Safety in the New Zealand sex industry

University of Canterbury working paper

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This paper uses survey data collected in 2006 to examine sex worker safety in the post-decriminalised sex industry in New Zealand. We use probit analysis to examine institutional and individual factors that affect the likelihood of sex workers experiencing violence, theft and threats. We find that, after controlling for the individual risk factors, the street is less safe than the indoor sector when it comes to threats and theft but perhaps surprisingly not so when it comes to physical violence. There is clear evidence of relative-risk heterogeneity of street, managed and private sectors between the main cities.

1. Introduction

The sex industry in New Zealand was decriminalised in June 2003 when all of the laws that had previously criminalised activities associated with sex work were lifted with the passing of the Prostitution Reform Act (PRA) 2003. It was expected that the new legal status would shift sex workers from the street sector that is considered a risky environment to the relatively safer environment in the managed sector, comprising of brothels and escort services, or to the private sector where workers operate from their homes or other private establishments. However, deregulation appears to have had little effect on the number and proportion of street-based workers, although it has moved a significant number of sex workers from the managed sector to the private sector (Abel et al., 2009) This movement within the industry supports the hypothesis that decriminalising sex work enhances the options of sex workers (Goodyear and Cusick, 2007): One clear benefit to sex workers post-decriminalisation is that it has enabled private sex workers to advertise without having to register with the police, which has drawn many sex workers to the private sector. More importantly, decriminalisation is likely to reduce the marginalisation of sex workers thereby reducing the occupational risks faced by sex workers. (Lowman, 2000; Goodyear and Cusick, 2007)

While sex work has been decriminalized in New Zealand for 10 years now, it still remains a fairly risky business. It is important to study how the risks are distributed between the cities and between the sectors within the sex industry to see where extra attention is required. The hazards of sex work in the street sector have been extensively documented in the literature (Barnard, 1993; Benson and Matthews, 1995; Sanders, 2001). Furthermore, it is widely agreed that the street sector is less safe than the indoor sectors that include the managed and private sectors (Whittaker and Hart, 1996; Church et al., 2001; Plumridge and Abel, 2000 and 2001; Vanwesenbeeck, 2001; Sanders, 2004; Shannon et al., 2008), although this is questioned by Day et al. (2001) who find evidence of violence amongst all sex workers in London regardless of their sector. However, it seems inconsistent that the street sector would remain so popular in the post-decriminalised New Zealand sex industry if it in

fact was the case that the sector was significantly less safe than the indoor sectors: the enhanced choices of sex workers post decriminalisation would have enabled many street workers to move to the less risky sectors. In fact, our results show that while street is significantly riskier than the private and managed sectors when it comes to theft and threats, this is not the case for physical violence, arguably the most important risk factor for sex workers. Furthermore, our results show that the Christchurch street sector is subject to less violence and theft than the street sector in Auckland and Wellington, which is consistent with the finding that Christchurch has a relatively larger proportion of street sex workers than Auckland and Wellington. Our results also show that while the managed sector has the best safety record for theft and threats of the three sectors, the managed sector in Christchurch has a worse safety record for physical violence than in the other cities.

Our study provides clear evidence as to where the industry is doing relatively well and where more work needs to be done and thus can inform an evaluation of policies that are set to mitigate the risks in the industry. Clearly, the way the Christchurch street sector has evolved works better than the street sectors elsewhere in New Zealand, but the opposite is true for the Christchurch managed sector. This study does not attempt to evaluate policies currently in place, however, it is certainly plausible that the outreach work done by the Christchurch branch of the New Zealand Prostitutes Collective (NZPC), the relationship between the police and the street workers and city council's policies of installing street lights and security cameras in high-traffic places have been successful in improving the safety of street sex workers in Christchurch. Nevertheless, there is clearly more work to be done to further decrease risks in the industry, even in Christchurch.

The risks faced by sex workers in a particular sector, be that street, private or managed, are not the same for all. Our study highlights the factors that affect the individual sex worker's risk of physical violence, theft and threats. By controlling for these individual factors in our probit estimation we are also able to isolate the pure effects of the institutional factors – the sector and city of choice – in the risk of negative outcomes faced by a sex worker. The individual factors that affect the risk of an adverse effect , we will show, include alcohol and drug use, gender, age, ethnicity, experience and education, but the importance of these factors in determining the overall risk of an individual sex worker differ greatly between the three adverse effects studied and the three sectors within the industry. Many of these factors are clearly not something the sex worker can choose. However, it is useful to understand the factors that affect risk to gain a better understanding of who are at risk so that policies can be better targeted, or in order for sex workers to be able to make informed choices on their sector of workplace.

The rest of the paper is structured as follows. Section 2 describes the data source and the variables used and reports on some descriptive statistics. Section 3 describes the model used in the econometric estimation. Section 4 reports and discusses the results and Section 5 concludes.

2. The data and the variables

The data used in this study is from the 2006 survey of sex workers, designed to evaluate the effect of the Prostitution Reform Act 2003 on the health and safety practices of sex workers. Details of the survey can be found in Abel et al. (2007). Briefly, the survey was administered by staff of New Zealand Prostitutes' Collective (NZPC), trained in interview techniques, on a sample of sex workers in the five cities – Auckland, Wellington, Christchurch, Napier and Nelson. The final sample contained

772 responses. Given earlier estimates of the total population of sex workers in these cities, this sample represented 32% of all the sex workers in the cities sampled. The survey contained 64 questions, many of which included sub-questions. Given the narrower focus of our study, we use only a fraction of the questions found in the survey. While the survey was carried out in Christchurch, Wellington, Auckland, Nelson and Napier, we decided to only use the responses from Christchurch, Wellington and Auckland due to the small number of respondents (42 total) from Nelson and Napier. Thus, our sample contains 730 responses.

Our focus is the safety of sex workers and the factors that contribute to that. The questions used to measure the safety in the survey are questions 51a-57a that asked about the sex worker's bad experiences during the previous 12 months. These questions cover refusal to pay and having had money stolen by a client, which we combined to form variable 'theft'; having been physically assaulted by a client while at work, having been held somewhere against will by a client and having been raped by a client, which we combined to form a variable 'violent'; as well as having been threatened by anyone with physical violence while working and having received abusive text messages from clients, which we combined to form a variable 'threat'. In our sample, 16% of the respondents reported having experienced violence (14% in Auckland, 16 % in Wellington and 18% in Christchurch), 23% reported theft (20% in Auckland, 23% in Wellington and 26% in Christchurch) and 20% reported threats (17% in Auckland, 24% in Wellington and 22% in Christchurch). The survey questions permitted 'yes' and 'no' answers, and we transformed the answers into dummy variables that carried a value one if the worker had experienced one or more adverse incidents in that category. These dummy variables were our categorical dependent variables in the four models that examine the determinants of the three types of risks in the New Zealand sex industry.

One of the main independent variables used to explain the probability of adverse incidents in this study is the sex worker's sector of workplace. The 2006 surveys asked participants "where do you mainly work at the moment?" (Question 12), giving seven different options to choose from. We classified those who responded with 'streets' as 'street' workers, those who responded with 'private from home or somewhere else (on your own)', 'private shared flat or place (working with someone else)' or 'bars' as 'private' workers and those who responded with 'parlour/brothel' or 'escort agency' as 'managed' workers, giving us three sectors. Those who responded with 'other - write in:' were sorted into the category that most closely reflected their description, in line with Abel et al. (2007), and then included in either 'street', 'private' or 'managed' groups. We used 'street' as the reference group and created a dummy that measured one if the sex worker belonged in the 'private' or 'managed' group. In our sample, 203 (28%) of the respondents worked mainly on the street, 177 (24%) in the private sector and 350 (48%) in the managed sector. The sector division was not equal across genders: all the transgender sex workers and all but four of the male sex workers worked either in the street sector or the private sector.

We controlled for many demographic and other individual factors that could correlate with risk. The first of these factors was the age of the worker (Question 1), where the workers could choose one of six categories. Following Abel et al. (2007), we combined the responses of the two under-aged categories to one, 'under 18'. We used category '22-29' (32 % of the respondents) as the reference group, giving us a total of five dummy variables for age: 'under 18' (3%), '18-21' (20%), '30-45' (37%), '45+' (8%) and 'Age NA' that included one respondent who did not wish to reveal their age.

We also controlled for the sex workers' ethnicity with a set of dummy variables. The choices the sex workers had to choose from were 'NZ European', 'Maori', 'Samoan', Cook Island Maori', 'Tongan', 'Niuean', 'Chinese', 'Indian' and 'Other', and there were no restrictions for choosing multiple ethnicities. (Question 2) We followed Abel et al. (2007) and formed a variable 'Pacific' to comprise of those who stated that they were 'Samoan', Cook Island Maori', 'Tongan' or 'Niuean', and we included those who stated they were 'Chinese' or 'Indian' in a category called 'ethnicity other' that also included those that did not fit in other categories. However, we dealt with multiple ethnicities differently from Abel et al. (2007): We formed a variable 'NZ European/Maori' to include those who stated that they were both 'NZ European' and 'Maori' and we formed a variable 'NZ European/Other' to include those who stated that they were both 'NZ European' and at least one other ethnicity but not 'Maori'. This gave us a total of five dummy variables after leaving 'NZ European' (51% of the respondents) as the reference group. 20% of the respondents were 'Maori', 5% were 'Pacific', 11% were 'NZ European/Maori', 2% were 'NZ European/other' and 11% were 'ethnicity other'.

The choices the respondents had for gender were 'Female', 'Male', 'Transgender' and 'Other', although none of the respondents chose 'Other'. We chose female sex workers as the reference group (81% of the respondents) and created dummy variables 'male' (6%) and 'transgender' (13%).

We also controlled for the sex workers' education. This variable was derived from responses to the question: "What education have you had? – tick the highest level attended" (Question 4). The choices given in the survey were 'Primary School', 'Secondary School (1-2 years)', 'Secondary School (3-4 years)', 'University, Waananga or other Tertiary' and 'Don't know'. While nobody answered 'Don't know', there were some who left this unanswered. We used those who had attended 3-4 years of secondary school as the reference group (40 % of the respondents) and recoded the remaining four variables as dummy variables called 'primary' (2%), 'secondary 1-2 years' (23%), 'tertiary' (34%) and 'Education NA' (1%) for those who did not answer this question. Notice that this question did not ask if that level of education was *achieved*, only if the sex worker *attended* an education institute at that level.

We also wanted to see how experience in the sex industry affects the risks for adverse incidents. This was measured in Question 5 that asked: 'How long have you been working in the sex industry?'. However, in the data set that we had access to, this variable had been coded as a categorical variable with options 'less than 6 months', '6-11 months', '12-23 months', '2-4 years', '5-9 years' and '10+ years'. We used the group with 12-23 months of experience as our reference group (10%), and created dummy variables for each of the other groups. This gave us five dummy variables called 'Experience <6 months' (10%), 'Experience 6-11 months' (8%), 'Experience 2-4 years' (18%), 'Experience 5-9 years' (19%), 'Experience >10 years' (23%) and 'Experience NA' (11%) for those who did not answer the question.

Last, we wanted to get a sense of drug dependency of sex workers, as it seems highly likely that such dependency could influence the vulnerability to violence and theft and affect the worker's risk behaviour and the ability to choose a sector to mitigate the risks of sex work. There were several questions in the survey that measured drug use, but we found that question 17 was the best proxy for alcohol, drug or gambling addiction. Question 17 asked: "For what reasons do you stay working in the sex industry?", giving 22 choices of which all of the ones that applied could be chosen. We set

up a dummy variable 'alcohol/drug' that equals one for those who said that they stayed to 'support for alcohol or other drug use' (19% of the respondents). We also set up a dummy variable 'gambling' that equals one for those who said they stayed to 'support gambling use' (5% of the respondents). Questions 25-27 asked about the sex workers' use of alcohol and various drugs just before or during work, during the previous 2 weeks. We felt that the style of this question could have been answered on the affirmative even when the worker was completely under control of the substances used, and therefore we chose to use question 17 instead.

3. The models

We use univariate probit to investigate the factors that affect the probability that a sex worker would experience one of the three adverse incidents that we measure. Each adverse incident variable measures whether or not the sex worker had at least one such adverse incident during the previous 12 months. In Model 1, the explanatory variables include only institutional factors - the sex worker's city and sector of employment. In Model 2, we expand the list of explanatory variables to include individual control variables including age, ethnicity, education, experience, gender, drug or alcohol use and gambling habit.

3.1. Univariate probit with institutional explanatory variables (Model 1)

Let an adverse incident Y_{ij} where j = ('violent', 'theft', 'threat') be a binary variable taking the value one if the sex worker i had an adverse incident of type j during the past 12 months and zero otherwise. We assume that Y_{ij} is a linear function that takes the form

$$Y_{ij} = a_{0j} + A_j X_i + u_{ij}, \tag{1}$$

where X_i is a set of controls for sex worker i, A_j is the corresponding vector of coefficients and u_{ij} is the error term. Equation (1) can be estimated with a univariate probit model:

$$y_{ij}^* = \beta_{1j} x_i + \delta_{1j} S_i + \mu_{1ij}$$

$$E[\mu_{1j}] = 0$$

$$Var[\mu_{1j}] = 1 \tag{2}$$

where y_{ij}^* is a latent variable for individual i given the n j, x is the vector of city dummies for Christchurch and Wellington and β_{1j} is the corresponding vector of coefficients, and S is the vector of sector dummies and δ_{1j} is its vector of coefficients. We observe empirically variable y_{ij} that equals one if the sex worker had an adverse incident of type j ($y_{ij}^* \geq 0$) and zero otherwise ($y_{ij}^* < 0$). We estimate (2) separately for each adverse incident category j.

3.2. Univariate probit with complete set of explanatory variables (Model 2)

Model 2 adds individual control variables to Model 1, and is also estimated with a univariate probit model:

$$y_{ij}^* = \beta_{2j} x_i + \delta_{2j} S_i + \theta_{2j} z_i + \mu_{2ij}$$

$$E[\mu_{2j}] = 0$$

$$Var[\mu_{2j}] = 1$$

(3)

where z_i is a set of individual-specific factors including age, gender, ethnicity, education, experience, alcohol and/or drug use and gambling habit[1] and θ_{2j} is its vector of coefficients. Because we are now controlling for individual factors, we would expect that $\beta_{2j} < \beta_{1j}$, $\delta_{2j} < \delta_{1j}$ and that the significance of these coefficients would decline from Model 1 to Model 2.

We run Model 2 on the whole dataset, which allows the three sectors to differ by intercepts but forces the slopes of the city of employment dummies x and all of the individual controls z to be common for the three sectors, which is a restrictive assumption if the real data exhibits heterogeneity in relative safety of the sectors between the cities or heterogeneity about how the individual controls affect risk in each sector. We could deal with this heterogeneity in the slopes by interacting the city dummies and the individual control variables with the sector dummies. However, this would not only be quite messy given the large number of variables we would need, but would also give us cause for concern due the possibility that the sector dummies are endogenously determined. Thus, we chose to approach this issue by running the model separately for each of the three subsectors. The full sample model gives us an idea of how the risks vary between cities and sectors overall, and the individual sector studies give us an idea of the importance of individual controls in determining risk in each sector and whether or not there is variance between cities at the sector level.

3.3. Endogeneity of the sector dummies

In a separate but related paper, we study the choice of the sector by sex workers. (Meriluoto et al., 2014) It is clear from that paper that for many sex workers, the sector within the sex industry is not randomly determined but is a conscious choice by the sex workers. While in that paper we are unable to construct a risk variable that has enough of variance to be used as an explanatory variable in the choice of sector model, it is nevertheless plausible and even probable that the perceived risk of each sector plays a role in the sector decision. (Abel and Fitzgerald, 2011) This, of course, implies that S_i in equations (2) and (3) could be endogenous. Due to the endogeneity, it is possible that the estimates of the coefficients δ_{1j} in (2) and δ_{2j} in (3) are biased and the probit estimation itself is inefficient.

To make sure our results were not unduly affected by endogeneity, we carried out 2SLS estimation to find appropriate instruments for the sector variable, and then undertook a recursive bivariate probit estimation, where we estimated both the probability of a adverse incident and the choice of sector using common controls x_i and z_i together with additional controls Q_i to instrument for the sector choice. However, given the difficulties in dealing with endogeneity in a multivariate independent variable, to do this we had to regroup sex workers into just two sectors, 'street' and 'indoor', hiding some interesting heterogeneity between the two indoor sectors. We found that correcting for endogeneity generally resulted in the coefficient for the sector variable increasing,

[1] The complete list of explanatory variables z_i is: 'under 18', '18-21', '30-45', '45+', 'Age NA', 'Maori', 'Pacific', 'NZ European/Maori', 'NZ European/Other', 'ethnicity other', primary', 'secondary 1-2 years', 'tertiary', 'education NA', 'experience <6 months', 'experience 6-11 months', 'experience 2-4 years', 'experience 5-9 years', 'experience >10 years', 'experience NA', 'male', 'transgender', 'alcohol/drug' and 'gambling'.

suggesting that the sex workers had indeed taken into account the relative risks when choosing their sector, but that the coefficients for the controls were substantially unaffected. The results of these estimates are available from the corresponding author upon request but not included here due to them not being directly comparable with the results of the three-sector model reported here.

4. Results

For each set of results, we report the marginal effects measured from the dummy variables moving from zero to one as well as the P-values that measure how significantly different from zero the estimated coefficients are. We will discuss each of the adverse incident categories in turn starting with violence and then moving on to theft and threats.

4.1. Violence

Table 1 reports the results for violence, first for Models 1 and 2 using the full dataset in column pairs 1 and 2, respectively, and then for Model 2 only using data from the managed sector (column pair 3), private sector (column pair 4) and street sector (column pair 5).

Let us first examine how the sector of employment affects the probability of violence. Looking at the first column pair in Table 1, we find that private workers are seven percentage points less likely to experience violence than street workers in Model 1 that only looks at the institutional factors, while there are no significant differences between managed and street workers or between the cities. However, once we introduce the individual controls in Model 2, we see from the second column pair that the differences between private and street sectors become insignificant. All these results suggest that the city and sector of employment have very little impact on the sex worker facing violence at workplace. However, we find some interesting differences when looking at the individual sectors independently as there appear to be large sectorial differences between the cities. The third pair of columns reveals that managed workers in Christchurch are 12.3 percentage points more likely to experience violence than managed workers in Auckland, and the fifth column pair reveals that street workers in Christchurch are 12 percentage points less likely to face violence than street workers in Auckland. These two differences cancel each other out in the whole sample study, which is why overall we found no difference between Auckland and Christchurch. One of the reasons for why the street sector is significantly safer in Christchurch than in Auckland when it comes to violence could be that the sector is less spread out in Christchurch, which is likely to contribute to better access to the street workers by NZPC and the police and easier solutions to installing safety features such as security cameras.

Column pairs 2-5 in Table 1 reveal the individual factors that affect the probability of violence at workplace in the full-sample study and the tree sectorial subsamples. First, we find that older workers are less likely to face violence than younger workers. This result seems to be driven by the private sector, where sex workers in the 30-45 age group are 17 percentage points less likely to face violence than the younger reference group[2], while violence in the other sectors is not affected by the age of the workers.

[2] The 45+ age group was dropped from the private subsample in this probit estimation due predicting failure perfectly, so we cannot report how much less likely they are to have experienced violence than the control group. However, this group is included in the whole-industry results in column pair 2.

Ethnicity of sex workers does not play an important role in the whole sample study, but we find that Pacific sex workers in the managed sector are 11 percentage points less likely to face violence than NZ European sex workers, while NZ European / Maori sex workers in the private sector are 9 percentage points less likely to face violence than NZ European workers.

The least educated sex workers are clearly the most vulnerable group. Having just primary education raises the probability of facing violence in the managed sector by 50 percentage points compared to those with 3-4 years of secondary education. Perhaps surprisingly, however, having had some tertiary studies *raises* the probability of violence by 18 percentage points in the managed sector and 16 percentage points in the private sector. We have no definite answer for why this is, but suspect that we could have a sample bias (more educated sex workers could be more likely to agree to be surveyed subject to having experienced violence), that tertiary educated sex workers could be less hesitant to reveal that they have been subject to violence, or that tertiary-educated sex workers have a background that make them less able to cope with the industry.

Industry experience does not alleviate the risk of violence in the industry. In the whole-sample study as well as the private sector and managed sector subsamples, we find no significant effect of experience on the risk of violence. However, we find, perhaps surprisingly, that experience increases the risk of violence in the private sector.

By far the most significant and largest effect comes from alcohol and drug use: Those who reported to have stayed in the sex industry to pay for alcohol and drug use (20% of the respondents) are 18 percentage points more likely to have faced violence than those who had other reasons to have stayed in the industry in the whole-sample treatment. This effect appears to be largely driven by the street sector where those who use alcohol or drugs have 20 percentage points higher probability of facing violence. Note that while 38% of street workers reported having stayed in the industry to support alcohol or other drug use, only 15% of private workers and 10 % of managed workers reported that. While drug or alcohol use is a good predictor of violence, gambling habit is not. The exception to this is the private sector, where we find that those who stayed in the industry to finance gambling habit are 10 percentage points *less* likely to face violence than others. One potential explanation to this could be that these sex workers work from casinos where clients are safer. However, we are not able to test this hypothesis with the data that we have.

4.2. Theft

Table 2 reports the results for theft. We will again start by examining the role the sector choice plays in the probability of the sex worker facing theft while at work. We find that managed and private workers are 26 and 10 percentage points less likely, respectively, to experience theft than street workers when we only account for institutional factors in Model 1. Once we allow for heterogeneity of sex workers, the result for the private sector becomes insignificant, while we find that the managed workers are still 20 percentage points less likely to face theft than street workers. There are no differences between the cities overall, but we find again that there is a lot of heterogeneity between the sectors in the three cities studied: the street workers in Wellington and Christchurch are 24 and 14 percentage points less likely, respectively, to be subject to theft than Auckland street workers, while the private workers in Wellington and Christchurch are 19 and 23 percentage points more likely, respectively, to be subject to theft than Auckland private workers. Again, these differences cancel each other out so that overall the cities appear to have little differences.

Column pairs 2-5 in Table 2 reveal the individual factors that affect the probability of experiencing theft in the workplace in the full-sample study and the tree sectorial subsamples. There is some evidence that age reduces the likelihood of theft, as it did for violence. In the whole sample, the 30-45 age group faces 8 percentage points less theft than those who are in the 22-29-year-old category. The benefit of age is the strongest in the private sector where this age group is 15 percentage points less likely to face theft than the younger control group.

Ethnicity has no significant impact on the likelihood of theft in the whole-industry study. However, sex workers who are both New Zealand European and Maori are 33 percentage points less likely to experience theft in the street sector than the New Zealand European sex workers. Furthermore, those we classify as 'ethnicity other' are 29 percentage points less likely to experience theft in the street sector but 25 percentage points more likely to experience theft in the private sector than New Zealand European sex workers. Last, the sex workers who are both New Zealand European and some other ethnicity but Maori are 23 percentage points more likely to face theft in the managed sector compared to the NZ European workers.

Having just primary education or having some tertiary education have very similar effects than they had for violence – those with primary education only are 51 percentage points more likely to experience theft in the managed sector and 35 percentage points more likely to experience theft in the street sector than and those with 3-4 years of secondary education. Furthermore, sex workers with tertiary education are 8 percentage points *more* likely to experience theft than those with 3-4 years of secondary education, a result driven by the managed sector where they are 10 percentage points more likely to be subject to theft. Similar hypotheses as for violence apply here.

Experience plays a role in the likelihood of theft that is different from the other two adverse incidents: the group most likely to be subject to theft is the group that has been in the industry for 2-4 years, that is 24 percentage points more likely to be subject to theft overall, with most of the theft reported in the street sector and the managed sector.

Being a male sex worker is not good news when it comes to the likelihood of theft. Male sex workers are 14 percentage points more likely to be targets of theft than female sex workers in the whole industry sample. This result is mostly driven by the private sector, where male workers are 22 percentage points more likely to be victims of theft than female sex workers.

Alcohol and drug dependency plays a role in the likelihood of theft but not as important a role as it plays in the likelihood for violence. Overall, those with alcohol or drug dependency are 10 percentage points more likely to face theft than others. When looking at the individual sectors, we find that theft is an alcohol-related problem largely in the managed sector while violence and alcohol were related mostly in the street sector.

4.3. Threats

Table 3 reports the results for threats. As with violence and theft, we begin by analysing how the sector choice affects the probability of facing threats. The results of Model 1 reveal that managed and private workers are significantly less likely to experience threats than street workers, and that Wellington sex workers are more likely to experience threats than Auckland sex workers. The results for the sectorial differences remain significant in Model 2 where we have added individual control variables: sex workers in the managed sector and in the private sector are 24 and 14 percentage

points, respectively, less likely to experience threats than in the street sector. However, Wellington ceases to be a significant explanatory factor for threats in the full-industry study. However, we find in column pair 3 that the managed workers in Wellington are 13 percentage points more likely to experience threats than Auckland managed workers.

Age reduces the likelihood of threats in the industry overall, which appears to be driven by the results from the private sector where those in age categories '30-45' and '45+' are 17 percentage points less likely to be threatened than those in the control group.

Pacific sex workers are nine percentage points less likely to be subject to threats, driven largely by the street sector where they are 21 percentage points less likely to be victims of threats than the New Zealand European sex workers. New Zealand European / Maori sex workers are 13 percentage points less likely to be subject to threats in the private sector than New Zealand European sex workers. Furthermore, sex workers who we have classified as 'ethnicity other' (some multiple ethnicities and all Asian sex workers) are 31 percentage points less likely to face threats in the street sector than New Zealand European sex workers.

The likelihood of threats seems to go up with education – those in the street sector with 1-2 years of secondary education are 17 percentage points less likely to be subject to threats in the street sector than those with 3-4 years of secondary education, while tertiary studies increase the probability of threats by 7 percentage points, driven largely by the managed sector.

When it comes to experience, those sex workers who have been in the industry for over 10 years are the most likely to be subject to threats, especially in the private sector where they are 30 percentage points more likely to be subject to threats than the workers with 12-23 months of experience.

Alcohol or drug use increases threats by 7 percentage points, driven by the street sector.

5. Conclusions and further research

We have investigated the factors that affect the risk environment of sex workers in New Zealand, where risk refers to the probability of the worker facing physical violence, theft or threats at workplace. The study is based on a survey carried out in 2006 or three years after decriminalisation of the sex industry in New Zealand. We control for institutional factors that include the sector and city of workplace, as well as many individual factors.

We find that overall the sector of employment has little impact of the likelihood of a worker facing physical violence, while the street sex workers are significantly more likely to be victims of theft and threats than managed and private sector workers. However, there are interesting differences between *relative* sector risks between cities. In Christchurch, the street sector is significantly safer than in Auckland and the managed sector is significantly less safe than in Auckland when it comes to violence. For theft, we find that Christchurch street sector is again significantly safer than Auckland street sector, while Christchurch private sector is less safe. These observations are consistent with the finding that the proportion of street workers amongst all sex workers in Christchurch is significantly greater than that in the other main cities – the relatively safer street environment may have pulled sex workers from the other sectors. In Wellington, street workers face less theft, private workers face more theft and managed workers face more threats than sex workers in Auckland.

The main contributing factor to the likelihood of physical violence is alcohol and drug use, which is especially true in the street sector. Alcohol and drug use also increases the probability of theft, especially in the managed sector and threats, especially in the street sector, although these effects are not as strong as for violence.

Older sex workers are less likely to be victims of violence, theft or threats than our reference group 22-29-year-old workers, especially when it comes to violence and threats. Experience, however, works against this benefit. The probability of violence increases with experience in the private sector across all experience groups, and the probability of theft is the highest for the sex workers with 2-4 years of experience in the managed and street sectors. With threats, the most vulnerable group is the sex workers with 10 years or more experience, especially in the private sector.

Ethnicity plays some role in the probability of adverse outcomes: Pacific sex workers are less likely to face violence in the managed sector and less likely to face threats in the street sector than New Zealand European sex workers. New Zealand European / Maori sex workers are less likely to experience violence in the private sector and theft in the street sector than New Zealand European sex workers, while New Zealand European / Other sex workers are less likely to face threats in the private sector than New Zealand European sex workers. Those whom we classify as 'ethnicity other' are less likely to experience theft and threats in the street sector but more likely to experience theft in the private sector than New Zealand European sex workers. While it is difficult to draw any definite conclusions from these results, one conclusion is that the risks tend to be the highest for New Zealand European sex workers.

Having only primary education increases the risk of violence and theft by 50 percentage points. However, education has a somewhat puzzling effect on the probability of adverse incidents for tertiary educated sex workers, who are significantly more likely to face all three adverse incidents than sex workers with 3-4 years of secondary education, especially in the managed sector where the majority of tertiary educated sex workers are placed.

Gender plays little role in the probability of adverse incidents with one exception: Male sex workers are 22 percentage points more likely to have money stolen or client refusing to pay than female workers in the private sector and 14 percentage points over all.

These results draw a detailed picture of the factors that contribute to risks of adverse incidents faced by sex workers. Because we control for individual factors we are able to isolate the effects of the sector and city of employment on the risks faced by sex workers, holding constant the make-up of the workers in each sector in an industry where the makeup varies greatly between the sectors and between the cities. We also find the individual factors that contribute to the risks.

The study was conducted three years after decriminalisation. Unfortunately, however, we were unable to gain a good understanding on the effects of decriminalisation on the probability of adverse incidents. While there was a study conducted in Christchurch before decriminalisation, the questions about adverse incidents were worded sufficiently differently from the 2006 survey so as not to give us confidence that we were picking up deregulation effects rather than survey wording change effects. Another study about the adverse incidents could potentially enable us to rectify the issues caused by the wording change, thus allowing us to estimate the effects of decriminalisation on the likelihood of adverse incidents as well as to see what has happened in the past eight years.

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Table 1: Analysis of factors that affect the probability of violence

	All sectors model 1		All sectors model 2[a]		Managed model 2[a,b,c,d]		Private model 2[a,c,e,f,g,h,i]		Street model 2[a]	
	dx/dy	p-value	dx/dy	p-value	dx/dy	p-value	dx/dy	p-value	dx/dy	p-value
managed	-0.036	0.257	0.003	0.937						
private	-0.071**	0.026	-0.043	0.253						
Christchurch	0.042	0.200	0.046	0.173	0.123**	0.016	0.062	0.475	-0.115*	0.078
Wellington	0.029	0.451	0.005	0.891	0.068	0.234	0.026	0.743	-0.084	0.209
under 18			0.174	0.121			0.530	0.097	0.191	0.226
age18-21			0.025	0.541	0.046	0.435	0.147	0.312	-0.086	0.189
age30-45			-0.026	0.437	0.027	0.590	-0.170**	0.031	-0.083	0.185
age 45+			-0.098***	0.006	-0.068	0.291			-0.075	0.325
Maori			-0.030	0.362	-0.022	0.673			0.033	0.631
Pacific			-0.056	0.251	-0.111***	0.001			0.016	0.876
Nz European / Maori			-0.055	0.122	-0.036	0.505	-0.094**	0.027	-0.007	0.946
Nz European / Other			0.030	0.711	-0.056	0.460	0.290	0.220	0.212	0.469
ethnicity other			-0.021	0.618	-0.024	0.644	-0.034	0.611	0.043	0.722
primary			0.025	0.790	0.501**	0.028			-0.089	0.303
secondary 1-2 years			0.010	0.775	0.082	0.239	0.017	0.852	-0.031	0.562
tertiary			0.106***	0.003	0.179***	0.000	0.163**	0.044	-0.076	0.255
education NA			0.161	0.457					0.449	0.266
experience < 6m			-0.044	0.356	-0.076	0.096			-0.075	0.488
experience 6-11m			-0.006	0.914	-0.048	0.382	0.339	0.252	-0.071	0.566
experience 2-4y			0.018	0.725	-0.011	0.854	0.357*	0.085	-0.053	0.650
experience 5-9y			0.087	0.151	0.045	0.545	0.413*	0.083	0.137	0.380
experience >10y			0.044	0.460	-0.038	0.564	0.488**	0.028	0.049	0.721
experience NA			0.032	0.612	-0.087*	0.057	0.509*	0.096	0.183	0.295
male			0.023	0.705	0.040	0.780	0.090	0.412	-0.135***	0.007
transgender			0.014	0.785			-0.079	0.134	-0.049	0.448
alcohol/drug			0.177***	0.000	0.110	0.150	0.174	0.150	0.200***	0.003
gambling			0.022	0.735	0.255	0.256	-0.099***	0.002	-0.060	0.411
# of observations	**730**		**729**		**345**		**125**		**203**	
Chi²	**7.25**		**54.12**		**41.78**		**32.68**		**40.01**	
Prob > Chi²	**0.124**		**0.002**		**0.007**		**0.026**		**0.029**	
Pseudo R²	**0.01**		**0.084**		**0.130**		**0.216**		**0.155**	

dy/dx columns report marginal effects, calculated against dummy variables changing from 0 to 1 where applicable (alcohol/drug, gambling) or against the chosen reference group (sector, age, ethnicity, education, experience).

[a] 'Age NA' dropped (1 observation) due to predicting failure perfectly or due to collinearity.

[b] 'under 18' dropped (2 observations) due to predicting failure perfectly

[c] 'educ NA' dropped (2 observations) due to predicting failure perfectly

[d] 'transgender' dropped due to colliearity

[e] 'age +45' dropped (24 observations) due to predicting failure perfectly

[f] 'Maori' dropped (15 observations) due to predicting failure perfectly

[g] 'Pacific' dropped (1 observation) due to predicting failure perfectly

[h] 'primary' dropped (3 observations) due to predicting failure perfectly

[i] 'experience < 6m' dropped (8 observations) due to predicting failure perfectly

*** Statistically significant at 1% level;

** Statistically significant at 5% level

* Statistically significant at 10% level

Table 2: Analysis of factors that affect the probability of theft

	All sectors model 1[a]		All sectors model 2[a]		Managed model 2[a,b,c,d]		Private model 2[a,c, e,f]		Street model 2[a,c]	
	dx/dy	p-value	dx/dy	p-value	dx/dy	p-value	dx/dy	p-value	dx/dy	p-value
managed	-0.255***	0.000	-0.200***	0.000						
private	-0.103***	0.002	-0.057	0.188						
Christchurch	0.034	0.347	0.054	0.154	0.040	0.329	0.358***	0.001	-0.218**	0.025
Wellington	0.035	0.421	0.015	0.731	0.053	0.264	0.270***	0.005	-0.279***	0.001
under 18			-0.033	0.671			0.096	0.752	-0.030	0.854
age18-21			-0.050	0.240	-0.005	0.917	-0.049	0.666	-0.057	0.612
age30-45			-0.084**	0.017	-0.030	0.398	-0.151*	0.062	-0.038	0.691
age 45+			-0.044	0.403	-0.056	0.132	0.092	0.488	-0.181	0.101
Maori			0.038	0.424	0.066	0.340	-0.020	0.869	-0.046	0.670
Pacific			-0.002	0.976	-0.002	0.982			-0.177	0.129
Nz European / Maori			-0.070	0.122	0.005	0.919	-0.067	0.486	-0.333***	0.000
Nz European / Other			0.121	0.286	0.230*	0.092	0.084	0.707	0.042	0.900
ethnicity other			-0.023	0.651	-0.005	0.917	0.245*	0.076	-0.289***	0.001
primary			0.220	0.139	0.508**	0.031			0.353**	0.043
secondary 1-2 years			0.077*	0.080	0.042	0.471	0.137	0.189	0.105	0.223
tertiary			0.084**	0.040	0.098**	0.016	0.046	0.565	-0.001	0.992
education NA			0.358*	0.081						
experience < 6m			0.042	0.634	0.024	0.747	0.153	0.498	0.119	0.639
experience 6-11m			0.043	0.633	0.014	0.845	-0.003	0.983	0.197	0.469
experience 2-4y			0.236***	0.005	0.173**	0.045	0.236	0.121	0.568***	0.000
experience 5-9y			0.123	0.118	0.138	0.132	0.072	0.610	0.248	0.219
experience >10y			0.105	0.182	-0.012	0.850	0.215	0.148	0.180	0.400
experience NA			0.205**	0.032	0.098	0.331	0.323	0.108	0.403**	0.029
male			0.141*	0.071	0.058	0.687	0.224*	0.068	0.250	0.144
transgender			0.030	0.591			0.064	0.637	0.132	0.188
alcohol/drug			0.096**	0.037	0.118*	0.090	-0.004	0.971	0.052	0.530
gambling			0.023	0.766	0.125	0.396	-0.115	0.370	0.016	0.909
# of observations	**730**		**729**		**345**		**172**		**201**	
Chi²	**57.14**		**95.41**		**44.26**		**31.12**		**38.23**	
Prob > Chi²	**0.000**		**0.000**		**0.003**		**0.094**		**0.033**	
Pseudo R²	**0.074**		**0.135**		**0.157**		**0.154**		**0.145**	

dy/dx columns report marginal effects, calculated against dummy variables changing from 0 to 1 where applicable (alcohol/drug, gambling) or against the chosen reference group (sector, age, ethnicity, education, experience).

[a] 'Age NA' dropped (1 observation) due to predicting failure perfectly or due to collinearity.

[b] 'under 18' dropped (2 observations) due to predicting failure perfectly.

[c] 'educ NA' dropped (2 observations) due to predicting failure perfectly.

[d] 'transgender' dropped due to collinearity.

[e] 'Pacific' dropped (1 observation) due to predicting failure perfectly.

[f] 'primary' dropped (3 observations) due to predicting failure perfectly.

*** Statistically significant at 1% level;

** Statistically significant at 5% level

* Statistically significant at 10% level

Table 3: Analysis of factors that affect the probability of threats

	All sectors model 1		All sectors model 2[a]		Managed model 2[a,b,c,d,e]		Private model 2[a,b,c,f,g]		Street model 2[a,h]	
	dx/dy	p-value	dx/dy	p-value	dx/dy	p-value	dx/dy	p-value	dx/dy	p-value
managed	-0.273***	0.000	-0.239***	0.000						
private	-0.155***	0.000	-0.135***	0.000						
Christchurch	0.015	0.665	0.025	0.486	0.052	0.188	-0.013	0.871	-0.056	0.573
Wellington	0.082*	0.063	0.059	0.164	0.126**	0.030	0.063	0.428	-0.165	0.103
under 18			0.098	0.351					0.249	0.150
age18-21			-0.013	0.752	0.010	0.826	-0.057	0.535	-0.012	0.919
age30-45			-0.070**	0.031	-0.048	0.136	-0.169**	0.023	-0.051	0.585
age 45+			-0.128***	0.000			-0.174***	0.000	-0.163	0.170
Maori			-0.024	0.537	0.026	0.659	0.018	0.847	-0.080	0.417
Pacific			-0.087**	0.047	-0.047	0.416			-0.205*	0.061
NZ European / Maori			-0.049	0.254	-0.006	0.916	-0.126**	0.022	-0.013	0.934
NZ European / Other			0.032	0.729	0.011	0.911	-0.080	0.431		
ethnicity other			-0.052	0.215	0.034	0.495	-0.054	0.480	-0.308***	0.000
primary			0.115	0.320	0.195	0.322	0.157	0.568	0.123	0.572
secondary 1-2 years			-0.002	0.961	0.064	0.260	0.088	0.389	-0.174**	0.035
tertiary			0.074**	0.046	0.076*	0.065	0.095	0.186	0.062	0.588
education NA			0.001	0.996					0.006	0.987
experience < 6m			-0.100**	0.028	-0.052	0.202			-0.271**	0.026
experience 6-11m			0.003	0.967	-0.004	0.949	0.142	0.466	-0.249*	0.095
experience 2-4y			0.054	0.378	0.047	0.456	0.114	0.430	0.090	0.641
experience 5-9y			0.082	0.210	0.069	0.374	0.239	0.119	0.029	0.869
experience >10y			0.118*	0.091	0.090	0.343	0.304**	0.040	-0.002	0.991
experience NA			0.038	0.571	-0.019	0.716	0.178	0.425	-0.032	0.855
male			0.011	0.861	0.027	0.817	0.061	0.531	-0.105	0.476
transgender			0.045	0.385			0.175	0.205	0.051	0.585
alcohol/drug			0.069*	0.094	0.000	0.993	0.116	0.283	0.143	0.101
gambling			0.007	0.917	0.203	0.290	-0.111	0.104	-0.083	0.533
# of observations	**730**		**729**		**330**		**163**		**201**	
Chi²	**77.32**		**102.16**		**29.88**		**25.99**		**27.26**	
Prob > Chi²	**0.000**		**0.000**		**0.095**		**0.207**		**0.293**	
Pseudo R²	**0.107**		**0.152**		**0.106**		**0.141**		**0.094**	

dy/dx columns report marginal effects, calculated against dummy variables changing from 0 to 1 where applicable (alcohol/drug, gambling) or against the chosen reference group (sector, age, ethnicity, education, experience).

[a] 'Age NA' dropped (1 observation) due to predicting failure perfectly or due to collinearity.

[b] 'under 18' dropped (2 observations) due to predicting failure perfectly

[c] 'age +45' dropped (24 observations) due to predicting failure perfectly

[d] 'educ NA' dropped (2 observations) due to predicting failure perfectly

[e] 'transgender' dropped due to collieality

[f] 'experience < 6m' dropped (8 observations) due to predicting failure perfectly

[g] 'Pacific' dropped (1 observation) due to predicting failure perfectly

[h] 'NZ European / other' dropped (2 observations) due to predicting success perfectly

*** Statistically significant at 1% level;

** Statistically significant at 5% level

* Statistically significant at 10% level