Valley, the San Gabriel Valley (a well-documented Asian immigrant enclave) (Li 1998, 1999, 2005; Zhou, Tseng, and Kim 2008), and the Westside (higher household income area) (Montgomery 2006; Purcell 1997).

The local test of spatial autocorrelation in NYC (Figure 2b) revealed a number of hotspots spread throughout Manhattan, sometimes close to or within Asian immigrant enclaves (Manhattan's Chinatown, Flushing Chinatown) (Hum 2004; Zhou 2001). A number of hotspots in Manhattan are spread throughout the borough, often in job centers, such as the downtown financial district (which abuts Manhattan's Chinatown), and high-income areas, such as the Upper East Side (NYC Department of City Planning 2019; Plitt 2017). Cold spots of significantly low massage parlor clustering are seen in the outer reaches of the outer boroughs (Bronx, Brooklyn, Queens, Staten Island).

Hypotheses 2 and 3: Are Market Forces, Regulation, or Other Factors Most Associated with Clustering?

Descriptive statistics are provided in Tables 1a and 1b, which show Census tract characteristics for each of the four types of clustering, as well as for all Census tracts in each locale overall.

In the unadjusted analysis for LAC (see Table 2a, left side), proportion Hispanic (OR=1.68, p=.001) and average household size (OR=1.48, p=.012) were both positively associated with sexually oriented massage parlor clustering. Being located in the City of Los Angeles approached significance (OR=4.16, p=.058). In the adjusted analysis for LAC (see Table 2a, right side), proportion Asian (OR=1.63, p=.015) and proportion Hispanic (OR=3.47, p=.004) were positively associated with massage parlor clustering. Los Angeles City's explanatory power disappeared in the adjusted analysis.

In the unadjusted analysis for NYC (see Table 2b, left side), average household size (OR=.31, p<.001) and proportion below poverty level (OR=.52, p=.048) were negatively associated with clustering, while employees per capita (OR=1.71, p=.001) and being located in Manhattan compared with other boroughs (OR=2.39, p<.001) were positively associated with clustering. In the adjusted analysis for NYC (see Table 2b, right side), average household size (OR=.38, p=.038) remained negatively associated with clustering, and being located in Manhattan (OR=1.84, p=.006) remained positively associated with clustering. Proportion Asian approached significance in the adjusted analysis and was positively associated with clustering (OR=1.40, p= .078).

Discussion

The results suggest that sexually oriented massage parlors in LAC are more likely to cluster in immigrant enclaves, whereas in NYC sexually oriented massage parlors seek to locate in business districts and higher income areas. The clustering pattern in NYC diverges from the historical pattern of red light districts centering on immigrant enclaves (Haller 1990). Although the association of massage parlor clustering with immigrant enclaves in LAC may appear to conform to the historical red light district pattern, our results show multiple hotspots throughout LAC, rather than a few clusters located in central city areas. This dispersed pattern is consistent with literature reporting dispersal of indoor sex work venues as a result of more aggressive police enforcement of street-based sex work and technological innovations that make it easier to locate indoor sex work venues (Murphy and Venkatesh 2006; Venkatesh 2011) Our study extends that literature by showing that sexually oriented massage parlors, while dispersing beyond red light districts to multiple locations, are still often clustered.

Differences in the factors associated with clustering in LAC and NYC may be related to differences in land use and transportation modes. LAC massage parlor workers and male clients are more reliant on automobiles for transportation compared to workers and clients in NYC.[iii] Because clients in LAC may be willing to drive to reach a sexually oriented massage parlor, and may even prefer to go somewhat out of their way to avoid being recognized (by face and by their car in the parking lot),[iv] massage parlors may not find it compelling to cluster along clients' routine travel paths, as they appear to do in NYC. In LAC, sexually oriented massage parlors appear to cluster in areas outside of Central Business Districts (although the clusters were located in the central part of Los Angeles County, location in Los Angeles City was non-significant in both the unadjusted and adjusted analyses) and closer to potential workers (proportion Asian was significant in the adjusted analysis).

The non-significance of the boundary variables in the adjusted analysis suggests that variations in regulation across Los Angeles City, other incorporated cities within Los Angeles County, and the unincorporated areas of Los Angeles County have limited influence on sexually oriented massage parlor clustering. This is consistent with a previous study that found zoning restrictions to be ineffective in changing the locational choices of sexually oriented businesses, although that research focused on legal businesses (Lyons, Schoolmaster, and Bobbitt 1999). Our analysis, however, is not able to discern the impact of city-by-city variation on sexually oriented massage parlor clustering among the incorporated cities of Los Angeles County, as all incorporated cities besides the City of Los Angeles were grouped into one category in the analysis. With 88 incorporated cities in Los Angeles County (County of Los Angeles 2016), a finer city-by-city analysis is a necessary next step for future research.

[iii]In 2012, 74% of jobs in the Los Angeles metropolitan area were reached by workers commuting by driving a car alone; the rate of driving alone for jobs in the New York City metropolitan area was 50% (Cox 2013). For jobs in New York City proper, the rate of driving alone was even lower at 24%.
[iv]The academic literature and popular media document the use of license plate numbers to identify individuals engaged in soliciting prostitution (Holley 2017; Thompson 2017) and more generally to invade individuals' privacy (Marx 2001).

In New York City, where the majority of residents commute by walking and taking public transportation (NYC Department of City Planning 2010), and where high population density and lack of need to park a car may minimize concerns about being recognized, sexually oriented massage parlors may find it beneficial to cluster closer to potential clients' routine commuting paths. In our analysis, being located in Manhattan, where jobs are concentrated, remained highly significant in the adjusted analysis. The somewhat even spacing of massage parlor hotspots on Manhattan's east and west sides flanking business districts suggests a possible association with subway stop locations; subways lines in those areas run north-south with stops about every 10 blocks. The regression analysis shows a positive, but statistically non-significant association between clustering and subway stops (see Table 2b). The non-significance of the subway stops variable may be partly the result of the fact that subway stops are relatively plentiful across New York City.

The only other significant factor in the adjusted analysis for New York City was average household size (negatively associated with clustering), which could indicate massage parlors' avoidance of areas where community opposition might be higher, with higher average household sizes suggesting a higher concentration of families with children. This latter interpretation would suggest that sexually oriented massage parlors are sensitive to community sentiment or to more aggressive code and police enforcement that results from community complaints. This interpretation is consistent with local media accounts that characterize police raids as having been spurred by community complaints or that call for more vigilance among community members to identify and report illicit massage parlors (Kern-Jedrychowska 2016; Mehlman-Orozco 2015).

Clustering in New York City appears to be driven mostly by client demand. However, labor supply may also be important in clustering. Proportion Asian (representing labor supply) approached significance in the adjusted analysis (p=.078), which suggests that massage parlors may find it somewhat beneficial to locate near Asian immigrant populations to be close to Asian female workers. Alternatively, the marginal significance of the proportion Asian variable may be reflective of the fact that business districts and Asian populations often overlap in New York City (e.g., the close proximity of Wall Street and Manhattan's Chinatown, and of the midtown business district and Koreatown).

It should be noted that this is a cross-sectional analysis that can identify factors associated with massage parlor clustering but cannot establish causation. The study's focus on Chinese, Korean and Asian sexually oriented massage parlors limits its generalizability to sexually oriented massage parlors associated with other racial/ethnic groups, although the literature and our research suggest that these other types of massage parlors represent a small share of the industry, at least in the US. Our geographic focus on Los Angeles County and New York City limits the study's generalizability to other places. The study's reliance on one website to identify sexually oriented massage parlors is also a limitation.

Conclusion

The different factors driving sexually oriented massage parlor clustering in LAC and NYC appear to be related to the divergent land use patterns of the two areas, particularly with

regard to population and business density, which in turn are associated with divergent transportation infrastructure and behavior (i.e., commuting by driving vs. walking or public transit). The two areas have similar population sizes but are vastly different in geographic size. Manhattan, which contains almost all of the sexually oriented massage parlor clusters in NYC, is a relatively small area of 23 square miles (U.S. Bureau of the Census 2010), while the City of Los Angeles spans 469 square miles (City of Los Angeles 2015) and the County of Los Angeles spans over 4700 square miles. In NYC, economic activity and employment are highly concentrated in Manhattan, while, in comparison, they are widely dispersed in Los Angeles (Gladstone and Fainstein 2003). In LAC, where potential clients are more likely to travel by car, clustering of sexually oriented massage parlors may be driven by proximity to labor supply (with a possible explanation that lower resourced workers have fewer transportation options than higher resourced male clients). In NYC, sexually oriented massage parlor clusters appear to be locating in business districts easily accessible to clients on their public transportation-based commute paths. LAC massage parlors may also be clustering in response to client preferences insofar as they locate away from areas where clients or their cars may be recognized.

Findings concerning the role of local regulation in clustering of sexually oriented massage parlors are mixed and not definitive. The non-significant boundary variables for the LAC analysis suggest that variations in regulation across jurisdictions have little effect on sexually oriented massage parlor clustering. In NYC, the significant and negative impact of household size may indicate massage parlors' sensitivity to community opposition. These analyses, however, are preliminary, and more research is needed to discern more precisely how regulation and enforcement patterns affect clustering of sexually oriented massage parlors. Furthermore, the analysis relies on observational data, rather than an experimental design, and therefore causal relationships cannot be established.

Overall, the analysis indicates that sexually oriented massage parlors cluster in a variety of areas, not just in traditional red light districts. To some degree, this may parallel patterns in formal economic sectors, where advances in transportation and communications have allowed operations to spread further and further afield while simultaneously re-centering higher level management functions and producer services in central cities (Sassen 2002). The study findings suggest a pattern that might be different from past depictions of the sexually oriented massage parlor industry as based squarely within ethnic enclaves in a tightly bound geographic area where regulatory and law enforcement agents were less likely to intervene (Haller 1990). Technology has made it easier to monitor illegal activities in ethnic enclaves, making them less of a haven for illegal activity, and at the same time may have made it easier for sexually oriented massage parlor owners to move outside of the ethnic enclave without overly compromising their ability to control workers and evade law enforcement. Clustering may still retain benefits, but clustering within the ethnic enclave or red light district may no longer be necessary to reap the benefits of clustering.

Efforts to thwart, move, or close sexually oriented massage parlors have typically focused on arresting sex workers for prostitution, a practice that criminalizes a group that is often already vulnerable (Barry and Singer ; Robbins 2014). Furthermore, as noted earlier, a reliance on criminal enforcement in response to community complaints may simply shift

unwanted uses to neighborhoods with greater social disorganization and less political clout (Edwards 2010; Weitzer 2014). The use of licensure and certification requirements seems to have had limited effects on sexually oriented massage parlor proliferation and clustering. Local governments and their planning departments may be inclined to use tools that directly restrict the physical location of massage parlors. This analysis and the literature suggest, however, that local regulatory practice faces difficulties in this approach from practical and legal standpoints given that sexually oriented massage parlors purport to operate as legal businesses.

As these businesses embody intersections of complex planning issues, balancing their potential positive and negative seconday effects is difficult at best. However, local governments and planners may be able to navigate this terrain better by recognizing the multilayered causes and functions of sexually oriented massage parlor proliferation in the larger urban economy. A more nuanced understanding of sexually oriented massage parlor clustering may help to foster better solutions that recognize and realign the economic benefits for workers and owners. For example, the finding that sexually oriented massage parlors may cluster in response to labor supply highlights (1) locational strategies for geographically targeting services for vulnerable immigrant workers and (2) an area for further reducing barriers and enhancing incentives for other types of immigrant-run businesses to locate in these cluster areas. Programs that aim to generate viable employment alternatives for immigrant women who have limited English-language skills might focus those programs in locations where sexually oriented massage parlors cluster. Similarly, an understanding that sexually oriented massage parlors in New York City cluster on commute paths for client convenience may lead to economic development strategies that highlight alternative forms of legal entertainment targeting male clients that also benefit immigrant women. A better understanding of clustering can shape a policy approach that more specifically addresses both the potential negative secondary effects of controversial sexually oriented land uses and the need for economic development in low-resourced communities in cities across the U.S.

Acknowledgements:

Author Biographies:

John J. Chin is a Professor of Urban Policy and Planning at Hunter College, City University of New York. His research interests include urban health, access to social and health services for under-served communities, and the role of community-based institutions in shaping community values and norms.

Lois M. Takahashi is the Houston Flournoy Professor of State Government and Director of the Sacramento Center at the University of Southern California Sol Price School of Public Policy. Her research interests include HIV prevention and care in communities of color, the NIMBY syndrome, and homelessness.

Douglas J. Wiebe is a Professor of Epidemiology in the Department of Biostatistics, Epidemiology and Informatics, Perelman School of Medicine at the University of Pennsylvania. His research interests include studying how places, policies, and the locations where people spend time have implications for health and injury risks.

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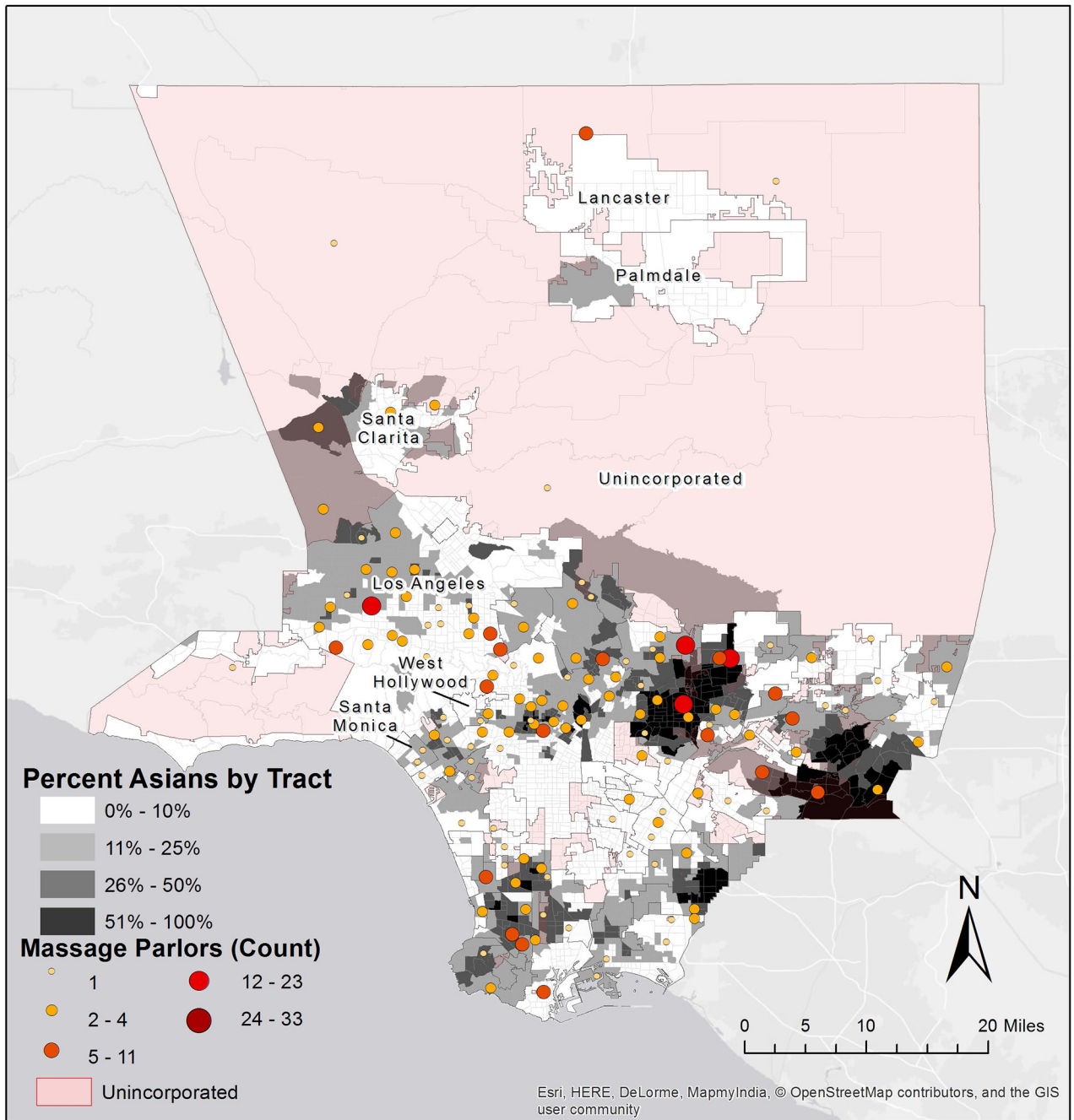
Figure 1a.
Massage parlor prevalence in Census tracts, Los Angeles County
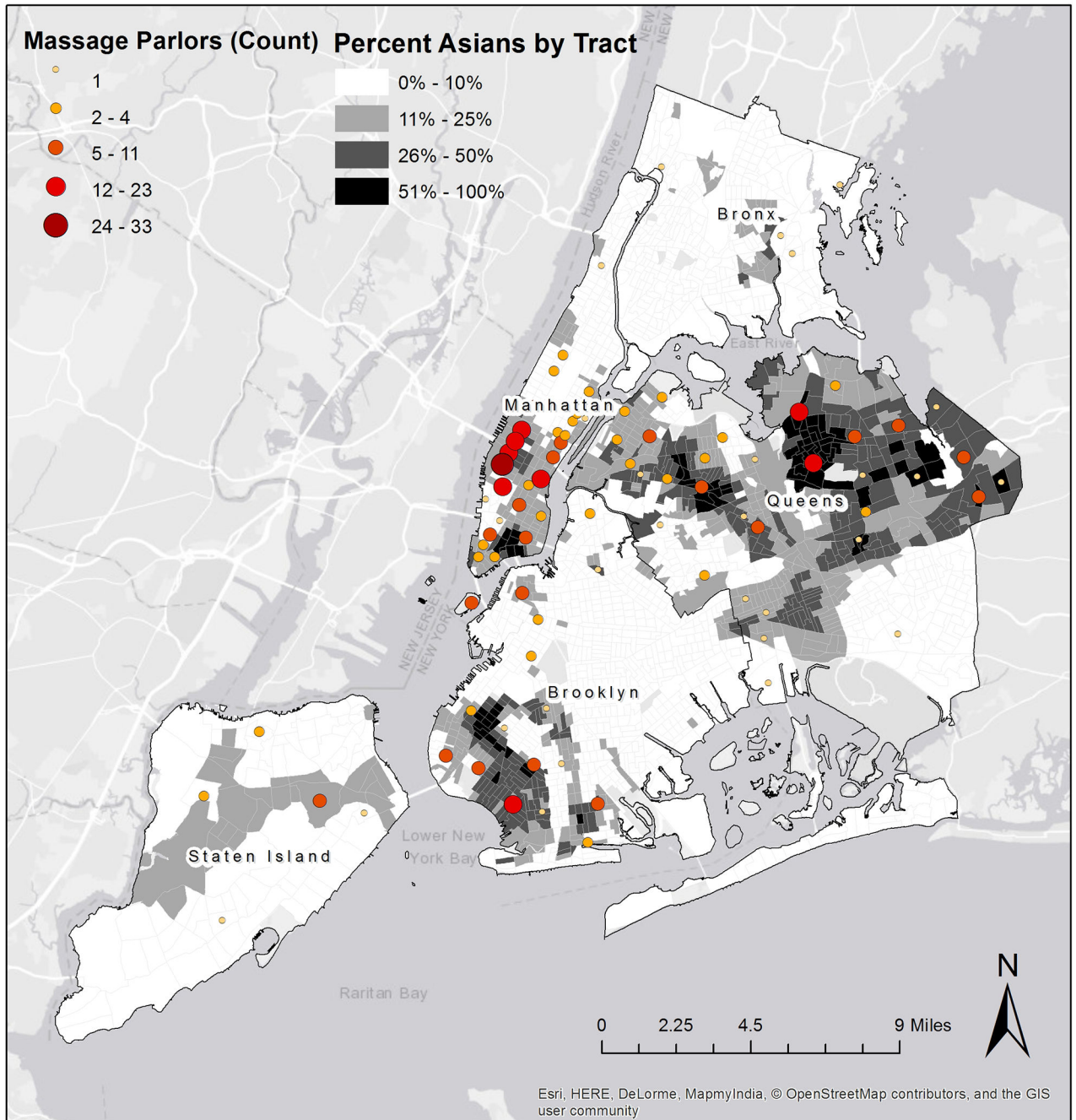
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Massage parlor prevalence in Census tracts, New York City
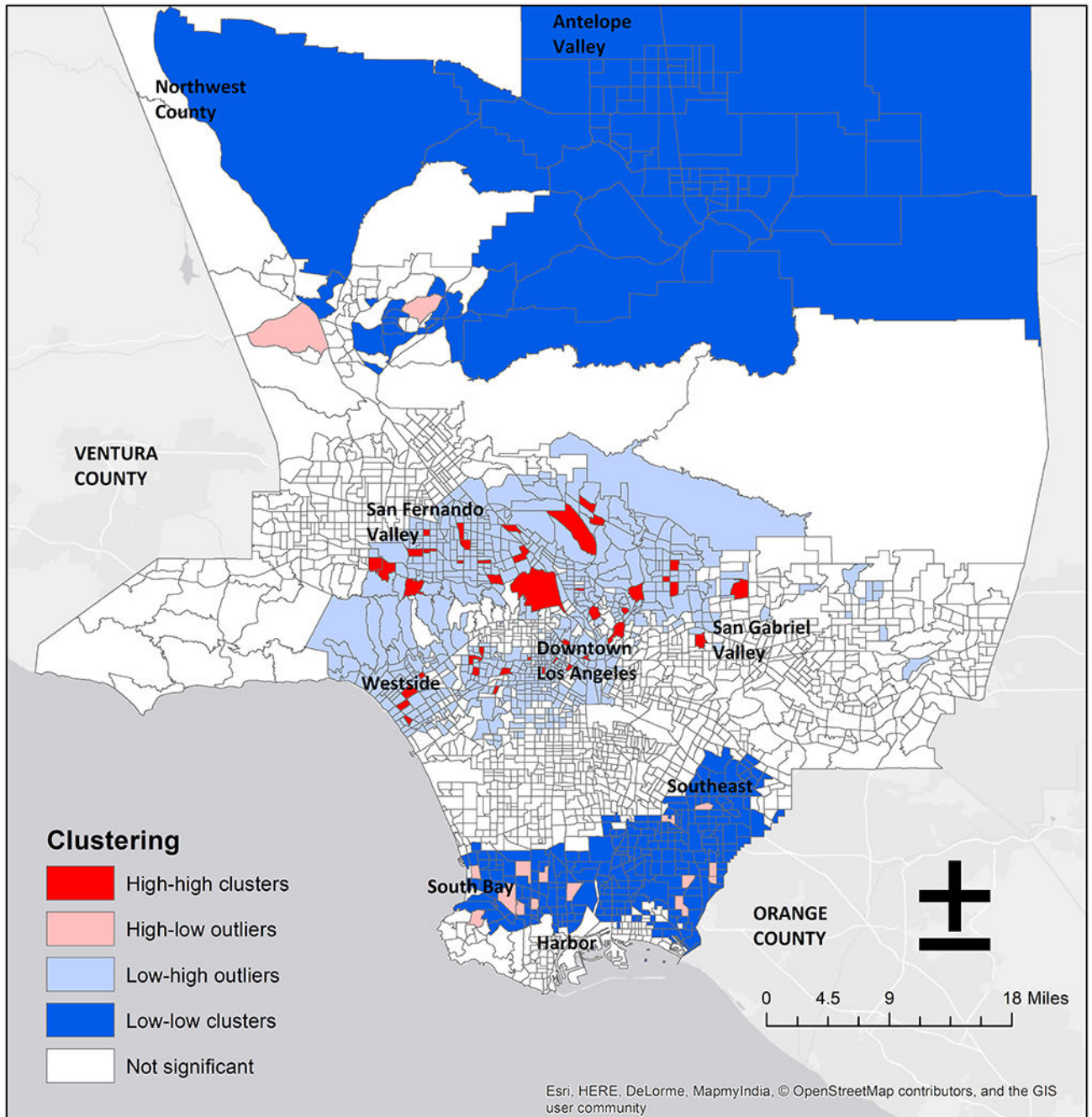
Figure 2a.
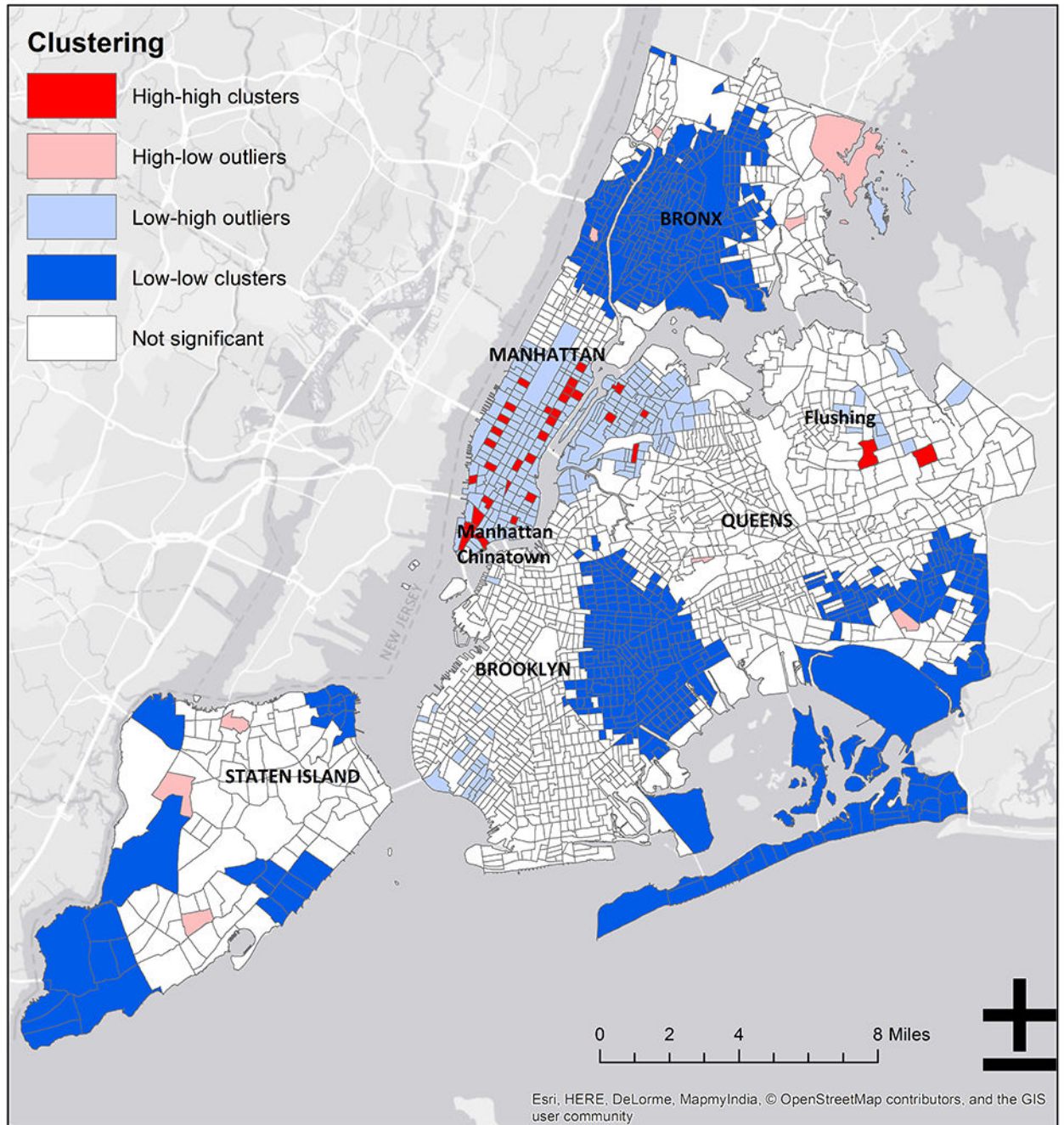Clustering of massage parlors in Census tracts, Los Angeles County

Figure 2b.
Clustering of massage parlors in Census tracts, New York City

Table 1a.

Characteristics of Census tracts (CTs) in Los Angeles County, CA

	Mean (SD)	Median (p25, p75)	High-high clusters (n=42) Median (p25, p75)	High-low outliers (n=16) Median (p25, p75)	Low-high outliers (n=607) Median (p25, p75)	Low-low clusters (n=348) Median (p25, p75)	Not significant CTs (n=1319) Median (p25, p75)
Proportion male (25-64)	0.31 (0.056)	0.30 (0.28, 0.32)	0.30 (0.29, 0.31)	0.30 (0.29, 0.33)	0.29 (0.28, 0.31)	0.31 (0.29, 0.32)	0.30 (0.28, 0.32)
Proportion Asian	0.14 (0.156)	0.08 (0.04, 0.17)	0.09 (0.04, 0.21)	0.11 (0.07, 0.21)	0.08 (0.02, 0.20)	0.09 (0.05, 0.17)	0.08 (0.04, 0.16)
Proportion Hispanic	0.47 (0.291)	0.45 (0.20, 0.73)	0.66 (0.43, 0.88)	0.53 (0.15, 0.67)	0.59 (0.28, 0.81)	0.40 (0.15, 0.64)	0.39 (0.19, 0.69)
Average household size	3.12 (0.833)	3.05 (2.56, 3.70)	3.38 (2.98, 4.07)	3.01 (2.83, 3.68)	3.27 (2.69, 3.95)	2.95 (2.54, 3.57)	2.98 (2.51, 3.6)
Median household income ($)	60028 (29456)	53601 (38643, 74056)	49226 (41369, 66715)	62996 (41766, 86577)	49551 (35707, 69563)	56718 (39490, 76526)	54696 (39696, 76181)
Proportion below poverty line (last 12 mos.)	0.14 (0.118)	0.10 (0.04, 0.20)	0.13 (0.05, 0.19)	0.07 (0.02, 0.20)	0.12 (0.05, 0.22)	0.10 (0.04, 0.19)	0.10 (0.04, 0.19)
Employees per capita (residents)	7.64 (226.92)	0.18 (0.09, 0.40)	0.17 (0.10, 0.39)	0.14 (0.06, 0.33)	0.16 (0.09, 0.36)	0.19 (0.09, 0.39)	0.19 (0.09, 0.43)
Bus stops	8.13 (11.76)	5 (0, 11)	3 (0, 7)	3 (1, 7.5)	6 (0, 13)	6 (1, 12)	5 (0, 11)

Note: SD = standard deviation; p25 = 25th percentile; p75 = 75th percentile.

Table 1b.

Characteristics of Census tracts (CTs) in NYC, NY

	Mean (SD)	Median (p25, p75)	High-high clusters (n=32) Median (p25, p75)	High-low outliers (n=9) Median (p25, p75)	Low-high outliers (n=262) Median (p25, p75)	Low-low clusters (n=612) Median (p25, p75)	Not significant CTs (n=1249) Median (p25, p75)
Proportion male (25-64)	0.27 (0.058)	0.26 (0.23, 0.29)	0.30 (0.28, 0.35)	0.27 (0.24, 0.29)	0.32 (0.28, 0.34)	0.23 (0.22, 0.25)	0.27 (0.24, 0.29)
Proportion Asian	0.13 (0.155)	0.06 (0.02, 0.17)	0.12 (0.09, 0.18)	0.03 (0.02, 0.04)	0.15 (0.09, 0.24)	0.01 (0.01, 0.03)	0.09 (0.04, 0.23)
Proportion Hispanic	0.27 (0.225)	0.18 (0.09, 0.39)	0.07 (0.06, 0.19)	0.37 (0.13, 0.62)	0.13 (0.07, 0.23)	0.26 (0.09, 0.62)	0.17 (0.10, 0.34)
Average household size	2.80 (0.598)	2.8 (2.4, 3.2)	1.8 (1.7, 2.2)	2.9 (2.78, 3.07)	2.1 (1.82, 2.46)	2.94 (2.64, 3.22)	2.82 (2.46, 3.22)
Median household income ($)	56065 (26980)	52140 (36563, 70495)	91026 (56817, 105305)	49385 (43883, 70227)	68052 (51993, 108613)	37875 (26643, 57310)	54157 (41166, 70642)
Proportion below poverty line (last 12 mos.)	0.15 (0.133)	0.12 (0.04, 0.23)	0.03 (0.01, 0.07)	0.09 (0.07, 0.12)	0.05 (0.01, 0.13)	0.21 (0.10, 0.34)	0.10 (0.05, 0.19)
Employees per capita (residents)	0.46 (0.11)	0.45 (0.40, 0.51)	0.63 (0.52, 0.68)	0.47 (0.42, 0.47)	0.56 (0.48, 0.64)	0.41 (0.35, 0.46)	0.46 (0.41, 0.50)
Subway stops	0.22 (0.54)	0 (0, 0)	1 (0, 1)	0 (0, 1)	0 (0, 1)	0 (0, 0)	0 (0, 0)

Note: SD = standard deviation; p25 = 25th percentile; p75 = 75th percentile.

Table 2a.

Results of unadjusted and adjusted logistic regression to identify characteristics associated with clustering of massage parlor venues in Census tracts in Los Angeles County, CA

	Unadjusted analysis			Adjusted analysis		
	OR	P-value	95% CI	OR	P-value	95% CI
Proportion male (25-64)	0.96	0.763	(0.71, 1.29)	1.16	0.500	(0.75, 1.80)
Proportion Asian	1.11	0.448	(0.85, 1.46)	1.63	0.015	(1.10, 2.42) [*]
Proportion Hispanic	1.68	0.001	(1.22, 2.30) [**]	3.47	0.004	(1.50, 8.04) [**]
Average household size	1.48	0.012	(1.09, 2.02) [*]	0.79	0.459	(0.42, 1.48)
Median household income	0.79	0.221	(0.54, 1.15)	1.07	0.849	(0.53, 2.17)
Proportion below pov. line in last 12 mo.	0.97	0.884	(0.72, 1.31)	0.62	0.063	(0.37, 1.03)
Employees per capita (residents)	0.00	0.719	(0.00, ∞)	0.00	0.532	(0.00, ∞)
Bus stops	0.88	0.502	(0.59, 1.29)	0.91	0.675	(0.57, 1.43)
City, LA	4.16	0.058	(0.95, 18.12)	2.63	0.208	(0.58, 11.87)
City, Other	1.59	0.552	(0.35, 7.24)	1.50	0.596	(0.33, 6.96)
Unincorporated	ref			ref		

Note: OR = odds ratio; CI = confidence interval.

Logistic regression conducted with spatial lag (count of venues) to account for spatial autocorrelation.

Adjusted analysis conducted with backward stepwise regression to retain covariates with P-value <0.20.

Each predictor variable was transformed to a z-score with mean of 0 and standard deviation of 1.

Area under the curve for adjusted model is 0.76 (95% CI 0.71, 0.82)

[*] P<0.05,

[**] P<0.01,

[***] P<0.001

Table 2b.

Results of unadjusted and adjusted logistic regression to identify characteristics associated with clustering of massage parlor venues in Census tracts in NYC, NY

	Unadjusted analysis			Adjusted analysis		
	OR	P-value	95% CI	OR	P-value	95% CI
Proportion male (25-64)	1.01	0.973	(0.70, 1.45)	0.62	0.131	(0.32, 1.16)
Proportion Asian	0.95	0.737	(0.71, 1.28)	1.40	0.078	(0.96, 2.04)
Proportion Hispanic	0.71	0.228	(0.40, 1.24)	1.47	0.324	(0.67, 3.32)
Average household size	0.31	0.001	(0.17, 0.56) **	0.38	0.038	(0.17, 0.95) *
Median household income	1.31	0.134	(0.92, 1.85)	0.83	0.504	(0.49, 1.42)
Proportion below pov. line in last 12 mo.	0.52	0.048	(0.28, 0.99) *	0.57	0.207	(0.24, 1.36)
Employees per capita (residents)	1.71	0.001	(1.23, 2.36) **	1.58	0.107	(0.91, 2.77)
Subway stops (yes vs. no)	1.19	0.108	(0.96, 1.47)	1.17	0.241	(0.91, 1.48)
Manhattan	2.39	0.001	(1.65, 3.45) **	1.84	0.006	(1.19, 2.84) **

Note: OR = odds ratio; CI = confidence interval.

Logistic regression conducted with spatial lag (count of venues) to account for spatial autocorrelation.

Adjusted analysis conducted with backward stepwise regression to retain covariates with P-value <0.20.

Each predictor variable was transformed to a z-score with mean of 0 and standard deviation of 1.

Area under the curve for adjusted model is 0.93 (95% CI 0.89, 0.97)

*
P<0.05,

**
P<0.01,

***
P<0.001