What was the effect of the *Protection of Communities and Exploited Persons Act* on Canadian sex work advertising?

Lynn Kennedy[1]* ORCID 0000-0002-4124-6838

[1]Sex Work Population Project https://populationproject.ca/

*corresponding author

Email address: lynn.kennedy@populationproject.ca

Abstract

Sex work in Canada is rapidly evolving, and this is reflected in where and how frequently sex workers advertise. The Protection of Communities and Exploited Persons Act (PCEPA) criminalized the purchase of sexual services in 2014. This study looks at the effect of this law using estimated sex worker populations based on classified advertising data. Data collected between December 9, 2022 and November 30, 2023 from one prominent classified advertising site used by contact sex workers in Canada is compared with data collected between November 1, 2014 and December 31, 2016 the two years following the introduction of PCEPA. Collected ads were analyzed to identify advertisers, names, and other demographic data such as ethnicity, gender, location and rates charged. Monthly and yearly population estimates are compared. Monthly, the mean estimated number of workers (17878, SD 1128) represented 84% of 2015 and 63% of 2016 estimates and, yearly, 90% of 2015 and 80% 2016 estimates respectively. In 2023, workers were typically White (52% of ads and 44% of advertisers) and cis female (89% of ads and 82% of advertisers). However, between 2016 and 2023 there were notable increases in the number of BIPOC and trans female advertisers. Advertisers increased in eastern Canada and the far north but decreased elsewhere. Median hourly rates increased from CAD$200 (IQR 160-250) in 2014-2016 to CAD$250, IQR 200-300) in 2022-2023. While most workers still engaged in contact sex work, a large majority of advertisers (61%, N=29308) have branched out to offer online services.

Keywords: sex work, Canada, population dynamics, demographics, advertising

Introduction

Contact sex work practice, sex work where services are provided in person, has evolved from the late 1960s to 2023 largely as a result of pressure from legal and cultural forces outside the industry (Brock, 1998). Brock describes the creation of the social problem of prostitution as the combined result of media fueled moral panic and a series of legal decisions and government responses to these legal challenges. Between 1892 and 1972 visible sex workers were profiled using the “Vag C” vagrancy section of the criminal code and those working in indoor work venues could be charged under the common bawdy house sections of the criminal code (Brock, 1998; Robertson, 2003). In the late 1960s and early 1970s, indoor sex work was the more tolerated option (Brock, 1998). However, in 1978 moral panic over the murder of Emmanuel Jacques in Toronto and the Hutt decision that mandated that street solicitation had to be “pressing and persistent” to constitute an offense resulted in the closure of many indoor venues and the migration of workers to the street and escort agencies.

In the late 1970s and 1980s, prostitution was mainly regarded as a nuisance to be controlled (Brock, 1998; Lowman, 1986). It was at this time that citizens' groups became more involved in the debate around what constituted acceptable practice for sex workers. In response to these pressures, the Progressive Conservative party attempted to repress street prostitution by eroding the privacy rights of Canadians: the definition of public space was expanded to include private motor vehicles and communicating for the purposes of prostitution was made an offense. It was also around this time that the definition of “prostitute” was expanded to include any gender identity.

This framework was in place until the Protection of Communities and Exploited Persons Act in 2014 (Protection of Communities and Exploited Persons Act, 2014). This act, once again,

was the Conservative government's response when three sections of the Canadian criminal code were struck down in the Canada v. Bedford decision in 2012: section 210 keeping a common bawdy house, section 212(1)(j) living off the avails of prostitution, and 213(1)(c) publicly communicating for the purpose of prostitution (Perrin, 2014). The authors of the legislation, as described in Perrin, viewed sex work as necessarily the product of exploitation, largely ignoring the perspectives of active sex workers (Perrin, 2014; Pivot Legal Society, 2006). At the time of the Bedford decision, it was clear that treating prostitution as a nuisance was not protecting the safety and dignity of sex workers (Jeffrey, 2004). The PCEPA addressed this by changing the focus of legislation: for the first time, the purchase of sexual services was an offense.

The industry adapted to all of these changes. Firstly, in the 1970s, by establishing safer indoor venues in which to work (Brock, 1998, p. 33). In the late 1970s and early 1980s, when licensed venues were shut down, sex workers moved on to the street or into escort agencies (Brock, 1998, p. 47; Lowman, 1986). However, the effect of the communication law and the large number of arrests that followed forced many workers into more isolated and risky venues, dramatically increasing the incidence of violence against sex workers (Lowman, 2000). The PCEPA would have continued this trend except that sex workers had started to advertise in new and innovative ways via personal websites (Cunningham & Kendall, 2010), escort directories (Kingston & Smith, 2020), review sites (Castle & Lee, 2008), and online classifieds sites including, between 2001 and 2009, Craigslist.com (Encyclopaedia Britannica, 2023; The Canadian Press, 2010) and, between 2004 and 2018, through Backpage.com (Biederman, 2019). Online classified sites, for the first time, provided low cost or free advertising for independent sex workers which was correlated with a measurable reduction in violence against women (Buckmaster, 2009; Tjaden & Makin, 2022).

Did the PCEPA have the desired effect on reducing the incidence of prostitution in Canada? As will be shown, it did not. Workers adapted by adopting online advertising in large numbers (Argento et al., 2018; Bernier et al., 2021; Chan et al., 2019). For example, from 2014 to 2016 population estimates based on online classified ads showed that the market grew substantially in spite of the hostile legal environment engendered by the PCEPA (Kennedy, 2022). At this time, the number of sites that offered free, low barrier options for those who wished to advertise online increased.

Significantly, some of the main sites used by contact sex workers in Canada also hosted other types of advertising, similar to the classifieds sections in print newspapers. The broad use of these sites not only exposed sex work advertising to a larger group of potential clients but also expanded the number of potential workers as many who were unfamiliar with the business could view the ads. There is evidence that those who advertised included many who had not been involved in the industry before (Cunningham & Kendall, 2011).

This all changed with the prohibition of sex work advertising in the United States (Jackman, 2018) that resulted in the loss of two of the main classified ad sites used by sex workers. This apparently had a domino effect on smaller sites as well. Of the six sites profiled in (Kennedy, 2022) only one remains, becoming arguably the main classifieds site for sex workers in Canada. However, in 2023, easy to access online advertising for sex workers appears to have largely vanished. Advertising online has become a much more complex process.

This study considers the evolution of online advertising in Canada by comparing two data sets: one comprises data collected between November 1, 2014 and December 31, 2016 used in (Kennedy, 2022) consisting of classified ads from six prominent classified advertising sites used by sex workers in Canada, the other, collected between December 9, 2022 and November 30,

2023, consists of ads from the one remaining classified site of the original six. I consider whether the number of sex workers identified through online ads has changed and whether there have been demographic changes to sex worker populations including hourly rates, locale, self-identified ethnicity, and self-identified gender.

Materials and methods

This study adds to the evidence collected in (Kennedy, 2022) showing how population estimates of contact sex workers based on classified advertising data may have changed. Then, as now, the sites used as data sources represent where the majority of Canadian contact sex workers advertise. The sites were originally identified by advisors from the *Sex, Power, Agency, Consent, Environment and Safety Project* (SPACES) (SPACES Team, 2016). SPACES was initiated in 2012 at the University of British Columbia to explore health and safety issues experienced by off-street sex workers. The SPACES advisors were people with experience in contact sex work, either as workers or third parties who were users of such websites.

Between November 1, 2014 and December 31, 2016 six sites were polled at least every 15 minutes for ads as described in (Kennedy, 2022). Between December 9, 2022 and November 30, 2023 the one site still active (Site 3) was polled every 10 minutes. Ads on these sites are linked in index pages similar to search engine results pages, with the most recent ads at the top of the page. The index pages link to ads by single advertisers. The advertisers can represent one or more workers. The index pages are segmented by type of service (escorts, massage etc.), gender (male, cis female, trans female), and location. The download process involved first downloading all index pages, then searching for new ads. Individual ads were then downloaded if they had not been seen before. Data from ads was extracted from the ad web pages and stored in a MariaDB

database (MariaDB & Widenius, 2017). Downloaded ads consisted of ad text and contact information, often with other metadata. As many sites allowed advertisers to store and reactivate ads, records of ads that had been seen before were updated to record the last time the ad was seen.

When available, metadata was collected from ads. Metadata could include the ad title, ad text, advertised name, availability (Outcall, Incall, or Online), ethnicity and hourly rate. Locale and gender were identified based on the ad URL. To better understand how many workers were represented in an ad, names were searched for in the title, ad text and any name metadata fields using techniques described in (Kennedy, 2022).

Advertisers were identified in 2022-2023 by using a metadata field, the *chat name*, used for an internal chat function. Advertisers could have multiple chat names, as described in (Kennedy, 2024a). In 2014–2016 advertisers were identified using a combination of phone numbers and email addresses as described in (Kennedy, 2022). Advertisers were considered collectives either because they were associated with multiple names or because they had cleaned ad text that matched the regular expression:

*\b(models|girls|we|our|us|spa|agency|club|nous|filles|agence|four *hands|duo|trio|room *mate|couple)\b*.

Additionally, image data was downloaded for each ad and images were identified using the perceptual hash algorithm (Khelifi & Jiang, 2010). Advertisers using the same images could be identified using the image hashes. In 2023, the mean number of advertisers associated with an image was used to estimate how many chat names were associated with a given real advertiser.

A random sample of ads was taken to estimate how often the name extraction algorithm had misidentified a name, and a random sample of advertisers with representative ad texts was

taken to determine how many advertisers were not contact sex workers. In the former case, a sample of ad texts, where advertiser-name pairs were identified, were visually checked to see if the found name was valid. In the latter case, the three most common ad texts of a random sample of advertisers were visually inspected for relevance. Advertisers were considered relevant if they were contact sex workers at least some of the time. See supplemental materials S1 File for the criteria used to identify relevant advertisers.

Statistical measures

The number of visible ads, advertisers, and worker names were tallied monthly as well as for the year. Worker estimates were generated by summing the number of names associated with that advertiser each month and applying the following formula to correct for overcounting:

$$\widehat{W} = p(relevant)\, p(validname)\, p(new) \sum_{a \,\exists\, Advertisers} names(a) \quad (1)$$

Where $\widehat{W}$ is the estimated number of workers, *p(relevant)* is the measured probability that the advertiser was a contact sex worker, *p(validname)* is the measured probability that a given name for an advertiser is valid, *p(new)* is the estimated probability that we have not already seen this advertiser before, and *names(a)* is the number of names found for that advertiser or, if no names were found, 1 if the advertiser was not a collective and the median number of names for collective advertisers if the advertiser was identified as a collective. The estimated probability an advertiser had been seen before was calculated as $p(new) = \frac{1}{mean\ image\ reuse}$ where *mean image reuse* was based on the average number of advertisers associated with any image.

This analysis was done for raw name and advertiser data from 2022-2023 and comparison estimates were made for the same months in 2014-2015 and 2015-2016 where the

proportional change was calculated for each corresponding month and year. In addition to population estimates, changes in proportions of advertisers and ads by ethnicity, province, social context (collective versus individual), and gender were compared between 2014-2016 and 2022-2023. Proportions of collective versus individual advertisers were tested for significance using the R *prop.test* function (R Core Team, 2021) at a 95% confidence level.

Ethics statement

All source data used in this study consisted of publicly available data at the time it was collected and was collected in accordance with the policies of the sites in effect at the time. The methods used are conformant with the ethical standards of the Canadian Sociology Association (section 4.10 II) and the American Sociology Association (section 10.5 c) (American Sociological Association, 2018; CSA-SCS Policy, Ethics, and Professional Concerns Subcommittee, 2018). As the replicability of the main results of this paper is important, a data set is provided as part of the supporting information along with the code used to process it. However, in order to protect the safety and privacy of advertisers and third parties, all identifying information has been removed, including the names of the source websites.

Results

The 2014-2016 collection comprised data collected for an earlier study (Kennedy, 2022). In 2022–2023 data was collected from December 9, 2022 to November 30, 2023 when data from the source site became unavailable. In 2022-2023 a total of 984792 ads were collected, produced by 48346 advertisers based on chat names found in ads. Table 1 shows population estimates based on this advertising data. The “add missing " column added 1 for each advertiser who did

not list any names in ads if they were considered an individual and 3 for collectives, the median number where names could be found. The “estimated workers" column reduced the number of names based on equation (1) where *p(relevant)* was 0.9440 (95% CI 0.9407-0.9473, N=1000), *p(validname)* was 0.9300 (95% CI 0.9260–0.9340, N=1000), and *av shared images* was 1.3054 (95% CI 1.3019–1.3089, N=788343). These population estimates are compared with estimates based on data from December 1, 2014 to November 30, 2015 (N=1220061 ads) and December 1, 2015 to November 30, 2016 (N=1486024) from 6 Canadian classifieds sites described previously in (Kennedy, 2022). Population estimates for 2015 and 2016 were generated using equation (1) where *p(relevant)* was 0.9499 (95% CI 0.9485–0.9515, N=3999), *p(validname)* was 0.9612 (95% CI 0.9600–0.9624, N=3553). In 2014-2016, the median number of names for collectives was 2. Table 2 shows the *mean image reuse* for each year and month. Supplemental materials S2 File contain detailed population estimates for all time periods.

Table 1: Population estimates for 2022-2023. The % change column represents the proportion of estimated workers in 2022-2023 divided by the estimated workers in 2014-2015 and 2015-2016.

period	names found	missing added	estimated workers (95% CI)	% change	
				2015	2016
2022-12	19673	23232.33	19381.84 (19275.32 - 19488.45)	97%	84%
2023-01	18104	21237.50	17311.87 (17223.33 - 17400.46)	102%	62%
2023-02	17530	20304.83	16469.77 (16384.55 - 16555.03)	88%	59%
2023-03	17843	20563.50	16840.61 (16754.11 - 16927.15)	81%	59%
2023-04	17394	20367.75	16637.33 (16551.41 - 16723.31)	81%	58%
2023-05	17854	20799.00	16971.28 (16886.98 - 17055.62)	79%	58%
2023-06	18490	21426.00	17419.26 (17334.50 - 17504.05)	80%	57%
2023-07	18713	21822.00	17583.20 (17499.65 - 17666.77)	83%	61%
2023-08	20049	23346.33	19074.73 (18977.71 - 19171.80)	85%	64%
2023-09	18643	21844.00	18229.85 (18127.38 - 18332.43)	78%	63%
2023-10	19219	22605.00	19116.72 (19004.86 - 19228.72)	79%	65%
2023-11	19557	22773.50	19496.04 (19377.20 – 19615.06)	97%	64%

Table 2: Image reuse. Mean number of advertisers associated with images based on perceptual hashes.

period	mean image reuse (SD, N)	period	mean image reuse (SD, N)	period	mean image reuse (SD, N)
2022-2023	1.30 (1.60, 788343)	2014-2015	1.33 (1.29, 724895)	2015-2016	1.35 (1.02, 957628)
2022-12	1.09 (0.54, 175731)	2014-12	1.06 (0.35, 26484)	2015-12	1.09 (0.42, 146964)
2023-01	1.10 (0.70, 215379)	2015-01	1.09 (0.55, 65544)	2016-01	1.13 (0.49, 206397)
2023-02	1.11 (0.70, 220865)	2015-02	1.13 (0.71, 105806)	2016-02	1.13 (0.49, 207164)
2023-03	1.10 (0.70, 216303)	2015-03	1.12 (0.59, 118274)	2016-03	1.14 (0.51, 217907)
2023-04	1.09 (0.67, 206553)	2015-04	1.14 (0.50, 117336)	2016-04	1.15 (0.52, 217190)
2023-05	1.10 (0.71, 199704)	2015-05	1.14 (0.53, 124383)	2016-05	1.14 (0.52, 216133)
2023-06	1.10 (0.72, 190421)	2015-06	1.14 (0.54, 122458)	2016-06	1.15 (0.61, 224883)
2023-07	1.12 (0.74, 180187)	2015-07	1.14 (0.55, 136465)	2016-07	1.14 (0.63, 212962)
2023-08	1.10 (0.63, 170734)	2015-08	1.14 (0.62, 133373)	2016-08	1.15 (0.61, 218025)
2023-09	1.08 (0.48, 158603)	2015-09	1.14 (0.63, 135013)	2016-09	1.15 (0.68, 208516)
2023-10	1.06 (0.41, 149904)	2015-10	1.13 (0.44, 134890)	2016-10	1.16 (0.74, 196340)
2023-11	1.05 (0.34, 138395)	2015-11	1.07 (0.34, 78568)	2016-11	1.16 (0.70, 174511)

Between Dec 9, 2022 and November 30, 2023, monthly an average of 18589 names were found (SD 82), adding in the missing names increased this to 21693 (SD 324) with the average number of names from equation (1) estimated as 17878 (SD 1128). Monthly estimates in 2022-2023 were 86% (SD 8%) of their corresponding 2014-2015 values (mean 20951, SD 1919) and 63% (SD 7%) of their corresponding 2015-2016 values (mean 28614, SD 1957). In 2014-2016 48% (N=80040) advertisers represented collectives, this increased significantly to 52% (N=25382) in 2022-2023 (95% CI 0.04 - 0.05, $p < 0.001$).

For the 2022–2023 year 114154 names were found, adding missing names increased this to 130457, and after reducing the estimate with equation (1), 87736 workers (95% CI 87288–88184) were estimated to be active during this period. The estimated number of workers in 2022-2023 was 91% of the 2014-2015 estimate (96946, 95% CI 96838–97054) and 80% of the 2015-2016 estimate (109744, 95% CI 109621–109866). The ratio of yearly over average monthly workers in 2022-2023 at 4.9. In 2014-2015 this decreased to 4.6 and in 2015-2016 this decreased further to 3.8,

Table 3 shows proportions of ads and advertisers by gender. Ads by cis-female and cis-male advertisers both decreased, with cis-males showing the most pronounced reduction. Compared to 2014-2016, in 2022-2023 there were 76% cis-male advertisers producing 88% of the ads they produced in 2014-2016. Trans-female and advertisers associated with multiple gender identities increased substantially, with 334% more trans-female advertisers producing 222% more ads compared with 2014-2016.

Table 3: Advertisers and ads by gender for 2022-2023. The % change columns represent the proportion in 2022-2023 divided by the proportion in 2014-2016 excluding ads and advertisers with unknown gender. Ads could only be associated with one gender, however advertisers could represent multiple genders.

	Advertisers		Ads	
Gender	N (%)	% change	N (%)	% change
cis female	39455 (81.58%)	94%	878672 (89.22%)	97%
cis male	2788 (5.76%)	76%	29514 (3.00%)	88%
multiple	2899 (5.99%)	216%	n/a	n/a
trans female	2375 (4.91%)	334%	58094 (5.90%)	222%
unknown	846 (1.75%)	n/a	18512 (1.88%)	n/a

Table 4 shows advertisers by ethnic self-identification. In 2014-2016 only one site provided a way for advertisers to identify their ethnicity, thus the comparison does not reflect the whole data set. However, with the limited data available, Mixed ethnicity advertisers in 2022-2023 were only 51% of the proportion found in 2014-2016. In some cases, the number of advertisers increased but the number of ads decreased. For example, Asian advertisers in 2022-2023 produced only 53% of the ads produced by Asian advertisers in 2014-2016 but had increased 132% compared to 2014-2016. The opposite was also the case, where White advertisers were 86% of the proportion of White advertisers found in 2014-2016 but produced 105% of the ads produced in 2014-2016. Most non-White ethnic categories increased substantially in 2022-2023 with Indo Canadian showing the most marked increase at 302%.

Table 4: Advertisers and ads by self-identified ethnicity for 2022-2023. The % change columns represent the proportion in 2022-2023 divided by the proportion in 2014-2016 excluding ads and advertisers with unknown ethnicity. Note that ads could only have one ethnicity associated with them.

	Advertisers		Ads	
ethnicity	N (%)	% change	N (%)	% change
Asian	7013 (14.50%)	132%	147535 (14.98%)	53%
Black	1947 (4.03%)	132%	64047 (6.50%)	359%
Canadian Born Chinese	260 (0.54%)	96%	6178 (0.63%)	112%
Caucasian/White	21420 (44.29%)	86%	511001 (51.89%)	105%
Indo Canadian	1910 (3.95%)	302%	25785 (2.62%)	138%
Latino/Hispanic	2524 (5.22%)	178%	84074 (8.54%)	373%
Middle Eastern	765 (1.58%)	145%	17879 (1.82%)	225%
Mixed	3270 (6.76%)	51%	117371 (11.92%)	84%
multiple	7919 (16.37%)	121%	n/a	n/a
Native	597 (1.23%)	227%	6258 (0.64%)	174%
unknown	738 (1.53%)	n/a	4664 (0.47%)	n/a

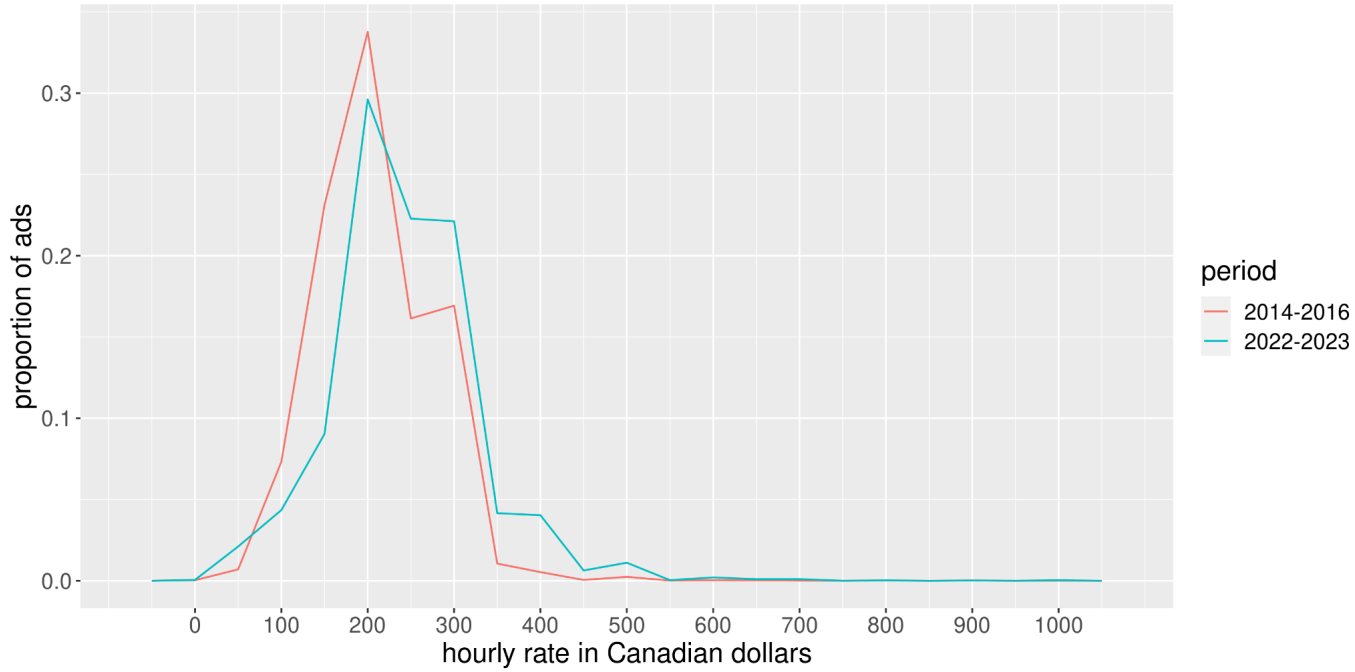
Table 5 shows advertisers and ads stratified by Canadian province and territory. The provinces of Quebec, Newfoundland, and Prince Edward Island showed marked proportional increases in advertisers and advertising relative to 2014-2016 as did the north. In the north, Nunavut and the Northwest Territories were represented for the first time. There were also proportionally more advertisers who advertised in multiple provinces. Marked proportional decreases in advertisers were found in New Brunswick, Nova Scotia, Ontario, the prairies, and British Columbia. In the 2014–2016 data, 6194 advertisers (3.70%) and 63774 (1.99%) ads did not have an identifiable province associated with them.

Table 5: Advertisers and ads by province and territory 2022-2023. The % change column represents the proportion of ads in 2022-2023 divided by the proportion of ads in 2014-2016.

province	region	Advertisers		Ads	
		N (%)	% change	N (%)	% change
New Brunswick	east	406 (0.84%)	52%	14247 (1.45%)	99%
Newfoundland	east	248 (0.51%)	5100%	3669 (0.37%)	6080%
Nova Scotia	east	495 (1.02%)	49%	19135 (1.94%)	121%
Prince Edward Island	east	261 (0.54%)	90000%	5269 (0.54%)	38892%
Quebec	central	11866 (24.54%)	243%	233065 (23.67%)	105%
Ontario	central	13591 (28.10%)	71%	388836 (39.48%)	108%
Manitoba	prairies	624 (1.29%)	38%	19509 (1.98%)	94%
Saskatchewan	prairies	525 (1.09%)	36%	24301 (2.47%)	101%
Alberta	prairies	3633 (7.51%)	48%	114530 (11.63%)	100%
British Columbia	west	5034 (10.41%)	89%	158718 (16.12%)	82%
Nunavut	north	53 (0.11%)	Inf	702 (0.07%)	Inf
Northwest Territories	north	69 (0.14%)	Inf	1038 (0.11%)	Inf
Yukon	north	171 (0.35%)	875%	1773 (0.18%)	140%
multiple		11367 (23.50%)	258%	n/a	n/a
unknown		0 (0.00%)	0%	0 (0.00%)	0%

Figure 1 shows how the distribution of hourly rates changed from 2014-2016 to 2022-2023. Hourly rates were identified from a metadata field in ads "Price" that appeared in ads associated with Site 3. In 2014-2016 a median hourly rate of CAD$200 (IQR 160-250; mean 212, SD 68.5, N=48693) was found. In 2022-2023 a median hourly rate of CAD$250 (IQR 200-300; mean 243, SD 84.4, N=315723) was found. Based on Canadian inflation rates, the median hourly rate would have been expected to increase to CAD$245 between 2016 and 2023 (Bank of Canada, 2022). Notably, the number of advertisers with advertised hourly rates of CAD$300 or more increased by 164% from 2014-2016 to 2022-2023.

Figure 1: Price comparison 2014-2016 vs 2022-2023.



Where sex workers provide services changed from 2014-2016 to 2022-2023. Prior to the COVID-19 pandemic, there was no easy way for advertisers to indicate that they provided online services and many of the commonly used technologies for online services either did not exist or were in their infancy. While most advertisers provided the more traditional incall and outcall services (incall: 91%, N=43964; outcall: 90%, N=43652) in 2022-2023 61% of advertisers

(N=29308) provided some form of online service. Most advertisers provided online services in addition to incall or outcall services, with only 226 advertisers (0.5%) exclusively offering online services.

Discussion and conclusions

This study looked at a new data set comprising almost one million classified ads collected between December 9, 2022 and November 30, 2023 from a prominent Canadian classifieds site used by contact sex workers. The data was compared with an earlier data set collected between November 1, 2014 and December 31, 2016. On average, it was estimated that 17878 (SD 1128) workers were active monthly in 2022-2023 based on names found in ads. The monthly estimates were 86% (SD 8%) of the estimated number of workers from data collected between December 1, 2014 and November 30, 2015 and 63% (SD 7%) of the estimated number of workers from data collected between December 1, 2015 and November 30, 2016. Yearly, 87736 workers (95% CI 87288 - 88184) were estimated to be active in 2022-2023. This was 90% of the estimate from 2014-2015 and 80% of the 2015-2016 estimate.

The proportion of estimated yearly workers divided by the average monthly workers, which would be proportional to worker turnover through the year, was highest in 2022-2023 but decreased in 2014-2015 and 2015-2016. These proportions suggest that the findings of (Kennedy, 2022) still hold true: advertisers are not active for long periods of time. Given that it is a much more complicated process to advertise now compared to 2014-2016 it is not surprising that workers may be advertising less frequently on the site. Indeed, the apparent monopoly on classifieds and the resultant barriers to advertising may have had more of an effect on advertiser and worker numbers than the PCEPA.

With a shrinking advertiser base, it is surprising that median advertised hourly rates have increased in line with inflation. However, there is a growing group of "elite" advertisers who charge CAD$300 or more per hour, suggesting perhaps that demand for sexual services may have increased for this group but not others and may be indirect evidence for growing inequality in Canadian society. In addition to increasing hourly rates, how services are provided has changed, and many workers now provide services online in addition to in person. Nevertheless, online service provision appears to have not replaced in person services for sex workers advertising on this site.

Demographic analysis showed that sex worker populations using Site 3 had expanded geographically, particularly in eastern and northern Canada. Furthermore, more trans female advertisers and persons of color were represented on the site in 2022-2023 when compared with data from 2014-2016.

Following the upheaval of the COVID-19 pandemic, it would not be surprising if the sex industry shrank in Canada (Al-Rawi & Zemenchik, 2022; Benoit, 2020; Lam, 2020). Indirect evidence for this can be found in policing statistics (Statistics Canada, 2023) as the number of charges under PCEPA dropped significantly between 2019 and 2020. In 2015, the first year after the introduction of the law, there were 632 incidents and 360 persons charged under the PCEPA, and in 2016 there were 759 incidents and 452 persons charged. After increasing in 2017-2019 with a peak of 1161 incidents and 563 charges in 2019, in 2020 the number of incidents had dropped 36% to 756, and, in 2022, incidents had dropped further to 703 with 283 charges. There was no information available on how many of the charges related to online advertising.

Evidence shows that it is the perception of being caught that deters people from engaging in lawbreaking (Nagin, 2013). The relatively small incidence numbers compared to the large

number of advertisers during the data collection periods suggests that it is unlikely that prospective clients would ever encounter a police sting operation in practice. If the PCEPA has a significant deterrent effect on the industry, one would expect the number of advertisers exclusively providing online services to substantially increase. Among classified advertisers, this has not been the case in the 10 years following the introduction of the PCEPA.

Nevertheless, other structural factors may have affected the number of workers advertising online. Based on my own experience attempting to set up advertising on Site 3 it is a more costly and complex process to advertise online now compared to, say, Craigslist in 2007, where anyone could post an ad with little difficulty. Furthermore, the classifieds sites used prior to 2018 hosted ads for many other goods and services other than contact or online sex work, increasing the number of potential clients who might be able to view ads.

Sites that require a cell phone and a credit card or a cryptocurrency account for access to advertising will exclude workers with poor or no credit and those lacking the technical skills to purchase cryptocurrency. There is some evidence that workers who only plan to be in the industry for a short period of time are not well represented in this data (Kennedy, 2023a; Tichenor, 2020).

The number of worker collectives appear to be increasing and increasing in size. Evidence for this trend can be seen in advertising data: the median number of names associated with collective advertisers increased in 2022-2023 as did the number of collective advertisers. The types of collectives may also be changing with new third party roles specific to the online advertising environment such as booking assistants who work exclusively with online independent workers. These advertisers can have large numbers of geographically diverse clients. While the overall number of workers appears to have decreased, it may have been the

case that this only affected workers who could not easily advertise. The number with resources to advertise may have actually increased. However, further research would be needed to resolve this question.

The increase in numbers of BIPOC advertisers is to be expected given that, in Canada, the number of non-White persons has increased significantly since 2001 (Hou et al., 2023). However, the relative proportions of workers based on ethnicity who could be reliably identified in 2014-2016 were from 8% of the collected ads (N=215063). It is possible that BIPOC advertisers used other sites in 2014-2016 where ethnicity was more difficult to identify.

The increase in advertising in eastern and northern Canada was not affected by data availability, and likely shows an expansion of sex workers advertising online in these areas. This is also the case for the notable increase in trans female advertisers found in 2023.

Given that the economic conditions in 2022-2023 were stagnant in Canada (BDC.ca, 2023) the economic impetus for people to become sex workers likely remained constant. If there are indeed fewer workers, how those who did not enter the industry are coping is a question for future research.

Strengths and limitations

The main advantage of this study was the availability of large data sets covering multiple years, which show demographic trends that would be difficult to identify otherwise. A disadvantage is that the data is collected “in the wild” and may be incomplete, difficult to interpret, or erroneous. Visually inspecting ads provides some insight into how much data is relevant, but this, too, is not a perfect measure of whether an ad is actually representing contact sex workers. The sampling strategy of polling the index pages for ads is likely a more

ecologically valid one than using sitemaps (lists of URLs provided by the site operator) used for a previous dataset from 2021-2022 described in other studies (Kennedy, 2023a, 2023b). Polling likely better reflects how a site visitor would view the ads and, importantly, ads found by polling are more likely to be from active advertisers. Supplemental materials S3 File contains a comparison of the two strategies.

How data is modeled can have an impact on population counts, and how advertisers are identified could have an effect on how worker populations are identified. In older data, the best way to identify advertisers was with phone and email contact information. In more recent data most phone and email contacts were obscured and another metadata field the *chat name* was used to identify advertisers. What is certain is that, while data taken from one site or a collection of sites may not be complete, advertiser counts will almost certainly be larger than the actual number of advertisers. This study takes advantage of images associated with ads as a way to estimate the number of advertisers who used multiple identifiers. However, using average image reuse as a measure is not perfect and can overestimate the number of advertisers associated with an image when images are stolen by other advertisers. Furthermore the image identification algorithm has limitations (see for example Kennedy, 2022 S1 appendix) and may not identify common images when they have been significantly altered.

Sites varied in how they mitigated the issue of image theft. The source site for the 2022–2023 data provided a way for advertisers to lodge complaints and also provided an advertiser verification process. In 2014-2016 image reuse was found to be in agreement with other methods of detecting the rate that advertisers used multiple identifiers.

Population numbers generated from models will also vary depending on the assumptions of the model. In earlier work (Kennedy, 2022), based on advertisers identified by phone numbers

and email addresses, it was considered reasonable to assume that, when identifiers change, these changes are sequential and infrequent. This assumption tends to produce models that count larger numbers of workers. Monthly worker population estimates from 2014-2015 using the original model were 3% higher on average (SD 3%) than those generated using equation (1) and estimates from 2015-2016 were 9% higher on average (SD 1%). See supplemental materials S2 File for a monthly breakdown. However, more research is needed to better understand how to refine and interpret these population statistics.

The criminalization of the purchase of sexual services in Canada along with the ease with which people can pay online (Kennedy, 2023b) has likely made it more tempting for advertisers to engage in fraud and identity theft, a risk for clients in addition to police sting operations. Safety practices such as asking for deposits or identification were not common in 2014-2016 but have become increasingly common in recent years (Kennedy, 2023b, 2024b). These practices protect advertisers from fake bookings and potentially dangerous clients. Fraudulent advertising puts workers at risk when they have to forgo these safety measures, as potential clients may be reluctant to pay in advance or provide identification online. It also makes interpreting population numbers more difficult, as little to no research exists on how many online advertisers actually provide the services they advertise.

Conclusions

> *"The institution of prostitution in the contemporary world may be a product of female oppression, but that does not prevent women from using it as a source of power."* (Brock, 1998, p. 21)**.**

Sex workers represent an “other” in Canadian society (Hallgrímsdóttir et al., 2008) and policy in Canada has often engaged in contradictory goals of either hiding the sex industry or exposing it to excessive public scrutiny. The industry responded to these changes by adapting how sex work was practiced.

Recent legislation in Canada and the United States attempted to reduce demand for sexual services by hampering workers’ ability to advertise services. This has affected the advertising environment by creating monopolies, making it more difficult for sex workers to advertise. Workers appear to have adapted by working collectively and advertising more sporadically. The fact that substantially more people were advertising sexual services in the two years after the enactment of these legislative changes, when many could advertise for free, suggests that low barrier access to advertising may have more of an influence on advertisers than measures that aim to reduce demand.

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Declaration of interest statement

The authors have declared that no competing interests exist.

Supplemental Materials

S1 File. List of criteria for valid advertisers. https://osf.io/7tdmc

S2 File. Tables. https://osf.io/j547s

S3 File. Downloading strategy comparison. https://osf.io/6peyx

Additional supplemental materials are available upon request.

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