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# An Exploratory Geospatial Typology of Illicit Massage Businesses in the Dallas-Fort Worth Metropolitan Area

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## ABSTRACT

Illicit massage businesses (IMBs) are a substantial element of the retail landscape in North America, and represent the most-visible illicit retail activity across the continent. The locational and descriptive data available to researchers from online IMB review sites allows for analysis of locational strategies of IMBs that are simply not possible with any other form of illegal commercial activity. And yet, spatial analyses of the industry to date all treat IMB firms as homogeneous features, rather than distinct firms that make locational choices to differentiate themselves from their competitors and/or make themselves more attractive to potential customers. The assumption of homogeneity produced conflicting and inconclusive results in previous IMB locational studies. This research begins the process of addressing this problem by drawing on extensive field surveying of IMB storefronts in the Dallas-Fort Worth Metro area to present the first geospatial typology of illicit massage businesses in North America. The typology represents a step toward a more nuanced understanding of the illicit massage industry, which can be used to improve locational analyses moving forward.

## KEYWORDS

Illicit massage businesses;  
retail geography;  
mixed-methods research;  
informal economy

## Introduction

There are roughly 10,000 illicit massage businesses (IMBs) in the operation across the United States today (Muller-Tabanera and Huang 2021). These businesses grew in number and geographic extent over the last decade in parallel with the growth of personal services industry-retail (Kickert 2021). The critical difference between the growth of, for example, eyebrow-threading salons or licit massage therapy firms, and these illicit massage businesses is the provision of commercial sexual services in states/municipalities where those services are illegal. Researchers' desire to produce and publish knowledge that can be used by policy-makers to reduce or eliminate human/sex-trafficking, that is endemic to a certain extent within the industry, motivated the bulk of research on IMBs over the last 10 years (Bouche and Crotty 2018; Muller-Tabanera and Huang 2021). The severity and/or extent of trafficking within the industry is disputed, even amongst experts, primarily due to disagreement about accepted definitions of coercion and/or entrepreneurial agency (Agustin 2006; Analoui and Herath 2019; Coreno 2021). Despite this disagreement, research clearly demonstrates that some of the IMB workforce participates against their will, and under highly challenging/illegal working conditions. (Nemoto et al. 2004; Raphael and Shapiro 2004). Addressing these issues also motivates this research; however, IMBs are worth studying

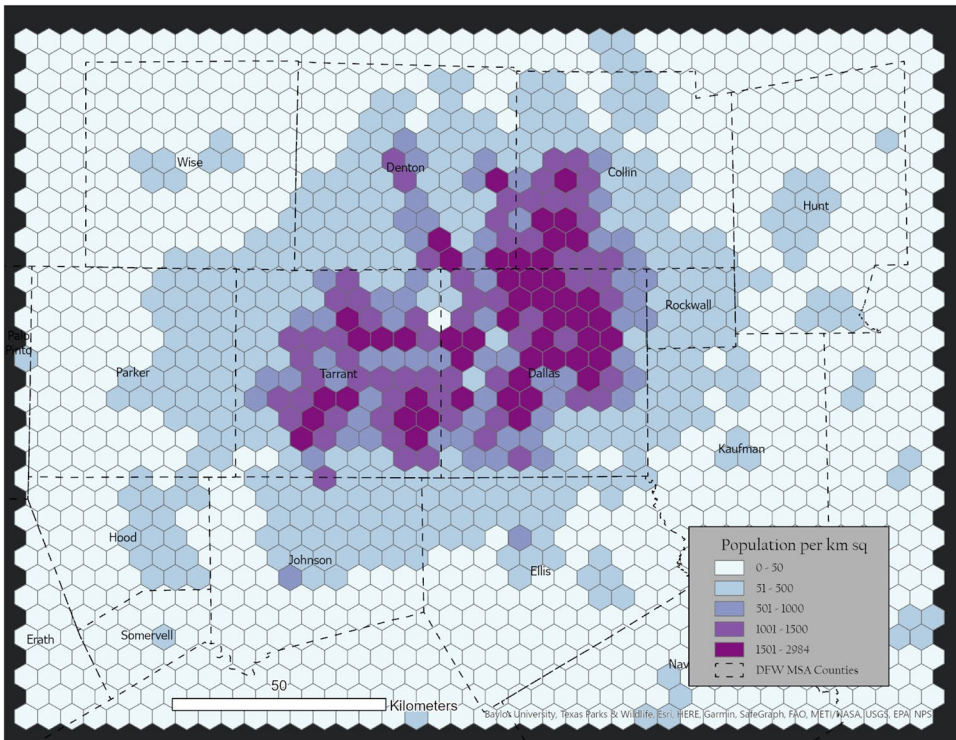


Figure 1. Population density in the DFW MSA.

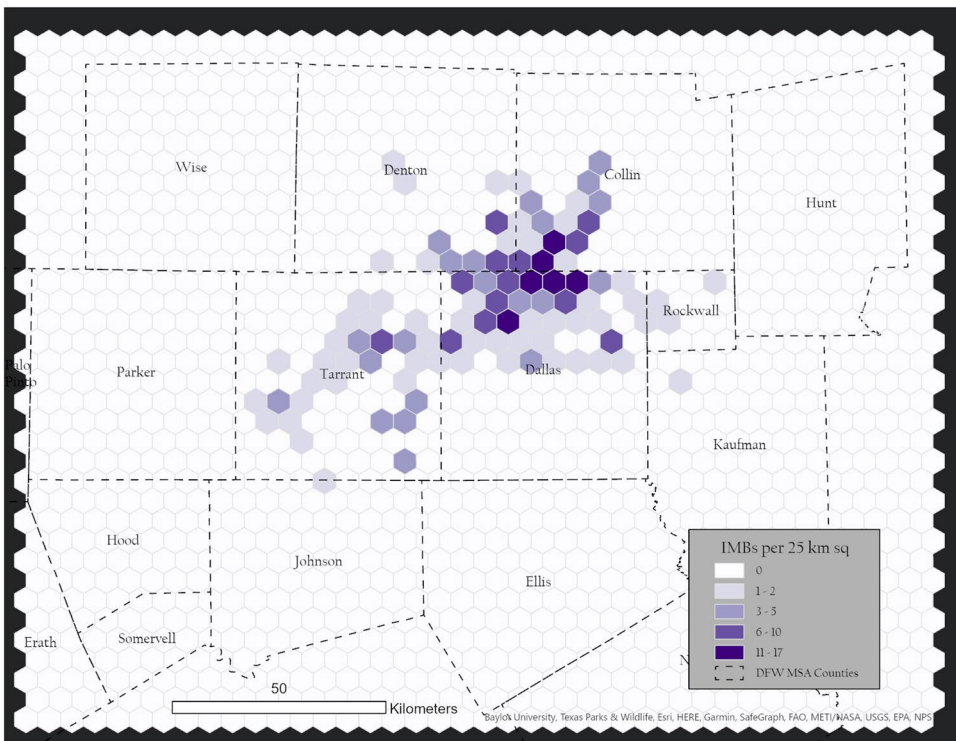


Figure 2. IMB density in the DFW MSA.



**Figure 3.** Permanently closed IMB with Blackout window treatment and no permanent signage.

for reasons beyond the human and labor rights violations that are unfortunately common within the industry.

IMBs are a substantial element of the retail landscape in North America, and represent the most-visible illicit retail activity across the continent. The locational and descriptive data available to researchers from online IMB review sites allows for analysis of locational strategies of IMBs that are simply not possible with any other form of illegal commercial activity. A business/retail geography perspective applied to IMBs can therefore provide deeper and new understanding of the commercial sex industry and grey/black market economies more generally.

One considerable shortcoming of previous research examining the locational strategies/patterns of IMBs is a uniform assumption of homogeneity within the IMB industry. Every quantitative analysis of IMBs locational patterns published to date considers any firm listed in an online review site as a single feature within the dataset equivalent to every other firm-location feature within the dataset (Chin et al. 2015; Crotty and Bouché 2018; Mletzko, Summers, and Arnio 2018; Chin, Takahashi, and Wiebe 2019; Huff et al. 2019; White, Guikema, and Carr 2021; de Vries 2022). In an industry with thousands of retail locations across the United States, assumptions of homogeneity are problematic and necessarily reduce the depth of inquiry and understanding possible. Geographic analyses of neighborhood-level access to financial services provide a useful example counter-example. In order to understand the predatory locational strategies employed by “alternative financial services firms” (e.g., payday lenders, pawn shops, etc.) researchers had to differentiate between those types of firms and traditional financial services firms (e.g., banks) (Graves 2003; Fowler, Cover, and Kleit 2014). Both alternative and traditional financial services firms provide similar services, and they are materially different in locational strategy, customer demographics, and social/societal impact. An analysis of financial services that did not differentiate between these types of firms would inevitably return incomplete, inaccurate results. And yet, this undifferentiated approach is the default in all IMB locational analysis to date. As a result, IMB researchers cannot speak to the underlying locational strategies of IMBs, their customer demographics, or their social/societal impact with much depth or nuance, as is suggested by the conflicting results of previous research discussed later in the manuscript.

The assumption of IMB homogeneity in previous research is particularly troubling when considering the source of the volunteered geographic data – an online review site whose own legal disclaimer suggests that the content on the website may be fantasy rather than reality. Geographers have noted issues with volunteered data within web 2.0 in a variety of contexts

(Goodchild 2007; Flanagan and Metzger 2008; Haklay 2010), and much of the general critique and caution suggested was ignored in early locational analyses of the illicit massage industry. This paper begins to address this shortcoming by presenting a visual landscape analysis of IMBs in the Dallas-Fort Worth metropolitan area (DFW) and corresponding qualitative typology of DFW IMBs. The mixed-methods approach used in this study may serve as a model for building heterogeneity into IMB research in other regions.

## Literature review

Over the past 15-20 years, the material landscape of commercial sex markets in the United States underwent a transformation from more visible outdoor-solicitation to less-visible forms of indoor-sex work. Indoor sex work has existed for hundreds, if not thousands, of years, so the idea, in itself, is not new. However, the percentages of indoor sex-work versus outdoor-sex work shifted considerably toward indoor sex-work over the last 20 years (Venkatesh 2013). The growth of indoor sex-work relative to outdoor sex-work is caused by a combination of factors including the growth of the internet and online message boards and advertising, targeted policing of outdoor sex-work as part of city “cleanup” efforts (Mitchell 2003; Hubbard et al. 2008; Hubbard, Matthews, and Scoular 2009), and in some areas, the dramatic collapse of demand for commercial retail space which has decreased commercial rents and made commercial space affordable for a variety of businesses that previously were a less-substantial part of the retail landscape, including personal services retailers like hair and nail salons, day spas, and massage therapists (Kickert et al. 2020; Kickert 2021).

Prior to this structural change in the commercial sex industry, researchers generally considered IMBs to be one sub-segment of the broadly defined commercial sex-industry. This framework placed IMBs under the umbrella of secondary/indirect forms of prostitution along with cabana boys, etc. The main distinction between direct and indirect forms of prostitution is whether sexual contact is the primary action for which the worker is paid (Harcourt and Donovan 2005). Research that dealt with IMBs did so indirectly, as elements of larger areas of research focus such as sexual-health practices of sex-workers and customers (Nemoto et al. 2004; Handlovsky, Bungay, and Kolar 2012; Kolar, Atchison, and Bungay 2014; Takahashi et al. 2013). There was no systematic analysis of IMB locations in this work. The research describes IMB locations as either in immigrant ghettos/neighborhoods or in red-light districts due to targeted policing and zoning, much like other sexually oriented businesses (SOBs) (Lyons, Schoolmaster, and Bobbitt 1999; Hubbard et al. 2008; Hubbard, Matthews, and Scoular 2009; Prior and Crofts 2012, Weitzer 2014). Scholars have only recently begun to examine the locational characteristics of IMBs in efforts to understand changes to the commercial-sex industry and its implications for society more broadly.

To the best of our knowledge, at the time of this writing there are five peer-reviewed studies published that specifically analyze the locational characteristics of IMBs and the neighborhoods where they operate. The earliest example of this research is from the research team led by John Chin, who mapped 889 IMB locations in Los Angeles and Orange County and analyzed the neighborhood characteristics that were significantly associated with IMB clusters in the region (Chin et al. 2015). They found that IMB clusters were more likely to occur in neighborhoods with a higher proportion of males aged 20-64, with higher average family size, and a higher proportion of residents living below the federal poverty level. Conversely, IMB clusters were less likely in neighborhoods with a higher average household size, a higher proportion of residents who walk to work, and a higher median household income (Chin et al. 2015). In a later study, the same research team compared the clustering and locational drivers of clustering in Los Angeles and New York City (NYC) illicit massage parlors. They found substantial clustering in both cities. However, the clustering correlated with different neighborhood characteristics in each city. In Los Angeles County, IMBs were “more likely to cluster in immigrant enclaves, whereas in NYC sexually oriented massage parlors seek to locate in business districts and higher income areas” (Chin, Takahashi, and Wiebe 2019, p. 8).

In a Houston, TX-based study, Crotty and Bouché (2018) similarly focused on the locational characteristics of IMBs. Their study included all IMBs in the Houston area listed as open and “erotic” from the most common online review website. The study employed two separate statistical tests, one at the regional scale that compared the characteristics of census tracts within one kilometer of an IMB with the region as a whole, and a second to explain neighborhood-level characteristics that correlated with IMB clustering in the Houston area. In this study, the regional analysis showed some clear differences between IMB neighborhoods and regional averages. However, the findings for the neighborhood-level clustering correlations proved inconclusive. Describing the results from the regional analysis they state: “IMB neighborhoods are home to relatively well-educated populations, many of whom are renters and live in nonfamily households. These residents have higher than average incomes, but have lower net worth than the residents of non-IMB neighborhoods. The population of IMB neighborhoods includes a higher percentage of Asian residents (and several nationalities that typically fall within the Asian racial category) and a lower percentage of black residents than regional averages” (2018, p. 9). So, in Houston, IMB neighborhoods are more Asian and less Black than regional averages, but the percentage of residents who are Asian or Black does not correlate with the degree of IMB clustering observed.

The research team led by Anna White applied machine learning techniques to examine the characteristics of 11582 IMBs across forty-nine US states (Alaska was dropped for data quality reasons) (White, Guikema, and Carr 2021). All IMBs included in the study were listed as open and erotic on the same popular IMB board from which data was drawn in most of the previous studies. White’s research team tested machine learning models on census-tract level data alone, and in combination with county-level data, in their exploration of IMB neighborhood characteristics. They found that “population density, total population, racial composition, income and rent levels, and distances to international airports and major cargo ports” were positively associated with IMB locations. Of particular note here is that their findings regarding racial composition of IMB neighborhoods are basically opposite of all the previous studies. “In most cases *higher proportion of Black and Asian residents were associated with lower IMB likelihood*, while higher percent White residents were associated with higher IMB likelihood” (p. 23, emphasis added). White’s team also examined the role religious institutions on IMB locations and found that religious presence was a strong predictor of IMB presence at the county-level. One distinct finding from their research compared with previous studies is that they were able to isolate state effects on the likelihood of and IMBs location. After controlling for all other variables, IMBs are more likely to be found in New York, Ohio, Tennessee, North Carolina, Michigan, Texas, and Alabama. This suggests that there are cultural, policing, or other state-level characteristics that make these places better for IMB activity than the remaining 42 states included in the study.

Finally, recent research by Ieke de Vries approaches the question of IMB locational characteristics from a criminological perspective, examining whether social disorganization theory, routine activity theory, or avoiding police presence best explains the locations of IMBs in Texas, Massachusetts, and Washington (de Vries 2022). The IMB locations in de Vries research are drawn from the same online review board as the previous studies, but de Vries only includes sites that are listed as open, erotic, and that have at least one review listed. To be included in the study the IMBs must also be located in a city with more than 50,000 residents. The results of this research are somewhat difficult to compare as it uses combined measures as proxies for aspect of social disorganization and routine activities, rather than unadjusted census tract attribute data. Nonetheless, the results are quite interesting. de Vries concludes that the odds of a census tract having an IMB in operation were higher in tracts “either greater racial/ethnic heterogeneity, residential instability, and income inequality” (p. 16). However, the odds of an IMB being found in a census tract were inversely correlated measures of concentrated disadvantage. “As such, the placement of IMBs was more likely in more advantaged areas...” (p. 17). de Vries further found that IMB odds increased with higher population density, in tracts that intersected a highway, and had substantive retail land use (de Vries 2022).

Examined collectively, the findings from these studies are intriguing and raise a number of questions for further inquiry. They are also frustratingly inconsistent and occasionally contradictory. For example, most of the city or metro-region scale studies find some positive association between the percentage of the resident population that is Asian and the likelihood of an IMB being present, but the lone national-scale analysis finds the exact opposite – higher percentage Asian population is negatively associated with the likelihood of IMB presence. Some of the differences in results between these studies are due to differences in the design of each study. Each study is organized at a slightly different scale, or in a different metro area. There are differences in the inclusion/exclusion criteria for IMB locations. For example, in their analysis of LAC and NYC IMBs, John Chin's research team dropped any location that listed the ethnicity of workers as non-Asian from the dataset (2019). This data selection choice reduced the potential variation within their dataset and makes the analysis less-representative of the complete IMB economy. Ieke de Vries' choice to only include IMBs in cities with over 50,000 residents makes sense from a criminology standpoint, population and resources for policing are correlated. However, that choice excludes quite a few IMBs located in large metro areas that functionally part of one commercial market, but happen to be operating in municipalities with fewer than the required number of residents. Differences in the statistical methods used to evaluate locations may also explain some of the differences in results – in their 2015 analysis John Chin's team measured clustering as a binary variable at the census tract level while Crotty and Bouché used Z-scores for each tract as the dependent variable in their regression analyses. These sorts of subtle methodological differences may lead to divergent findings. Furthermore, differences in urban form, population density, and corresponding mobility constraints for sex-workers and customers likely produce some of the inconsistency in results. And yet, there is one glaring commonality among the existing IMB research – each of the five studies detailed above implicitly assume that the IMBs are homogeneous. In this article, we argue that the assumption of homogeneity is necessarily limiting and recommend that researchers identify and classify IMBs with more nuance in their analyses moving forward.

Descriptive typologies are commonly used in research on the commercial sex industry. Indeed, the typology presented here is a further refinement of the illicit massage parlor “type” from Harcourt and Donovan's global typology of commercial sex work (2005). Other scholars used qualitative typologies to provide more detailed understanding of particular aspects of the commercial sex industry. For example, Williamson and Baker (2009) typology of work-styles among street-based commercial sex workers in the “Midwest” region of the United States, or Buzdugan et al.'s (2010) typology of female commercial sex work in Karnataka, India. Both studies primary focus was on aspects of social and physical risks to commercial sex workers, and though the studies were not explicitly spatial, they are extremely effective in demonstrating the ways that particular work-styles and place-of-work structures lead to higher risk of physical violence and sexually transmitted diseases, respectively. Another more spatially sensitive typology of commercial sex work in Pakistan was used to similarly understand how particular types of organizational structure for commercial sex workers/operations produced disparate exposure to HIV/AIDS (Emmanuel et al. 2013). In that study, the research team led by Faran Emmanuel observed substantial differences in the predominance of particular typologies of female sex work between cities in Pakistan. In the following sections, we present a typology of illicit massage businesses based on qualitative observations in the Dallas-Fort Worth Metro area, which we believe provides a greater depth of understanding of this industry. The paper does not replicate previous studies, but establishes a framework for researchers to improve spatial analyses within the region and beyond in future research.

### ***Study area and research methods***

The greater Dallas-Fort Worth Metro area includes 224 municipalities spread across 12 counties. At more than 22,000 square kilometers, the region is roughly the size of the state of New

Hampshire. DFW is home to 7.5 million people making it the fourth-largest MSA in the United States by population.

The data analyzed and typologies presented in this article were created in a multi-method process combining web-scraping, Geographic Information Systems (GIS) mapping, as well as field-mapping/verification, landscape photography, and qualitative attribute coding based on grounded-theory approaches (Knigge and Cope 2006; Knigge 2017). This research project was judged to be exempt according to 45 CFR 46.101(b) Exempt Category 2 by IntegReview IRB. We have elected to go beyond the IRB requirements in order to best protect the IMB workers, so all images of IMBs, signage, etc. included in this manuscript are of locations that have *permanently closed* since the time of this field research.

The first stage of the analysis was compiling and mapping all IMBs listed within the study area. The data was collected in August 2018 and included all listings in Texas from a widely used and publicly accessible review-website, as well as IMB attributes included as descriptive information on the review site.<sup>1</sup> The data was then subset to only include locations within the DFW MSA. These IMBs were mapped using ArcGIS Pro 2.8 and the ESRI World Geocoder (ESRI 2021). After geocoding and eliminating IMBs listed at the same location (address and suite), as well as duplicate entries, the final dataset examined in what follows includes a total of 328 unique IMB locations, of which 241 were listed as open and the remaining 88 were listed as closed on the review-website. This study included locations listed as closed for field verification because much of the previous research and reporting on IMBs throughout the United States has documented the businesses tendency to close and reopen in the same location. The re-opened business may or may not use a different name, but locational stability appears to be one mechanism by which illicit businesses ensure that repeat customers can access their services (Wang 2010).

We began field verification and landscape photography of the 328 unique locations in March of 2019. Initially, we intended to only record qualitative descriptions of each site, along with some attribute categories that previous reports on IMBs suggested corresponded with illicit activity such as window treatments that make it impossible to see inside the business from outside, absent or low-cost/quality signage, etc. We quickly determined that our descriptive approach was inefficient for recording all relevant data, so we created a field survey tool using kobotoolbox.org. This web-browser based tool uses the geolocation function on a smart phone to provide accurate latitude and longitude coordinates for each entry, and allowed us to upload up to four images per IMB from the smartphone's camera. The KoboToolbox survey tool also included 37 additional attributes to enter for each IMB including the type of building the IMB was located within (e.g., stand alone, strip-mall, and anchored center), whether the IMB was still open, if its name had changed/differed from the IMB review site entry, the existence and quality of signage, and store frontage details like whether or not the windows were opaque and the method used to reduce interior visibility (e.g., blacked out, blinds, colorful massage advertisement images/pictures). The final attributes we recorded were the types of businesses that co-located with IMBs. For IMBs in shopping centers or office parks, we defined co-location as any business in the same shopping center. For stand-alone IMBs, we defined co-location as any businesses located directly adjacent to the IMB (see [Appendix 1](#) for a full list of attributes recorded for each potential IMB). The bulk of the field verification took place in July and August 2019, using the KoboToolbox tool, which we used for 259 of the total sites. We then merged the data from handwritten notes from the first 69 locations surveyed with the KoboToolbox database so each IMBs attribute data was recorded in the same format.

Simply determining the number of actually open and operating IMBs was an important early portion of the field verification process. Of the 241 unique IMB locations listed as “Open” on the review site at the time of the data collection, 211 were still in operation when we reached that location for field verification. Of the 211 still in operation, 32 had changed the business name but were operating from the same address/suite number. 22 were closed, and we could not determine the operational status for 8 locations. Of the 87 locations listed as “Closed” at

the time of the data collection, 31 were actually open and operating in the same location (15 of the locations had new names, while the other 16 were using the same business name/signage). 43 locations listed as closed were verified to be closed, and we could not determine the operational status for 13 locations. Therefore, at the time of the field verification, there were 242 IMB locations which we verified were operating in the DFW metro area. The typology presented below is based primarily on those 242 locations – though viewing the landscapes where IMBs formerly operated certainly also helped to shape the qualitative understanding of the spaces in which particular types of IMBs operate. In total, the field verification process took approximately 136 hours to complete, including more than 2000 miles of driving throughout the DFW metro area. The data was labor-intensive to collect, but provide depth of insight regarding the structure of the IMB economy that simply are not available through purely technical and quantitative methods currently. The qualitative typologies defined in the following sections are based on grounded-theory approaches this observational data.

## Results

IMBs operate in every type of rentable commercial space in the DFW region. The majority of firms listed on the IMB review website are found in strip malls (66.9%,  $n=162$ ). The second largest commercial landscape where IMBs operate is anchored commercial centers (20.2%,  $n=49$ ). These two categories are quite similar in terms of the landscape esthetic and only differ in the relationship of the commercial space to a large anchor tenant like a major grocery store or a shopping mall. 21 IMBs in the DFW area were operating from office parks (8.6%,  $n=21$ ). Office parks were listed as the locations of another 29 IMBs that were closed or that we could not verify operating status. This was the largest percentage difference between locations listed and operational status by location type. The architectural design of these office parks varies considerably, from high-rise buildings to ground-level suburban-medical office parks. The absence of retailers among the co-locating businesses is the main point of differentiation from strip malls and anchored centers. These office parks are not one goes to purchase a good, but medical, legal, accounting, and myriad other services are available in these spaces. Twenty-two IMBs operated out of stand-alone buildings. These buildings are single purpose and include both commercial buildings and personal residences either in single-family homes or apartment complexes.<sup>2</sup>

The level of investment evident in the signage and frontage design/decoration for IMBs varies considerably. Prior to the field validation process, we established four categories for classifying signage based on previous research descriptions of common IMB signage styles: No Permanent Signage, Permanent sign that only says “Massage,” Permanent sign with full name, other signage.<sup>3</sup> The type and quality of signage reflects the firm owners’ relative levels of investment in the long-term locational stability of their businesses. As such, we hypothesized that locations displaying low-levels of investment in signage would be more likely to provide full-service and/or be sites where the employees are trafficking victims. Unfortunately, there is no visual evidence to validate or disprove this hypothesis. Moreover, just about all the firms surveyed for this study engage in strategies to reduce the cost of relocation or, more commonly, re-opening in the same location with a different business name. The most obvious examples of this cost-reduction strategy are the 23 IMBs in the region that have no permanent sign. These firms tend to print their signs on banners and hang them on building walls or tape them to the inside of the IMBs windows, rather than having a sign that is permanently affixed to the building.

Seven IMBs have permanent signs that only say “Massage” and make no effort to advertise the full name of the business. These firms depend on customers understanding that the service provided is equivalent, despite the name on a sign not matching the name listed on the IMB review site.

The majority of IMBs have permanent signs that display the full business name. City zoning related to signage, in combination with private regulations established in lease contracts by

commercial centers that require permanent, often lighted, signage, are likely the reason that most IMBs have permanent lighted signage. As such, the permanent signage may not reflect a lower-rate of closure/reopening among stores compared to firms with no permanent signage. Indeed, we observed a common signage and business name-selection strategy that would reduce the cost for firms that reopen in the same location with a new name. The general rule in these cases is that the business name will include a short letter, term, or image, followed by “massage” or “Feet” in the case of foot-massage firms (e.g., Q Massage, Lucky Massage, Happy Feet, etc). The signage consists of two lighted pieces. One piece is small and consists of only the first letter of the business’s name or an image. The second piece is larger and consists of the full word, “Massage.” When the firms close and reopen in the same location, the cost of changing the signage is reduced because only the smaller front element needs to be replaced. In a hypothetical example, a business that opened as “Q Massage” could reopen as “Lucky Massage” and the only change to the signage would be to replace the “Q” element in the sign with a 4-leaf clover symbol (see [Figure 4](#) for an example of replaceable signage from a now-permanently closed business in DFW).

On its list of indicators that a massage parlor is engaging in illicit activities, the anti-trafficking group, Polaris Project, includes windows that are covered so the passerby cannot see into the establishment (Keyhan 2018). We documented the use, and type, of window treatments on all IMBs in the region. Forty-eight of the businesses surveyed operated in windowless buildings, so this characteristic didn’t apply to them, though their interiors were similarly not visible to passersby like those IMBs that used window treatments (see [Figure 9](#) for an example). Of the firms



**Figure 4.** Massage business with blinds for visibility reduction.

with front-facing windows, only 46 had clear windows with open views to the interior of the business. The others employed either a blackout or reflective sticker (26%,  $n=89$ ), massage-themed posters (18%,  $n=63$ ), hanging blinds (28%,  $n=94$ ), or some combination of treatments in their front-facing windows. It is our belief that the value of this attribute for identifying an illicit business versus a legally operating one is limited, however. A casual examination of legal massage businesses (those not listed in the IMB database at the time of the research) showed that nearly all massage businesses, including firms that are part of franchised chains, use some form of window treatment to reduce interior visibility. Moreover, there are a variety of reasons why many businesses, regardless of the relative legality of their activities, might use one or more of the window treatments, including energy savings, glare reduction, generating revenue by placing advertisements in windows, etc. Indeed, if you examine the window treatments of strip-mall businesses west-facing front doors, most use window treatments to reduce afternoon glare.

The final major attribute category we collected was the commercial neighbors for each IMB. This data provided a structure for analyzing patterns of business co-location and/or deagglomerative effects. Ultimately, some of the business-neighbor categories were more useful than others for understanding the IMB landscape. The attribute of proximity to other businesses that cater to a specific non-American nationality is of particular use in defining the ethnoburb IMB type in the following section. Co-location with other SOBs was quite rare at 4.1% ( $n=10$ ), however the presence of SOBs within the more broadly conceived neighborhood is a factor in defining the historic red-light district IMB type. Many of the other categories simply reflect the general commercial/retail landscape of the region than specific co-location patterns for IMBs. Categories, like tobacco/vape, dry cleaners, coffee shops, donut shops, insurance agents/agencies, medical services, and financial services, proved less-useful in differentiating between types of IMBs. The under-specification of the categories as-defined is part of the problem for applying the co-locating businesses to the typology. For example, medical services providers operate in high-income shopping centers and lower-income shopping centers. The specific services offered vary substantially by neighborhood income-level, from plastic surgeons operating in high-income areas to low-income areas where blood-plasma donation-for-payment and dialysis clinics are more common. There are similarly examples many types of retail businesses operating in neighborhoods with high diversity and in neighborhoods with low residential diversity.

Ultimately, the value in this field-surveying process is a nuanced understanding of the ways that IMB firms differentiate themselves from each other and make their services accessible to customers with different service demands, experiential desires, price-sensitivity, and tolerance for perceived risk. Taken independently, the above attributes cannot provide this level of nuance. However, placed within the appropriate spatial context and evaluated in combination, they provide the basis for a qualitative typology that describes consistent traits/trends observed in IMBs across the region.

### ***Typology descriptions***

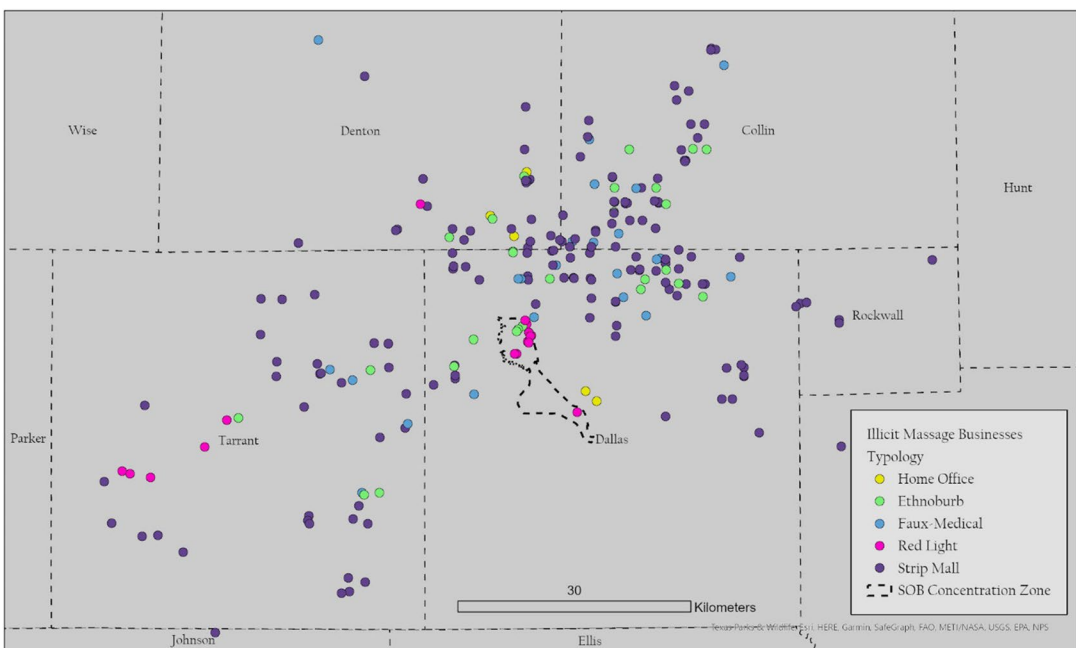
In the following sections we provide detailed description of each type of IMB identified through the qualitative field verification process. To better explore the spaces in which each type of IMB operates, we mapped all IMBs in the region according to their assigned “type.” We used the TidyCensus package in R to retrieve 5-year estimate data for 2019 from the American Community Survey (ACS) for census tracts in the DFW region (Walker and Herman 2022) and calculated comparable percentage values for the demographic characteristics of each tract (see Table 2 for all compared attributes). Next we assigned types to all census tracts located within 1 kilometer of an IMB of that particular type. The tracts are then grouped by type to generate demographic profiles of each type of IMB neighborhood (Table 2), and the IMB type-neighborhoods were mapped for reference in the following discussion (Figure 6, see also Appendix 2). We also provide a table highlighting the number of reviews that each type of IMB typically received. Though it is not the focus of this study, a brief examination of the text-content of reviews for IMBs in

**Table 1.** IMB typology counts and review data.

Type	Total firms	Average review count	Median review count	Review count range
Home office	5	10.4	6	25–Mar
Ethnoburb	27	12.1	8	Jan–48
Faux medical	24	16.2	8	Jan–52
Red light	25	40.8	36	2–156
Strip mall	161	8.3	4	0–52
Total	242	13	6	0–156

**Table 2.** Neighborhood demographic characteristics by IMB typology.

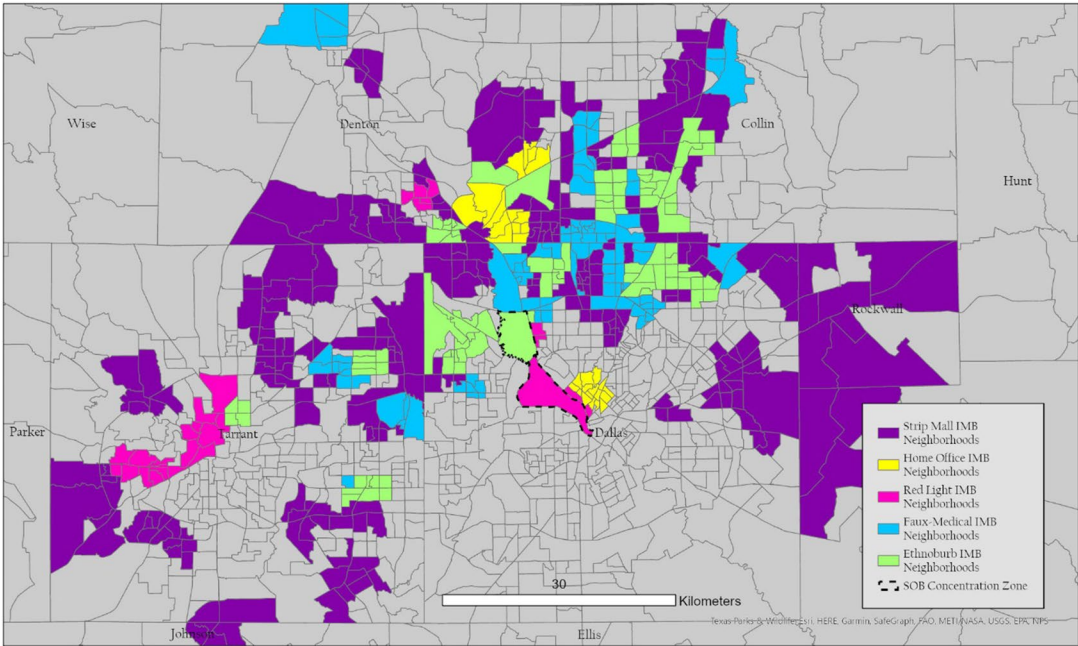
Type	All tracts	IMB tracts	Strip mall	Ethnoburb	Faux Med	Red light	Home office
Pop density	1693.06	2085.16	1974.18	2159.03	2344.49	1805.04	3123.71
Med HH Inc.	37872.52	41176.98	41542.78	38643.4	38934.88	33244.8	52449.03
% White	0.46	0.49	0.5	0.41	0.46	0.42	0.56
% Black	0.15	0.13	0.13	0.13	0.14	0.1	0.09
% Asian	0.06	0.1	0.1	0.15	0.08	0.04	0.11
% Hispanic	0.3	0.25	0.23	0.26	0.28	0.42	0.22
% Foreign Born	0.19	0.21	0.2	0.27	0.25	0.23	0.19
% Poverty	0.12	0.1	0.09	0.1	0.11	0.13	0.09
% Renters	0.41	0.46	0.43	0.48	0.54	0.54	0.5
% Non-family HH	0.31	0.34	0.32	0.31	0.38	0.43	0.48

**Figure 5.** DFW metro area IMBs by type. The sexually oriented business (SOB) concentration zone in Dallas, TX, is adapted from Lyons, Schoolmaster, and Bobbitt 1999.

the region suggests that a higher number of reviews may correlate with an increased likelihood that an IMB offers a wider-range of commercial sexual services.

### **Strip mall IMBs**

Personal care services are one element of the North American retail landscape that grew substantially over the last 10 years. Massage businesses are just one example – manicure/pedicure



**Figure 6.** DFW metro area IMB neighborhoods by type. The sexually oriented business (SOB) concentration zone in Dallas, TX, is adapted from Lyons, Schoolmaster, and Bobbitt 1999.



**Figure 7.** Most Faux-medical IMBs in the DFW region operate from single-story medical/office parks. The space shown was formerly occupied by an IMB, was later leased to an accounting firm.

spas, hair salons, eyebrow threading/waxing, are all examples of types of personal services firms that increased as a percentage of commercial retail space – now comprising 23% of all street-level commerce in urban areas throughout the US (Kickert 2021; Kickert et al. 2020). Strip-mall-style street-level commercial spaces make up the vast majority of architectural spaces where IMBs operate. More than three-quarters of all IMBs in the region operate in street-level commercial



Figure 8. A permanently closed red-light district IMB in a windowless, stand-alone building.

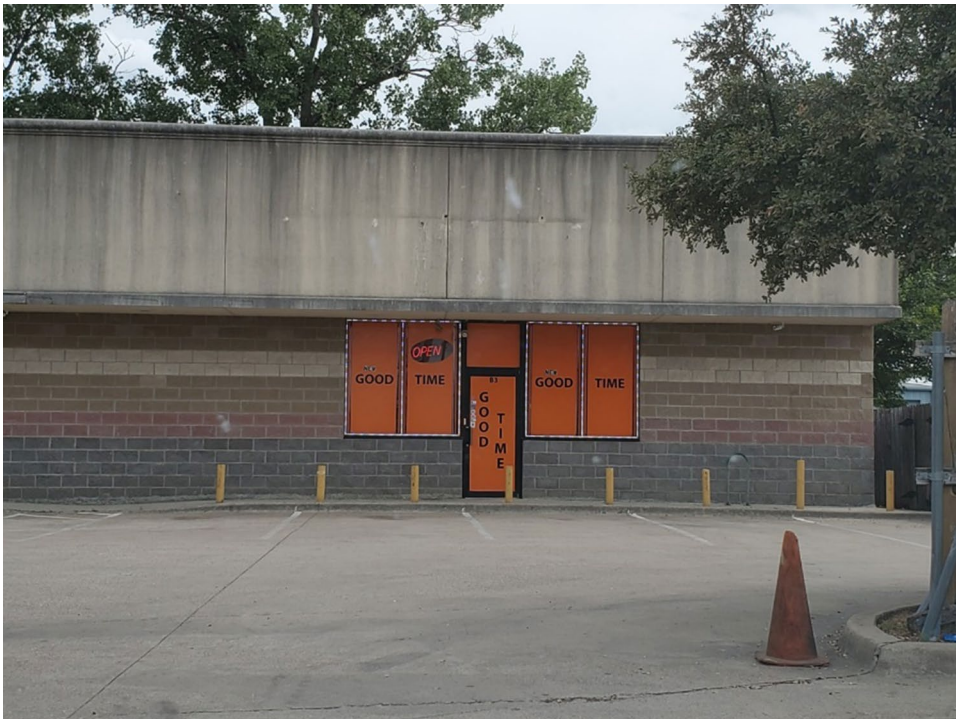


Figure 9. Example of permanently closed red-light district IMB frontage/design.

retail spaces. In our field survey, we differentiated between retail spaces linked to an anchor retailer and spaces that are not near to an anchor retailer, but for the purposes of the IMB industry, the distinction does not appear to make much difference. The esthetic choices, as well as services provided, do not vary based on proximity to an anchor retailer.

At the time of the field verification, there were 159 strip-mall IMBs operating in the DFW metro area, making it the most common type of IMB in the region. The strip-mall IMB type is defined in part based on the architectural space in which it operates, however the second and critical element for differentiating between strip mall IMBs and ethnoburb IMBs is the *absence* of other businesses focused on the goods and services from a particular non-US country. Whereas ethnoburb IMBs operate in shopping centers that feature at least one, but typically multiple retailers specializing in goods or services from China, Korea, Thailand, Mexico, etc; strip mall IMBs operate in shopping centers where none of the other businesses specialize in the same way. Strip mall IMBs commercial neighbors are more likely to be tobacco/vape shops, and financial services (tax preparers), etc. that do not cater to customers from a particular ethnic or nationality group.

Strip mall IMBs are found throughout the most densely populated counties of the DFW region, with the largest cluster near the boundaries of Denton, Collin, and Dallas counties. The breadth of geographic space across which strip mall IMBs are found in the region is perhaps more noteworthy than the concentration of strip mall IMBs. They are the most common type on the suburban fringe of the metro area. So, while they are certainly found in a variety of landscapes, the breadth of the neighborhoods in which they operate makes the characteristics of strip-mall IMB neighborhoods more similar to regional averages than is the case for any other IMB type. Strip-mall IMB neighborhoods are home to a slightly higher proportion of White and Asian residents, and slight lower proportion of Black residents than the regional average. The most substantive demographic difference between regional characteristics and strip-mall IMB neighborhoods is in regards to the proportion of Hispanic residents, which is 7% lower in these IMB neighborhoods.

The number of reviews for strip-mall IMBs ranges from 0 to 52 reviews for an average of 8.3 reviews per firm across the group. This is the lowest average number of reviews of any IMB type.

### **Ethnoburb IMBs**

Ethnoburb IMBs are defined by their commercial and residential neighbors more than the building type, frontage details, or other physical attributes of the business. Instead, these IMBs are identified by their presence in a neighborhood defined by the visible presence of one or more of the nationalities from which the Asian race category is derived (as defined by the US Census, this includes Chinese, Japanese, Korean, Thai, and Vietnamese). First proposed by Wei Li (1998), the concept of the ethnoburb is generally understood as multi-ethnic suburban communities, in which one ethnic minority group has a significant concentration, but does not necessarily comprise a majority. Within this landscape, the imprint of a particular ethnic group within the landscape is not restricted to a small, highly concentrated space as was the case for places like San Francisco's Chinatown. Instead, the ethnic landscape is defined at the scale of the suburban shopping center – many of which cater to a particular non-American nationality, but may be near to or even directly adjacent to a shopping center that caters to a different nationality. This is certainly the case in the north-east suburbs of the DFW region, where shopping centers catering to the needs of residents from China, India, Korea, are commonly found near to each other, as well as to shopping centers anchored by general goods retailers and grocery stores that do not explicitly target customers of a particular nationality group.

Ethnoburb IMB neighborhoods are found in a few generalized areas in the region – the southeast part of Denton County, Southern Collin county, and the northern portions of Dallas county. This area that is generally to the northeast of Dallas-Fort Worth International Airport comprises the largest cluster of IMBs of all types in the region, including 23 of the 27 ethnoburb IMBs. Asian residents comprise 15% of the population in ethnoburb IMB neighborhoods, more than double the regional average of 6%. There are also a higher proportion of foreign-born

residents (25%) and renters (54%) in the neighborhoods near ethnoburb IMBs compared to regional averages. The number of reviews for ethnoburb IMBs ranges from 1 to 48, which an average of 12.1 for all firms in the category.

### ***Faux-medical IMBs***

Faux-medical IMBs are firms that operate in medical or general office-parks. The office parks are commercial spaces, but they are not retail-oriented. The IMBs that operate in these spaces tend to have names that refer to medicine, holistic-health, or wellness. These IMBs are different than the red-light district IMBs, for example, in their hours of operation. While red-light district IMBs are open often until 12am or later, faux-medical IMBs operate on relatively standard medical office schedules – closing at 7 or 8 pm at the latest. Faux-medical IMBs may use this combination of location, esthetics, and hours of operation to attract customers who would otherwise be too concerned about a chance-encounter with a coworker, spouse, neighbor, etc. who could view the customer's use of commercial sexual services negatively to visit a less-discrete type of IMB.

The Faux-medical IMB neighborhoods are demographically similar to the ethnoburb neighborhoods except for the percentage of Asian residents which, at 8%, is still slightly higher than the regional average, but is half that of the ethnoburb neighborhoods. Slightly higher proportions of White, Black, and Hispanic residents combine to make up the difference. The demographic similarities between ethnoburb and faux-medical IMB neighborhoods is not especially surprising considering the adjacency and overlap of the two types. Faux-medical IMB neighborhoods are found directly adjacent to ethnoburb IMB neighborhoods in all except two cases, both of which are located at the northern edges of the region. Faux-medical IMBs average 16.15 reviews per firm, which is the second highest average of any type.

### ***Red-Light IMBs***

Typically found in older commercial and industrial zones, red-light IMBs operate in areas where policing and zoning practices concentrated outdoor-solicitation other legally operating SOBs (strip clubs, adult bookstores, etc.), respectively. In the DFW metro area, this effect is most pronounced in the city of Dallas, where city zoning concentrates legally operating SOBs along a corridor that runs northwest from downtown along and just west of Harry Hines Blvd (Lyons, Schoolmaster, and Bobbitt 1999), but there are also red-light IMB neighborhoods in central and west Tarrant County, as well as a small pocket in southern Denton County. The characteristics of red light IMB neighborhoods are among the most divergent from the regional average as well averages for other IMB neighborhood types. At just over 1800 people per square kilometer, the population density in red-light IMB neighborhoods is still above the regional average, but lower than any other IMB neighborhood type. The residential composition of Red light IMB neighborhoods is considerably more Hispanic than the regional average at 42% and 30%, respectively. These are also the only IMB neighborhood type with a median household income level lower than the regional average.

Within the DFW region, there are two architectural styles common for this “type” of IMB. Some businesses operate in stand-alone, often windowless, buildings.

The second type of historic/red-light district IMB operates in strip malls and/or anchored commercial centers in red-light districts. These IMBs are distinct from other IMB types not because of the building architecture, but because of their signage and naming practices. The names of these IMBs often include the word spa, but do not reference massage specifically. These businesses also do not advertise medical-sounding treatments, such as reflexology. Instead, they have names that range from ambiguous (Green Spa) to sexually suggestive (Lucky Haven). These businesses also differentiate themselves with the window treatments used to make the

interior opaque to anyone outside. First, the business owners fully black out the windows and doors. These window and door treatments may have colorful or reflective patterns facing the street or parking lot, but do not include massage-business related images or wording. These businesses can be highly clustered, and in some cases are found in close proximity to SOBs. The lack of disguise suggests that policing authorities informally tolerate their presence.

The number of reviews for red-light IMBs ranges from 2 to 154. This is good for an average of about 40 reviews per IMB of this type, more than three-times the average across all IMBs in the study (13) and twice the average number of reviews of the second-highest type: faux-medical IMBs. Examination of the text reviews for IMBs along this corridor also suggests, albeit anecdotally, that a larger percentage of the IMBs in this area offer “full-service” commercial sex compared to the regional averages for service level scores. As such, historic-red light IMBs are closer to a “direct” form of commercial sex work than indirect. Though we cannot directly confirm this without a more systematic examination of all IMB reviews for the region, it appears possible that the historical tolerance for commercial sexual activity that classically defined red-light districts still hold some influence on the services provided at IMBs.

### **Home-office IMBs**

Home-office IMBs operate out of residential spaces rather than rented commercial space. In DFW, IMBs operate from both large apartment complexes and single-family suburban residences. In each case, the residential space is used for massage/illicit commercial sex services. We have not included images of these locations to protect the workers’ privacy, as in some cases, they are also the workers’ places of residence. Images would provide no additional clarity regarding the type of illicit activity that occurs within the residential space, as home-office IMBs display no signage or other exterior design characteristics related to IMB activity.

There are three business structures evident among the five firms classified as home-office in the DFW region. The first business structure is supposedly licensed massage therapists who, according to user reviews, also provide some sexual services for additional cost. The reviews for these businesses are fairly detailed in their descriptions of the non-sexual massage elements, which is an exception in the review texts. We did not observe any cases in which the licensed massage therapists offered full-sexual services to their clients. The second business structure that falls under the home-office IMB typology is home-based full-service prostitution advertised on the IMB review site. This specific type of direct sex work is called “Private” within Harcourt and Donovan’s typology and is described as follows: “Client contacts sex worker by phone... services provided in sex-worker’s premises.” (2005, p. 202). These “businesses” are marked by a lack of extensive reviews and limited information on the review website’s page for the business. Often, only an address and a phone number are listed for the location. Other IMB researchers have observed overlap in the phone numbers listed for some IMBs listed on the IMB review website and advertisements for commercial sexual services listed on other sex-classified advertisement sites (White, Guikema, and Carr 2021). Indeed, there is anecdotal mention of home-based IMBs operating as fronts for human trafficking in other IMB research (Barry and Singer 2018). The third business structures within the home-office IMB type are mobile massage workers, who travel to clients to provide massage services. For these businesses, the residences are not the place where commercial sexual work takes place and there’s no clear evidence from reviews that the addresses listed are the workers’ places of residence. This model is most similar to the “escort” type of direct commercial sex-work, in which a sex worker travels to an agreed upon location to meet the client after arranging the details of the work either through direct communication or an agency (Harcourt and Donovan 2005).

There are only five home-office IMBs in the DFW area, so we are somewhat reticent to read too much into their role within the regional IMB landscape. However, their neighborhood characteristics and spatial distribution are unique enough to warrant some discussion. Home office IMBs are found in the most urban neighborhoods in the DFW region, with average population density of 3123 residents per square kilometer compared to a regional average of

just under 1700 residents per square kilometer. Incomes in home office neighborhoods are also much higher in home-office IMB neighborhoods than the rest of the region, and in other types of IMB neighborhoods. At over \$52,000 median household income, home office IMB neighborhoods boast incomes roughly 40% higher than the regional average. These neighborhoods are 10% Whiter than the regional average and 7% Whiter than the average for all IMB-neighborhoods. Home office neighborhoods also have a much higher percentage of households who are renters and higher percentage of households with non-family living arrangements. These neighborhoods must resemble de Vries (2022) conflicting findings related to the correlation of social disorganization with IMB neighborhoods. That study found IMB neighborhoods were correlated with social disorganization, but only along a few of the component elements as defined in the study. Neighborhoods with high residential instability as measured by the percentage of the population who are renters and the percentage of the population that changed residences in the previous year were more likely to host operating IMBs. Neighborhoods with high racial/ethnic heterogeneity were also more likely to host operating IMBs. However, IMBs were *less likely* to be found in neighborhoods with high concentrated disadvantage, as measured by percentage of the population living in poverty, percent female-headed households, and percent of working-age population that is unemployed. To the extent that higher-income levels correlate with higher levels of formal and informal social control, the home-office arrangement allows commercial sex workers to offer services in neighborhoods where demand exists but social controls make it difficult or impossible to operate in the commercial and office spaces where IMBs are more commonly found. Examining the locations of home-office IMB neighborhoods within the DFW region, this is most clearly the case for the home-office IMB neighborhoods located east of the red-light district near downtown Dallas, in an area where IMBs are otherwise entirely absent.

## Concluding discussion

We hope that this project helps to demonstrate the value of incorporating qualitative fieldwork, to the extent that it is possible, into research design for studies of grey and black-market economic activities. Thus far, all IMB researchers have undertaken the work as a form of big data/quantitative geographic analysis, which is typical of locational analysis studies within the discipline. We believe that this mixed-method approach demonstrates that much can be gained from a more-qualitative and experiential understanding of the places and landscapes in which IMBs operate. The field verification processes demonstrated that the visual cues for illicit activity and potential human trafficking suggested by the leading anti-trafficking NGO in the United States are under-theorized and do not appear to be more prevalent among IMBs than other legal massage services, or other legal businesses operating in the same retail/commercial/office landscapes. However, one of the two building/frontage types common among red-light IMBs in the DFW region does employ a notably different window treatment, so while treatments to make windows opaque to passersby are not unique to IMBs, there are unique window treatments within a particular type of IMB businesses.

The qualitative typologies presented in this paper show that IMBs can and should be differentiated for spatial/locational analysis. The characteristics of each type of IMB neighborhood are notably different from each other and most show considerable differences from regional averages. This type of differentiation is missing in the previous research by Crotty and Bouché (2018), de Vries (2022), White, Guikema, and Carr (2021), and the research teams led by Chin (Chin et al. 2015; Chin, Takahashi, and Wiebe 2019). Due to the small number of examples of all types except for the strip-mall IMB, it is not possible to replicate the methods of previous research and test the statistical significance of those differences between IMB types, but future research could and should do so with a larger sample of IMBs for field verification.

The biggest challenge for researchers doing this type of qualitative fieldwork is the cost and time required to complete the inquiry. Researchers may find some of the results could be mimicked using Google Street View or a similar ground-level remote sensed imagery product. This

process would necessarily be less-accurate as IMBs close and open more often than Google updates its street-view imagery, so the best researchers could claim is a visual census of imagery across the temporal range exhibited in the imagery for their study area. Documenting that temporal range for images of each location would still be quite time consuming because the imagery dates can vary even when observing a single location. IMBs also often operate in spaces where street view imagery is missing or lacks sufficient resolution. Another possible option for reducing the cost of generating a typology would be to use k-means cluster analysis on a set of variables deemed relevant to differentiating between IMBs and the neighborhoods in which they operate. This approach has some merit and could potentially incorporate qualitative and quantitative data from the text of reviews for each location such that the particular services offered could be incorporated into the analysis.

In this study, the very basic examination of the average number of reviews by IMB type shows that some IMB types are attracting customers who are more likely to post about their experience in online review boards. If we believe that the number of reviews for a location correlates with different types of commercial sexual services available (i.e., more reviews means “full service” is more likely to be available), then it stands to reason that the types of IMBs correspond with different types of customers. As such, the locational strategies of each IMB and the corresponding IMB neighborhood would be quite different. The most substantive shortcoming of a street-view and/or k-means approach to developing an IMB typology for areas outside the DFW region would be the lack of qualitative and experiential understanding of landscape and place that the field-verification and observation process provided in this study.

This typology is limited in a few important ways. First, it is not an overview of all the existing segments of the commercial sex industry. It does not include any segments of the commercial sex industry that do not advertise their services on the particular publicly accessible review website from which the data is collected. This leaves out street prostitution, commercial sex escort businesses, and what the Polaris project calls “Cantina Model” in which businesses posing as normal restaurants in majority Latinx communities also provide commercial sex services to their clientele (Couture and Kimball 2016). The typology is also locationally specific. Though many of the general patterns are likely present in other North American cities (strip malls for example, are ubiquitous in suburban areas), the unique nature of each city may lead to particular types of IMBs being more or less prevalent, or may require researchers to identify different types of IMBs found in their study locations. Nonetheless, the typology represents a step toward a more nuanced understanding of the illicit massage industry, which can improve locational analyses moving forward.

## Notes

1. Following the example of de Vries (2022), I am not including the name/address of the website in this manuscript to better protect the confidentiality of commercial sex workers, website users, and locations of IMBs where illicit events and potential victimizations may occur.
2. Six IMBs were operating out of spaces so unique that they do not fit within the framework we established for the field surveys. Because each of these cases is unique itself, it is not possible to describe these spaces in general terms, and discussing them in detail would directly identify still-operating businesses.
3. We also included a binary attribute to record if the only signage for the establishment was a printed phone number, which anti-trafficking researchers suggested was a sign of illicit activity. Across the entire region, only three locations’ signage was limited to a phone number. In each case the only-phone-number signs were also not permanent signs, so for the purposes of this discussion, the low-level of investment is adequately captured by the lack of permanent signage.

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## Disclosure statement

none.

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## Appendix 1. Attributes collected with KoboToolbox field survey tool

Attribute	Description/Response options
IMB_Name	Name of business
InDB	If the entry was listed in the scraped database
SurveyDate	Date of field survey
Open	Binary - Yes/No - if business is still operating.
NameChanged	Binary - Yes/No - if business has changed name.
Loc_Type	Stand Alone; Office Park; Strip Mall; Anchored Center
Windows	Clear; Opaque (Blacked out); Opaque (Blinds); Opaque (Posters); No Windows
Signage	No permanent sign; Permanent sign that reads "Massage"; Permanent sign with full name; Other permanent sign
OnlyPhone	Binary - Yes/No - Is there just a phone number (no other signage)?
Neighbors	Check box if the type of business is present in the same shopping center as the IMB.
	PrintShop
	Smoke_Vape
	TaxServices
	Financial
	Payday
	Dental
	Chiro
	Med_Service
	Psychic
	Insurance
	Restaurant
	Cleaner
	Hair_Salon
	Nail_Salon
	Fitness
	Ed_Children
	Ed_Adult
	Pers_Service
	Cellphone
	SOB
	Bar_Late
	Spec_Retail
	Grocery
	Ethnic_Retail
	Vacant
	Religious
	Donut
	Coffee
	Other
Other_notes	Qualitative/Text Entry - If other is checked, note explaining the business type entered here.
Overall_notes	Qualitative/Text Entry - General notes on location for analysis, and iterative data collection process.
Photo_IMB	Upload Photo of business front/façade
Photo_N_1	Upload Photo of business neighbors
Photo_N_2	Upload Photo of business neighbors
Photo_Sign	Upload Photo of business signage
Address notes	Qualitative/Text Entry - any notes specifically about location/address inaccuracies or other issues.

## Appendix 2. IMB neighborhoods by typology

