

# The introduction of CCTV and associated changes in heroin purchase and injection settings in Footscray, Victoria, Australia

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## Abstract

**Objectives** In June 2011, closed-circuit television (CCTV) was introduced in Footscray (a suburb of Melbourne, Australia) to help deter street-based drug trading. We investigate whether there were subsequent shifts in the settings (e.g., street, house) in which heroin was purchased or injected by people who inject drugs (PWID).

**Methods** Using heroin purchase data from the Melbourne Injecting Drug User Cohort Study, multinomial logistic models with fixed effects for CCTV introduction were used to estimate the percentage of: (1) heroin purchased on the street, from mobile dealers and in house settings; and (2) heroin injections occurring in street, car, public toilet, and house settings. Displacement effects were investigated with a logistic model capturing the likelihood of traveling to Footscray to purchase heroin.

**Results** Following CCTV introduction, the percentage of heroin injections occurring in public toilet settings decreased by 13 % (95 % CI −27 %, −0 %). This was accompanied by a non-significant increase in the percentage of heroin injections in street

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settings of 23 % (95 % CI −1 %, +41 %). Changes in other settings were small and non-significant. No suburb displacement effects were found.

**Conclusions** The introduction of CCTV in Footscray may have displaced PWID who previously injected heroin in public toilets to street settings. Apart from this, Footscray's street-based heroin market operates much as it did before CCTV.

**Keywords** Heroin · People who inject drugs · Closed-circuit television · Drug market

## Introduction

As a response to anti-social behavior and street-based drug trading, 32 closed-circuit television (CCTV) cameras were installed in June 2011 in the central business district (CBD) of Footscray, a suburb in the inner west of Melbourne, Australia. The cameras cover 16 “high-use pedestrian areas” within Footscray's approximately 1 km<sup>2</sup> CBD, including the Nicholson Street mall, small parkland immediately adjacent to the mall, and two automated public toilets (Maribyrnong City Council 2014). Street-based drug use in Footscray has been focused in an approximately 2-km<sup>2</sup> area containing the CBD, and includes three main alleyways (out of sight of the CCTV) and two public toilets, which were included in the surveillance. The stated purpose of installing CCTV was to “improve perceptions of safety in Footscray Central”, with secondary objectives being to reduce crime and disrupt the street-based drug trade by providing evidence to support police prosecutions (Dumble 2014).

The introduction of CCTV in Footscray occurred within the period of our ongoing longitudinal study of injecting drug use, the Melbourne Injecting Drug User Cohort (MIX) study (Horyniak et al. 2013). MIX participants report the purchase and use of heroin in public or private settings, allowing us to measure shifts in heroin use patterns (such as changing from street-based to house-based purchases) that may coincide with the introduction of CCTV. The same individuals were interviewed before and after CCTV introduction, minimizing bias due to fluctuations in the population's characteristics. Participants' residence and drug purchase locations are also known, allowing some assessment of whether there was displacement of drug trade to surrounding suburbs.

We exploit this quasi-experiment to investigate whether there were shifts in the settings in which heroin was (1) purchased or (2) injected by a cohort of people who inject drugs (PWID) following the installation of CCTV in Footscray, as well as (3) whether any displacement of drug trade occurred.

## Methods

### Setting

Footscray is part of the Maribyrnong local government area (LGA), which is home to a population of approximately 77,000 people, about half of whom were born overseas. Historically, Footscray is a working-class suburb and has a current population of about 14,000 people (Department of Transport, Planning and Local Infrastructure 2015). It has been characterized by successive waves of immigration and is a hub for

Vietnamese, South Asian, and East African immigrants in Melbourne, and is being gentrified. Footscray is a commercial and transport hub for the western suburbs and has had an active street-based illicit drug market since the early 1990s (Higgs et al. 2001). Law enforcement in Footscray is managed by Victoria Police, a state-wide organization. The CCTV is relayed to the local police station.

## Data source

MIX is a prospective cohort study of 688 PWID recruited between April 2008 and January 2010. Each participant is interviewed approximately annually from their recruitment date, and interviews are conducted continuously throughout the year. As of August 1, 2013, 2,152 interviews had been conducted and 51 % of participants had been interviewed four or more times.

Participants are asked to report the number of times they injected heroin in the past week, as well as specific details about their three most recent heroin purchases, including the day of purchase; suburb of purchase (for this analysis classified as Footscray or Rest of Melbourne—defined as all suburbs in Greater Melbourne except Footscray); the setting of the purchase (street, pre-arranged meeting or house); and the setting in which the purchase was subsequently injected (street, car, public toilet or house). Further details are in the [Supplementary material](#) and also in Scott et al. 2015. Numbers of valid observations are listed in Table 1.

## Analysis of shifts in purchase and use settings

For heroin purchases made in Footscray, we used multinomial logistic regressions with fixed effects for CCTV to measure changes in purchase and injection settings. The models controlled for a linear time trend, seasonal variation, and whether the purchases were made by a local resident (a drug purchase was considered to be local if it occurred in the same LGA in which the participant lived). These were estimated as follows.

Let  $D = \{\text{street, pre-arranged meeting, house}\}$  and  $E = \{\text{street, car, public toilet, house}\}$  be the sets of possible outcomes for purchase and injection settings, respectively. For the dummy variables ‘autumn’, ‘winter’, ‘spring’, and ‘local’, define a vector of covariates:

$$X = (1, t, \text{autumn, winter, spring, local, CCTV}(t))$$

**Table 1** Number of heroin-purchase observations from the Melbourne Injecting Drug User Cohort Study, April 18, 2008 to August 1, 2013

|  | Footscray        | Rest of Melbourne <sup>a</sup> |
|--|------------------|--------------------------------|
| Number of interviews   | 376 <sup>b</sup> | 1,776                          |
| Number of heroin purchases with valid purchase date response | 915              | 2,821                          |
| Heroin purchases with valid purchase setting response        | 914              | 2,714                          |
| Heroin purchases with valid injection setting response       | 881              | 2,616                          |

<sup>a</sup> Comprises 123 additional suburbs of Greater Melbourne, although only ten of these suburbs had more than 70 heroin-purchase observations, together comprising 65 % of non-Footscray observations

<sup>b</sup> Interviews where the majority of (up to three) reported heroin purchases were made in Footscray

where CCTV(t) is 0 for  $t < \text{June 2011}$  and 1 for  $t > \text{June 2011}$ .

Define  $\beta_i$  and  $\delta_i$  to be vectors of unknown parameters with lengths matching that of  $X$ . For each entry  $i \in D$ , Stata was used to best fit the elements of  $\beta_i$  by maximizing the likelihood of

$$p_i(t) = \frac{\exp(\beta_i X^T)}{\sum_{i=1}^3 \exp(\beta_i X^T)}, \quad i \in D$$

over valid purchase setting observations in Footscray. Similarly, for each entry  $j \in E$ , Stata was used to best fit the elements of  $\delta_j$  by maximizing the likelihood of

$$q_j(t) = \frac{\exp(\delta_j X^T)}{\sum_{j=1}^4 \exp(\delta_j X^T)}, \quad j \in E$$

over valid injection setting observations from purchases made in Footscray. In each case, street settings were used as the base outcome (i.e.,  $\beta_1 = \delta_1 = 0$ ). Standard errors were clustered on participant ID to help control for repeated measurement bias. Base probabilities were determined for each parameter  $p_i$  and  $q_j$  by evaluating at

$$X = (1, \text{January 2009}, 0, 0, 0, 0, 0),$$

and marginal effects ( $\frac{\partial p_i}{\partial \text{autumn}}$ ,  $\frac{\partial q_j}{\partial \text{autumn}}$ , etc.) and 95 % confidence intervals were calculated for each covariate. A control variable (date\*CCTV) that allowed for a longer-term trend change was tested but was not significantly different from date alone, and so was excluded to improve statistical power.

Logistic models only measure changes in the percentage of purchases and injections occurring in each setting, and do not account for simultaneous reductions or increases in market size. For example, if street purchases started to account for a larger proportion of heroin acquisitions, yet the overall size of the heroin market was decreasing, this could still be a desirable outcome. Drug use frequency is believed to be correlated with the size of a drug market in a given location (Degenhardt et al. 2005), so we used changes in the cohort's mean heroin injection frequency to estimate concurrent changes in market size. Interviews specifying that the majority of (up to three) heroin purchases occurred in Footscray were pooled into 6-month periods between January 2009 and June 2013 (354 of 376 interviews); the end of 2008 was excluded since there was a gap in observations between the pilot phase of MIX and the subsequent observations. We calculated the mean number of heroin injections in the past week for each period.

For comparison, the models were run for purchases occurring throughout the rest of Melbourne (excluding the CCTV variable), and the 6-monthly mean heroin injection frequency was calculated between January 2009 and June 2013 for interviews where the majority of heroin purchases were not made in Footscray (1,714 of 1,776 interviews).

## Analysis of market displacement after CCTV introduction

Sparse data from surrounding suburbs meant displacement effects could not be measured directly using analogous methods in adjacent suburbs. Instead, displacement was measured using a logistic model that captured whether heroin was purchased in Footscray or elsewhere. To measure changes among Maribyrnong (Footscray's LGA) and non-Maribyrnong residents correlated with the timing of CCTV introduction, CCTV and CCTV\*Maribyrnong fixed effects were included. Controls were included for a linear time trend, season, and residence in Maribyrnong.

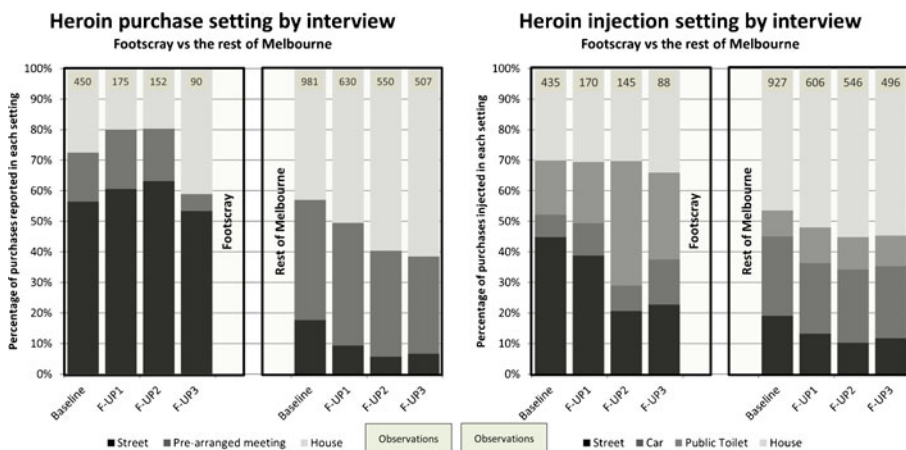
## Results

### Purchase and injection settings

Our data suggest Footscray has a more active street-based drug market than the rest of Melbourne. Between April 2008 and August 2013, 57 % ( $n=523$ ) of heroin purchases in Footscray were in street settings, compared to 11 % ( $n=298$ ) for the rest of Melbourne ( $\chi^2(3)=835.7$ ,  $p<0.001$ ), and 37 % ( $n=322$ ) of heroin purchases in Footscray were injected in street settings, compared to 14 % ( $n=372$ ) for the rest of Melbourne ( $\chi^2(4)=385.2$ ,  $p<0.001$ ). Figure 1 shows the breakdown of these settings for the first four interview waves. Note that CCTV was implemented during the second follow-up interview wave (for interview wave dates see [Supplementary material](#)).

### CCTV introduction and changes in purchase settings

Table 2 presents the estimated model parameters for the settings of heroin purchases relative to those made in summer, at the start of 2009 (i.e., using the value of the estimated linear time trend at this point), outside the LGA of residence and before CCTV. For example, at the start of 2009 and in summer, 52.7, 14.2, and 33.1 % of



**Fig. 1** Decomposition of heroin purchase (*left panel*) and injection (*right panel*) settings, April 2008 to August 2013, MIX baseline and first three follow-up interview waves

**Table 2** Predicted values and marginal effects for heroin purchase settings, by suburb, April 2008 to August 2013, including CCTV controls for Footscray

| Purchase location<br>predicted values<br>and marginal<br>effects (%) | Footscray, <i>n</i> = 913 (percentage point<br>change, 95 % CI) |                         | Melbourne excluding Footscray, <i>n</i> = 2,710<br>(percentage point change, 95 % CI) |                       |                         |
|--|---|-------------------------|---|-----------------------|-------------------------|
|  | Street  | Pre-arranged<br>meeting | House   | Street                | Pre-arranged<br>meeting |
| Predicted values   |   |                         |   |                       |                         |
| Purchase date (per<br>365 days from<br>1 Jan 2009)                   |   |                         |   |                       |                         |
| Lives nearby   |   |                         |   |                       |                         |
| CCTV   |   |                         |   |                       |                         |
| Summer   |   |                         |   |                       |                         |
| Autumn   |   |                         |   |                       |                         |
| Winter   |   |                         |   |                       |                         |
| Spring   |   |                         |   |                       |                         |
|  | 52.7 (41.0, 64.3)   | 14.2 (7.2, 21.2)        | 33.1 (21.7, 44.6)   | 18.8 (13.3, 24.3)     | 35.1 (28.9, 41.3)       |
|  | -1.2 (-7.9, 5.4)  | 2.6 (-2.6, 7.8)         | -1.3 (-6.5, 3.8)  | -5.1** (-8.6, -1.6)   | -1.5 (-4.5, 1.4)        |
|  | -7.5 (-19.5, 4.5)   | 8.8 (-0.5, 18.0)        | -1.3 (-10.2, 7.6)   | -11.8** (-20.5, -3.0) | 0.1 (-7.1, 7.2)         |
|  | 2.2 (-18.3, 22.7)   | -12.2 (-28.9, 4.5)      | 10.0 (-7.5, 27.5)   | 0                     | 0                       |
|  | 0   | 0                       | 0   | 0                     | 0                       |
|  | 6.1 (-8.3, 20.5)  | -15.5* (-30.9, -0.2)    | 9.4* (0.4, 18.5)  | -5.1 (-14.1, 3.9)     | 3.4 (-5.0, 11.8)        |
|  | 0.3 (-14.8, 15.4)   | -9.3 (-23.8, 5.3)       | 9.0 (-0.8, 18.8)  | -8.7 (-20.3, 2.8)     | 8.6 (-0.1, 17.3)        |
|  | 17.4* (2.7, 32.1)   | -7.4 (-20.7, 5.9)       | -10.0 (-24.0, 4.0)  | -3.1 (-13.0, 6.8)     | 4.2 (-4.6, 12.9)        |
|  |   |                         |   |                       | 11.7*** (5.9, 17.6)     |
|  |   |                         |   |                       | 0                       |
|  |   |                         |   |                       | 1.7 (-5.3, 8.8)         |
|  |   |                         |   |                       | 0.2 (-8.7, 9.0)         |
|  |   |                         |   |                       | -1.1 (-9.3, 7.2)        |

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

heroin purchases made in Footscray by non-Maribyrnong residents were made in street, pre-arranged meeting and house settings, respectively.

The introduction of CCTV coincided with non-significant increases in the percentages of heroin purchases made in house and street settings of 10.0 and 2.2 percentage points, respectively, and a non-significant decrease in the percentage of heroin purchases made in pre-arranged meeting settings of 12.2 percentage points.

### **CCTV introduction and changes in injection settings**

Table 3 presents the estimated model parameters for the settings of heroin injections relative to those reported in summer, at the start of 2009, outside the LGA of residence and before CCTV.

The introduction of CCTV coincided with a statistically significant decrease in the percentage of heroin purchases injected in public toilet settings of 13.4 percentage points, a non-significant increase in the percentage of heroin purchases injected in street settings of 23.2 percentage points, and non-significant decreases in the percentage of heroin purchases injected in car and house settings of 2.9 and 6.9 percentage points, respectively.

### **Overall changes in market size**

There was no significant change in the overall heroin injection frequency of participants who reported the majority of their heroin purchases in Footscray, and a slight decline for participants who did not (Fig. 2). Although these estimates may not reflect the frequency of heroin use of all PWID (see limitations), the stable heroin injection frequency of MIX participants in Footscray is consistent with what one would expect if the percentage point changes reported in Tables 2 and 3 also reflected changes in the *absolute number* of purchases and injections occurring in each setting by the MIX cohort.

### **CCTV displacement effects**

There was no statistically significant change among Maribyrnong or non-Maribyrnong residents in the likelihood of purchasing heroin in Footscray that coincided with the introduction of CCTV (Table 4).

## **Discussion**

Between January 2009 and June 2013 no significant changes were observed in the frequency of heroin use in Footscray among MIX participants. We found only limited evidence of changes to the heroin market coinciding with the implementation of CCTV in Footscray's CBD in June 2011: a decrease in heroin injection in public toilets and no suburb displacement effects.

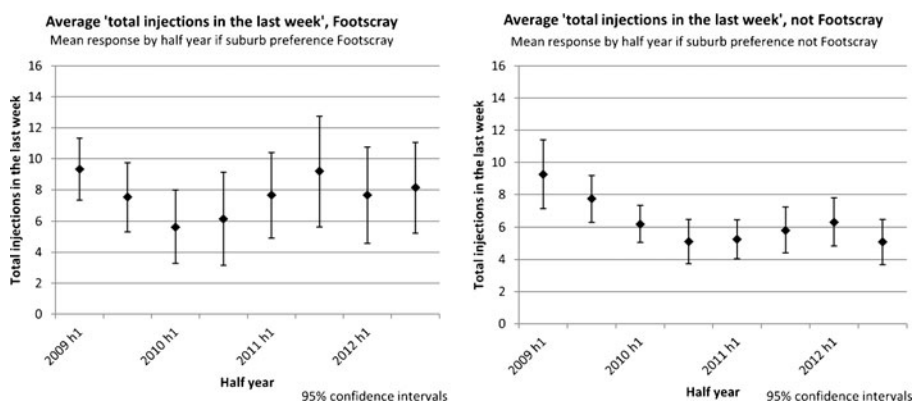
It is worth asking whether the decrease in heroin injecting in public toilets was part of a (potentially undesirable) displacement effect, in particular as it was largely offset by a non-significant increase in heroin injections in street settings. It is plausible that a camera installed visibly over a public toilet in Footscray's CBD deters PWID from injecting heroin in this particular location, especially given that the 16 cameras in high-

**Table 3** Predicted values and marginal effects for the settings of heroin injection by suburb, April 2008 to August 2013, including CCTV controls for Footscray

| Injection location<br>predicted values<br>and marginal<br>effects (%) | Footscray, $n = 874$ (percentage point change, 95 % CI) |                    |                      |                      | Melbourne excluding Footscray, $n = 2,612$ (percentage point change, 95 % CI) |                        |                      |                      |
|---|---|--------------------|----------------------|----------------------|---|------------------------|----------------------|----------------------|
|   | Street  | Car                | Public toilet        | House                | Street  | Car                    | Public toilet        | House                |
| Predicted values  | 56.6 (45.5, 67.8)                                       | 8.6 (2.3, 14.9)    | 13.5 (7.1, 19.9)     | 21.3 (12.1, 30.5)    | 21.8 (15.8, 27.7)   | 27.8 (21.3, 34.3)      | 11.6 (7.2, 16.0)     | 38.9 (32.5, 45.2)    |
| Purchase date (per<br>365 days from<br>1 Jan 2009)                    | -13.6*** (-20.1, -7.1)                                  | 2.7 (-0.8, 6.3)    | 7.5*** (3.4, 11.6)   | 3.4 (-0.5, 7.3)      | -3.3* (-6.0, -0.5)  | -0.3 (-2.7, 2.1)       | 0.4 (-0.7, 1.5)      | 3.2** (1.1, 5.2)     |
| Lives nearby  | 1.4 (-14.8, 17.7)                                       | -6.6 (-17.7, 4.5)  | -14.3 (-28.6, 0.1)   | 19.4*** (12.0, 26.9) | -2.4 (-9.5, 4.7)  | -18.7*** (-27.5, -9.9) | -7.0** (-12.2, -1.8) | 28.0*** (22.2, 33.9) |
| CCTV  | 23.2 (-1.0, 41.4)                                       | -2.9 (-16.1, 10.3) | -13.4* (-26.7, -0.1) | -6.9 (-20.2, 6.3)    | 0   | 0                      | 0                    | 0                    |
| Summer  | 0   | 0                  | 0                    | 0                    | 0   | 0                      | 0                    | 0                    |
| Autumn  | 7.3 (-6.2, 20.7)  | -5.9 (-16.6, 4.8)  | -6.5 (-17.6, 4.6)    | 5.2 (-2.1, 12.4)     | 1.4 (-6.1, 8.9)   | -0.4 (-9.2, 8.4)       | 2.6 (-1.6, 6.7)      | -3.6 (-11.8, 4.6)    |
| Winter  | -14.4 (-30.7, 1.9)                                      | -2.2 (-13.1, 8.6)  | 3.3 (-6.5, 13.0)     | 13.4*** (6.7, 20.0)  | -3.7 (-12.5, 5.2)   | -3.7 (-13.4, 6.1)      | 4.2* (0.2, 8.2)      | 3.1 (-4.9, 11.1)     |
| Spring  | 0.0 (-13.9, 13.9)                                       | -4.1 (-14.7, 6.6)  | 7.0 (-1.8, 15.7)     | -2.9 (-12.1, 6.4)    | 0.5 (-7.4, 8.5)   | 2.2 (-6.9, 11.2)       | 2.4 (-2.1, 6.9)      | -5.1 (-13.9, 3.7)    |

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$





**Fig. 2** Six-monthly mean response to 'total heroin injections in the past week' reported in MIX between January 2009 and June 2013. Participants who made the majority of their heroin purchases in Footscray (*left panel*), and those who did not (*right panel*)

use pedestrian areas did not cover all possible street-based injecting locations. However, the increase in injection in street settings—which was not statistically significant—may have been influenced by other factors, even if it was a real change. There may even have been reverse causality if CCTV installation was a reaction to a perceived increase in street use; observation numbers in our data were insufficient for time series modeling, and the fixed-effects methods we used rely on averages before (April 2008–May 2011) and after (June 2011–August 2013) CCTV, meaning that the specificity of the timing of changes in our models was reduced.

There are some limitations to our study. First, this was a quasi-experiment rather than a randomized controlled trial; we measured only the effects of CCTV on patterns of heroin purchase and heroin injection of a convenience sample of PWID. Second, factors external to CCTV may have influenced the behavior of the PWID in our sample. For example, changes to law enforcement operations (e.g., street patrols) or

**Table 4** Modeled odds ratios for the likelihood of purchasing heroin in Footscray, April 2008 to August 2013

|                                   | Adjusted odds ratios for purchasing heroin in Footscray, $n = 3,596$ (95 % CI) |               |
|-----------------------------------|--|---------------|
| CCTV * Lives in Maribymong        | 0.924  | (0.426–2.007) |
| CCTV * Doesn't Live in Maribymong | 1.157  | (0.723–1.851) |
| Purchase date (per 365 days)      | 0.786**  | (0.660–0.936) |
| Lives in Maribymong               | 2.964***   | (2.059–4.266) |
| Summer                            | 1  | 1             |
| Autumn                            | 0.905  | (0.647–1.264) |
| Winter                            | 0.801  | (0.545–1.177) |
| Spring                            | 0.922  | (0.645–1.320) |
| Constant (OR at 1 Jan 2009)       | 0.455  | (0.335–0.617) |

\*  $p < 0.05$ , \*\*  $p < 0.01$ , \*\*\*  $p < 0.001$

public toilet cleaning procedures may have caused some displacement of injecting settings, and it is also unclear whether the PWID in our sample were aware of the CCTV. Further, the willingness of drug users to purchase heroin in Footscray is likely to be influenced by changes to drug prices and availability that were not considered in this study. Third, our estimates for the frequency of heroin use may not reflect the behavior of all PWID, including MIX participants who became lost to follow-up (25 % of participants had not been followed up by August 1, 2013) and those who only initiated injecting drug use more recently. Fourth, the timing of interviews (i.e., annually for individuals) means that for some participants the change we measured in purchasing/injecting settings could have occurred up to a year post-CCTV installation. Nevertheless, using longitudinal data on individual PWID behavior provides unique information to complement traditional crime statistics.

## Conclusions

Footscray's street-based heroin market appears to operate much as it did before CCTV. The introduction of CCTV in Footscray coincided with a decrease in the percentage of heroin injections occurring in public toilet settings, perhaps due to a particular camera covering a toilet block frequented by PWID, but this decrease may have been largely offset by a non-significant increase in injections in street settings.

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## References

- Degenhardt, L., Day, C., Dietze, P., Pointer, S., Conroy, E., Collins, L., & Hall, W. (2005). Effects of a sustained heroin shortage in three Australian States. *Addiction*, 100, 908–920.
- Department of Transport, Planning and Local Infrastructure. (2015). <http://www.dpcd.vic.gov.au/localgovernment/find-your-local-council#councils>.
- Dumble, L. (2014). Footscray CCTV System evaluating its effectiveness. *Crime Prevention and Communities: Building Better Local Solutions* June 10–11: Melbourne [http://www.aic.gov.au/media\\_library/conferences/2014-crimeprevention/presentations/tue-102-1050-Lynley-Dumble.pdf](http://www.aic.gov.au/media_library/conferences/2014-crimeprevention/presentations/tue-102-1050-Lynley-Dumble.pdf).
- Higgs, L. M., Jordens, J., Dunlop, A., & Sargent, P. (2001). Harm reduction and drug users of Vietnamese ethnicity. *Drug and Alcohol Review*, 20(2), 239–245.
- Horyniak, D., Higgs, P., Jenkinson, R., Degenhardt, L., Stoove, M., Kerr, T., Hickman, M., Aitken, C., & Dietze, P. (2013). Establishing the Melbourne Injecting Drug User Cohort Study (MIX): rationale, methods, and baseline and twelve-month follow-up results. *Harm Reduction Journal*, 10, 11.
- Maribyrnong City Council (2014). Community Services>Public Health and Safety>Public Safety>Safety in Public Places>Footscray Public Safety CCTV System. [http://www.maribyrnong.vic.gov.au/Page/Page.aspx?Page\\_Id=6469](http://www.maribyrnong.vic.gov.au/Page/Page.aspx?Page_Id=6469) Webpage last updated 27 Oct 2014.
- Scott, N., Caulkins, J. P., Ritter, A. & Dietze, P. (2015). Understanding and describing Australian illicit drug markets: drug price variations and associated changes in a cohort of people who inject drugs. *National Drug Law Enforcement Research Fund (NDLERF), Final Report Monograph Series No. 58*.

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