Published in final edited form as:

J Subst Use. 2017 ; 22(6): 630–636. doi:10.1080/14659891.2017.1296039.

Drug dealing and drug using behaviors among people who inject drugs in Colombia: A cross-sectional study

David Toro-Tobón^{a,b}, Dedsy Berbesi-Fernandez^{b,c}, Pedro Mateu-Gelabert^d, Ángela M. Segura-Cardona^{a,b}, Liliana P. Montoya-Vélez^{a,e}

^aSchool of Medicine, CES University, Medellin, Colombia

^bEpidemiology and Biostatistics Research Group, CES University, Medellin, Colombia

^cSchool of Nursing, CES University, Medellin, Colombia

^dNational Development and Research Institutes, New York City, New York, USA

^eDivision of Public Health, CES University, Medellin, Colombia

Abstract

Introduction: People who inject drugs (PWID) are highly exposed to drug-dealing networks. In Colombia, a recent dramatic increase in drug consumption has been reported. However, involvement of PWID in drug dealing, their demographics, and drug using behaviors has not been studied.

Methods: A cross-sectional study involving 1,099 PWID recruited by Respondent Driven-Sampling in five Colombian cities was conducted in 2014. Correlates of demographic characteristics, drug dealing, and injection behaviors were examined by multivariate analysis, and a binary logistic regression model.

Results: Drug-dealing PWID were predominantly male (86%) with a mean age of 26 years. 56% of participants—of whom 64% had low familial socioeconomic status—had been involved in drug dealing in the previous six months. Compared to non-drug-dealing PWID, drug-dealing PWID reported higher daily injection rate (AOR: 1.3), higher odds of injection equipment confiscation by the police (AOR: 1.4), and were less likely to pay for the drugs they injected (AOR: 0.6).

Conclusions: Involvement of Colombian PWID in drug dealing was higher than previously reported, and drug-dealing PWID presented sociodemographic vulnerabilities and risky injection practices. Addressing these findings may lead to effective policy design and implementation, decreased drug-dealing involvement, harm reduction, and consumption prevention.

Keywords

Colombia; drug abuse; drug dealing; intravenous

Introduction

Over the past decades, injecting drug use has been recognized as a growing global public health issue with severe associated morbidities and mortality, (Majid Ezzati et al., 2004; PAHO, 2009). Reports including data of over 148 countries estimate that globally, close to 16 million currently people inject drugs (Mathers et al., 2008).

Historically, developed countries have higher percentages of illegal drug consumption and higher prevalence of injectable drug use than developing countries (EMCDDA, 2000, 2012; Mathers et al., 2008; Substance Abuse and Mental Health Services Administration, 2010), while developing countries, including Colombia, have been mainly considered as drug producers (PAHO, 2009; UNODC Colombia, 2015). Despite these perceptions, injectable drug use in Colombia has increased rapidly over the past decades (Colombian Ministry of Justice and Law, 2013; Mateu-Gelabert et al., 2016; PAHO, 2009). However, studies assessing drug injection practices among people who inject drugs (PWID) in Colombia are limited and policy design, and implementation has been sluggish and ineffective.

Risky injection behaviors such as assisted injection and sharing needles, syringes, and other paraphernalia have been extensively described, and their presence in specific drug user populations depends on social and environmental characteristics (Cheng et al., 2015). A clear association has been established between risky injection practices and secondary damage such as blood-borne infections transmission (Human Immunodeficiency Virus, Hepatitis C and Hepatitis (Frajzyngier et al., 2007; Mathers et al., 2008; Nelson et al., 2011; UNAIDS, 2006), overdoses, cutaneous infections, and venous trauma (Fairbairn et al., 2010).

Previous studies report a prevalence of drug-dealing PWID to range between 17% and 43% (Bretteville-Jensen & Sutton, 1996; Kerr et al., 2008; Ti et al., 2014). Studies on the influence and implications of drug markets and exposure to micro-trafficking on PWID strongly suggest that PWID get involved in drug dealing in order to provide for their own drug consumption (Coomber & Maher, 2006; Dwyer & Moore, 2010). Furthermore, drug-dealing PWID are characterized by socio-demographic vulnerabilities, risky environments (Fitzgerald, 2009; Werb et al., 2008), as well as a complex network of social and altruistic relationships specific to each drug market (Dwyer & Moore, 2010).

To date, few studies have described the characteristics and risky injection behavior of drug-dealing PWID. Studies indicate that drug-dealing PWID are more likely to engage in injection risks such as higher injection frequency (Sherman & Latkin, 2002), sharing of syringes and other injection paraphernalia (DeBeck et al., 2007), assisted injection, and over-dose (Kerr et al., 2008). Additionally, behaviors and implications on associated injection risks and secondary harms are influenced by demographic, social, cultural, and economic network factors such as prior criminal involvement, social exclusion, lack of income generating activities, chronic poverty, unstable housing, lack of autonomy and alternative exciting activities, and the unique illicit drug scene of each population (Kerr et al., 2009).

While PWID in Colombia are highly exposed to drug market and drug-dealing networks (Alvarado, 2013), a correlation between PWID and drug-dealing involvement has not been described. Therefore, the aim of this study is to analyze the demographics and injection practices of drug-dealing PWID in two large and three medium-sized Colombian cities.

Methods

Data were collected during a 2014 cross-sectional study conducted in the following five cities in Colombia selected due to their high number of injecting drugs users, and their known status as micro-traffic and drug-dealing epicenters (Colombian Ministry of Justice and Law, 2013; Perez, 2010): Armenia (State of Quindío), Bogotá D.C., Cúcuta (State of Norte de Santander), Medellín (State of Antioquia) and Pereira (State of Risaralda).

Participants and instruments

A total of 1,099 participants were recruited through “Respondent Driven Sampling” (RDS), a recruitment method that uses chain-referral sampling to evaluate hard-to-reach populations based on participant’s existing social network ties to obtain a sample that approximates to the study population (McCreesh et al., 2013). This study followed the STROBE RDS checklist (White et al., 2015) to strengthen the methodology and report of the results. Inclusion criteria were as follows: being an active PWID during the last six months, being between 18 and 59 years old, and providing signed informed consent.

A minimum sample size of 184 PWID for each of the selected cities was calculated with the formula for the proportion with a $1-\alpha = 95\%$ confidence level, a 3.5% error and a design effect of 2. Following the RDS methodology, recruitment began with a group of three seeds (non-randomized, heterogeneous participants) from the target population in every city. From these seeds, recruitment chains were made until the final sample of PWID was obtained. Two types of incentives were given to each participant: a primary incentive for taking part in the study (US\$ 4) and a secondary one, linked to the successful recruitment of three new participants (US\$ 5).

Measures

Participant data were collected through a survey technique with a previously applied and reviewed form of PWID (Berbesi et al., 2012) based on the instrument designed by the World Health Organization (WHO) in Bogota (Mejía & Gómez, 2005). This questionnaire examines demographic characteristics (age, sex, primary income source and familial socioeconomic status), injection risk behaviors (Daily injection rate, Syringe or needle acquisition from a drug dealer, self-financing of drug consumption, confiscation of injection equipment by police or any authority, giving or selling used syringes, injecting another person and using encapsulated or ready to use drug vial), equipment exchange conducts (Sharing syringes, needles, and paraphernalia such as cotton, filter, water, and mixer) within the last six months and the last reported injection episode, and ever presenting injection-related harms (suffering an opium or heroin overdose and knowing someone who suffered an overdose).

Ethical considerations

Ethical considerations and informed consents were approved by the CES University's ethics committee in Medellín, Colombia.

Statistical analysis

A description of PWID characteristics and injection patterns determination was initially performed. Contingency tables were designed to establish an association between independent risk factors and dependent variable drug dealing defined as having sold drug or being part of a drug selling operation on the last six months. This analysis was based on statistical tests (chi square and Fisher's exact test), OR and 95% CI. Missing data were 2.1% in some variables and were excluded from the analysis. Multivariate analysis was performed. First a binary logistic regression model was conducted, and all variables with significant crude OR ($p < 0.25$) were included in the multivariate model obtaining adjusted ORs. All tests were two-tailed and used $p = 0.05$ as the cutoff for statistical significance. All statistics were performed using SPSS software (version 21.0; SPSS Inc., Chicago, IL, USA).

Results

Recruitment waves

The required waves to reach sample equilibrium for key demographics, minimum number of participants, and median network size and range of network members for each of the cities are shown in Table 1. No biases were found regarding recruitment patterns by key demographic characteristics and injection risk behaviors. RDS-adjusted estimates for key demographics were similar to reported sample prevalence rated.

Demographics

A total of 1,099 PWID from the five selected cities participated in the study. Sociodemographic background is presented in Table 2. There was a predominance of male injectors (86.1%) with a mean age of 26 years; and female injectors (13.9%) had a mean age of 25 years. In our sample, 56% of PWID were involved in drug dealing, of whom 64.7% had a low familial socioeconomic status, and four out of 10 had middle–high socioeconomic status. However, no statistical differences were found on bivariate analysis between drug-dealing and non-drug-dealing PWID (OR 1.2; $p = 0.12$). Additionally, 8.5% of drug-dealing PWID reported—in addition to drug-dealing—robbery and other illegal activities as their primary income source, and this had three times greater odds compared to non-drug-dealing PWID ($p < 0.001$) (Table 3).

Injection behavior

During the last six months of injection, 43% of the total sample injected four or more times daily. There was statistically significant higher injection frequency in drug-dealing PWID compared to non-drug-dealing PWID (47.2% vs. 36.8%; OR = 1.5; $p < 0.001$). Crude ORs from bivariate analysis of injecting behaviors demonstrate that, compared to non-drug-dealing PWID, drug-dealing PWID had 3.5 times the odds of obtaining new syringes and needles from a drug dealer ($p = 0.04$); 1.6 times the odds of giving or selling used syringes

to other drug users ($p < 0.001$), and 1.4 the odds of having injection equipment confiscated by police or any other authority ($p < 0.001$) (Table 3).

Last injection episode

During the last injectable episode, drug-dealing PWID had 1.3 times the odds of sharing paraphernalia ($p = 0.03$), and 2.1 times the odds of injecting another person ($p = 0.02$) compared to non-drug-dealing PWID. Additionally, drug-dealing PWID were less likely to pay for the drug to be injected (76.1% vs 82.5%; OR = 0.6; $p = 0.01$). No statistical significant differences were found regarding sharing a syringe or use of encapsulated drug or ready to use vial (Table 3).

Overdose related harm

On bivariate analysis, drug-dealing PWID were associated with greater odds (1.4) of suffering an overdose in their lifetime compared to non-drug-dealing PWID (39.2% vs 30.5%; $p < 0.001$). Additionally, drug-dealing PWID showed 1.5 greater odds ($p < 0.001$) of knowing someone who had died of an overdose (Table 3).

Multivariate analysis

Adjusting for demographic and injection pattern variables, the differences found in the bivariate analysis between drug-dealing and non-drug-dealing PWID regarding drug dealing, robbery or other illegal activities as the primary source of income, daily injection rate, giving or selling new syringes to other people, self-paying for drugs to be injected, and suffering an overdose, remained statistically significant with only slight variations in adjusted ORs. However, obtaining new syringes from a drug dealer, sharing syringes and paraphernalia, injecting another person and knowing someone who died from an overdose were no longer statistically significant (Tables 1–3)

Discussion

Despite the clear problem of injectable drug use and high exposure to drug market and drug-dealing networks in Colombia, this is the first study that approaches the overlap between them as well as their secondary consequences in related morbidity. In agreement with previous studies, (Bretteville-Jensen & Sutton, 1996; Kerr et al., 2008; Ti et al., 2014), 5 of every 10 PWID included in the sample had been involved with drug dealing during the last six months. Our data strongly suggest a relationship between injectable drug use and drug dealing, raising concerns about the high level of PWID's involvement in drug dealing. This may be partially explained by their need of income to support their—often high-drug intake.

Over the past 30 years, multiple authors have stated how drug dealing represents financial, social, and altruist benefits to PWID (Deering et al., 2011; Dwyer & Moore, 2010; Friedman et al., 1998, 2002; Sherman & Latkin, 2002). In our study, 56% of participants had been involved in drug dealing during the previous six months, and 1 in 10 drug-dealing PWID additionally reported robbery and other illegal activities as the primary source of income. This behavior had three times greater odds in drug-dealing PWID compared with non-drug-dealing PWID. Furthermore, our results are consistent with previously studies in which

involvement of PWID in drug dealing is highly frequent, even becoming this population's primary—illegal—source of income (DeBeck et al., 2007, 2011; Fischer et al., 1999; Kerr et al., 2008; Werb et al., 2008). Studies have also shown that the main reason for PWID's involvement in drug dealing is to sustain their own consumption, make economic profit, and improve their accessibility to drugs (DeBeck et al., 2007; Deering et al., 2011; Dwyer & Moore, 2010; Friedman et al., 1998, 2002; Hutchinson, et al., 2000; Long et al., 2014; Small et al., 2013).

The need to get involved in illegal activities, such as drug dealing, can be explained by the high costs of drugs for self-consumption in the cities included in this and other studies (Boyum & Kleiman, 2001; Caulkins & MacCoun, 2003; DeBeck et al., 2007; Deering et al., 2011; Hutchinson et al., 2000; Richardson et al., 2010) as well as by criminal history, economic ambitions, lack of employable job skills, and lack of legal work opportunities (Bretteville-Jensen & Sutton, 1996; Hammersley et al., 1989; Long et al., 2014; Sherman & Latkin, 2002, 2002; Werb et al., 2008) Unfortunately, due to the design of our current study, these variables could not be fully assessed.

Interestingly, this study found a negative correlation between drug dealing and paying for drugs participants injected. This result could be explained by the usual dynamic of a trading day, in which drug dealers purchase large amounts of drugs (weight) and divide it in personal doses for further retail, saving the remaining for self-consumption (Dwyer & Moore, 2010). Also, data from a previous empirical study (Johnson, 2003) indicate that drug dealers provide their labor and skills in exchange for drugs to be self-injected, which may also explain our findings.

In this study, we found that 60% of drug-dealing PWID had a low familial socioeconomic status (SES), which implies low financial income (DANE, 2015). These findings could be explained by the environmental context of this population with social, cultural, and economic risk factors remarkable for high exposure to the drug market. Additionally, lack of formal training and stable job opportunities in people with low SES (Alvarado, 2013; Soto et al., 2007) makes them more susceptible to getting involved in illegal activities such as drug dealing (Burris et al., 2004; DeBeck et al., 2011). However, contrary to the study conducted in Vancouver (Long et al., 2014), we found income level not to be a statistically significant risk factor for involvement in drug dealing. This finding, together with the fact that in our study, up to 4 out of 10 drug-dealing PWID have middle–high SES, should be further investigated in order to assess whether high SES is a consequence of drug-dealing activity, or whether there are other associated causes—such as political corruption, lack of alternative high-profit generating activities, need to acquire high social status, among others—that could stimulate drug-dealing activities despite having high SES.

This study found that drug-dealing PWID had higher daily injecting frequency, higher risk of overdose and of giving or selling used syringes to other people. On the other hand, we found no statistical difference in syringe and paraphernalia sharing. These results are consistent with previous studies which report PWID involvement in drug dealing to be associated with higher individual and network behavioral risks such as blood-borne infection transmission, overdose, seeking injection assistance, lending syringes (Darke & Hall, 2003;

Fairbairn et al., 2008; Friedman et al., 1998; Kerr et al., 2008; Sherman & Latkin, 2002; Tyndall et al., 2003; Werb et al., 2008), as well as higher injecting frequency (DeBeck et al., 2007; Kerr et al., 2008; Long et al., 2014; Sherman & Latkin, 2002).

In our multivariate analysis, the risk of having injection equipment confiscated by the police was greater in drug-dealing PWID. Additionally, on bivariate analysis, the risk of obtaining new syringes or needles from a drug dealer and of giving or selling used syringes was also greater in drug-dealing PWID. These findings could be a consequence of high police interaction, distributive needle sharing, and limited access to new needles and syringes due to law enforcement based policies. These policies implemented in Colombia do not take into account social and structural factors affecting drug-dealing PWIDs, and furthermore, policing activities not only have limited effectiveness, but also rather may inadvertently generate greater injecting-related harm (Benson et al., 1992; Galea et al., 2003; Kerr, et al., 2005; Nurco, 1987; Rhodes, 2002; Wood et al., 2004).

Given the role of Colombia as a drug producing country, multiple policies with a high component of law enforcement strategies have been established with the objective of reducing mainly non-injectable drug production, supply and consumption (Colombian Ministry of Justice and Law, 2013). However, despite the growing use of injectable drugs over the last 20 years, only a few programs focusing on PWID harm reduction have been established (Quintero, 2012), and there are no specific protocols to prevent harm for drug-dealing PWID. Unfortunately, the present study cannot fully determine the level of influence of current policies on the obtained results.

One limitation of our study is that the Respondent Driven Sampling method employed is not a random selection of the sample, and specific requirements must be met by the sample for it to be considered as representative. Despite training personnel for data collection, another limitation of our study is that the employed questionnaire includes self-reports on injection episodes and risk behaviors, which rely on participants' answers honesty. Finally, the type of study conducted is limited from the perspective of the establishment of causal relations in the analyzed variables. As previously stated (Coomber & Maher, 2006), it is difficult to know the exact behavior of the involved variables because drug market and drug dealing are not fixed but rather dynamic entities. Nonetheless, we pursued the best possible approximation of the real outlook, and to avoid possible bias, the initial seeds were selected through ethnographic methods in order to obtain diverse and representative starters. Additionally, all of the resultant referral chains were extensive, which could represent adequate penetration in the target population.

In this study, we described demographics and injecting patterns of drug-dealing PWID in five Colombian cities. Our observations may serve as a starting point for subsequent qualitative studies and policy-making efforts addressing the complex economic, social and cultural factors leading to drug dealing by PWID. In addition to law enforcement actions, previous studies have suggested implementing structural and personalized policies for drug-dealing PWID including network outreach programs (Richard & Needle, 2005) and intensive case management (Robles et al., 2004). Altogether, studies by us and others strongly suggest that in order to effectively prevent consumption, diminish involvement of

PWID in illegal activities and related risks among PWID and their entire consumption network, newer policies must be designed and implemented to provide better care for drug-dealing PWID.

Acknowledgments

Funding

This study was supported by the Panamerican Health Organization under Grant number N°COL/LOA/1400008.001. The time of author Mateu-Gelabert was partially supported by Grant No. 1R01DA041501 from the National Institute on Drug Abuse.

References

- Alvarado L (2013). Microtráfico y narcomenudeo: caracterización del problema de las drogas en pequeñas cantidades en Colombia. Ministerio de Justicia y del Derecho en Colombia - Dirección de política contra las drogas y actividades relacionadas
- Benson BL, Kim I, Rasmussen DW, & Zehlke TW (1992). Is property crime caused by drug use or by drug enforcement policy? *Applied Economics*, 24(7), 679–692. doi:10.1080/00036849200000036
- Berbesi D, Montoya L, & Segura A (2012). Prevalencia de VIH y comportamientos de riesgo en UDI en Medellín y Pereira Bogotá: Ministerio de Protección Social.
- Boyum DA, & Kleiman MAR (2001). Substance abuse policy from a crime-control perspective. N: Wilson J, Petersilia J (Eds.), *Crime* San Francisco, California.
- Bretteville-Jensen AL, & Sutton M (1996). The income-generating behaviour of injecting drug-users in Oslo. *Addiction*, 91(1), 63–79. [PubMed: 8822015]
- Burris S, Blankenship KM, Donoghoe M, Sherman S, Vernick JS, Case P, ... Koester S (2004). Addressing the “Risk Environment” for injection drug users: The mysterious case of the missing cop. *The Milbank Quarterly*, 82(1), 125–156. doi:10.1111/j.0887-378X.2004.00304.x [PubMed: 15016246]
- Caulkins JP, & MacCoun R (2003). Limited rationality and the limits of supply reduction. *Journal of Drug Issues*, 33(2), 433–464. doi:10.1177/002204260303300208
- Cheng T, Kerr T, Small W, Dong H, Montaner J, Wood E, & DeBeck K (2015). High prevalence of assisted injection among street-involved youth in a Canadian setting. *AIDS and Behavior*, 1–8. doi: 10.1007/s10461-015-1101-3 [PubMed: 24668254]
- Colombian Ministry of Justice and Law. (2013). El problema de las drogas en Colombia: Acciones y resultados 2011–2013 Retrieved from <http://www.odc.gov.co/Portals/1/publicaciones/pdf/consumo/estudios/nacionales/OD010121113-acciones-resultados-2013.pdf>
- Coomber R, & Maher L (2006). Street-level drug market activity in Sydney’s primary heroin markets: Organization, adulteration practices, pricing, marketing and violence. *Journal of Drug Issues*, 36(3), 719–753. doi:10.1177/002204260603600310
- DANE. (2015). Preguntas frecuentes de estratificación
- Darke S, & Hall W (2003). Heroin overdose: Research and evidence-based intervention. *Journal of Urban Health : Bulletin of the New York Academy of Medicine*, 80(2), 189–200. doi:10.1093/jurban/jtg022 [PubMed: 12791795]
- DeBeck K, Shannon K, Wood E, Li K, Montaner J, & Kerr T (2007). Income generating activities of people who inject drugs. *Drug and Alcohol Dependence*, 91(1), 50–56. doi:10.1016/j.drugalcdep.2007.05.003 [PubMed: 17561355]
- DeBeck K, Wood E, Qi J, Fu E, McArthur D, Montaner J, & Kerr T (2011). Interest in low-threshold employment among people who inject illicit drugs: Implications for street disorder. *International Journal of Drug Policy*, 22(5), 376–384. doi:10.1016/j.drugpo.2011.05.012 [PubMed: 21684142]
- Deering KN, Shoveller J, Tyndall MW, Montaner JS, & Shannon K (2011). The street cost of drugs and drug use patterns: Relationships with sex work income in an urban Canadian setting. *Drug & Alcohol Dependence*, 118(2), 430–436. doi:10.1016/j.drugalcdep.2011.05.005 [PubMed: 21704461]

- Dwyer R, & Moore D (2010). Beyond neoclassical economics: Social process, agency and the maintenance of order in an Australian illicit drug marketplace. *International Journal of Drug Policy*, 21(5), 390–398. doi:10.1016/j.drugpo.2010.03.001 [PubMed: 20356725]
- EMCDDA. (2000, 10). 2000 Annual report on the state of the drugs problem in Europe
- EMCDDA. (2012, 11). 2012 Annual report on the state of the drugs problem in Europe
- Fairbairn N, Small W, Van Borek N, Wood E, & Kerr T (2010). Social structural factors that shape assisted injecting practices among injection drug users in Vancouver, Canada: a qualitative study. *Harm Reduction Journal*, 7, 20. doi:10.1186/1477-7517-7-20 [PubMed: 20807442]
- Fairbairn N, Wood E, Stoltz J, Li K, Montaner J, & Kerr T (2008). Crystal methamphetamine use associated with non-fatal overdose among a cohort of injection drug users in Vancouver. *Public Health*, 122(1), 70–78. doi:10.1016/j.puhe.2007.02.016 [PubMed: 17645904]
- Fischer B, Medved W, Gliksman L, & Rehm J (1999). Illicit opiates in Toronto: A profile of current users. *Addiction Research & Theory*, 7 (5), 377–415. doi:10.3109/16066359909004395
- Fitzgerald JL (2009). Mapping the experience of drug dealing risk environments: An ethnographic case study. *International Journal of Drug Policy*, 20(3), 261–269. doi:10.1016/j.drugpo.2008.10.002 [PubMed: 19171472]
- Frajzyngier V, Neaigus A, Gyarmathy VA, Miller M, & Friedman SR (2007). Gender differences in injection risk behaviors at the first injection episode. *Drug and Alcohol Dependence*, 89(2–3), 145–152. doi:10.1016/j.drugalcdep.2006.12.021 [PubMed: 17276623]
- Friedman SR, Furst RT, Jose B, Curtis R, Neaigus A, Jarlais DCD, ... Ildefons G (1998). Drug scene roles and HIV risk. *Addiction*, 93(9), 1403–1416. doi:10.1046/j.1360-0443.1998.939140311.x [PubMed: 9926546]
- Friedman SR, Kang S-Y, Deren S, Robles R, Colón HM, Andia J, ... Finlinson A (2002). Drug-scene roles and HIV risk among Puerto Rican injection drug users in East Harlem, New York and Bayamón, Puerto Rico. *Journal of Psychoactive Drugs*, 34(4), 363–369. doi:10.1080/02791072.2002.10399977 [PubMed: 12562104]
- Galea S, Ahern J, & Vlahov D (2003). Contextual determinants of drug use risk behavior: A theoretic framework. *Journal of Urban Health : Bulletin of the New York Academy of Medicine*, 80(Suppl 3), iii50–iii58. doi:10.1093/jurban/jtg082 [PubMed: 14713671]
- Hammersley R, Forsyth A, Morrison V, & Davies JB (1989). The relationship between crime and opioid use. *British Journal of Addiction*, 84(9), 1029–1043. doi:10.1111/j.1360-0443.1989.tb00786.x [PubMed: 2790266]
- Hutchinson SJ, Gore SM, Taylor A, Goldberg DJ, & Frischer M (2000). Extent and contributing factors of drug expenditure of injectors in Glasgow. *The British Journal of Psychiatry*, 176(2), 166–172. doi:10.1192/bjp.176.2.166 [PubMed: 10755055]
- Johnson BD (2003). Patterns of drug distribution: Implications and issues. *Substance Use & Misuse*, 38(11–13), 1789–1806. doi:10.1081/JA-120024241 [PubMed: 14582578]
- Kerr T, Fast D, Small W, & Wood E (2009). “Coming “Down Here.” *Social Science & Medicine* (1982), 69(8), 1204–1210. doi:10.1016/j.socscimed.2009.07.024 [PubMed: 19700232]
- Kerr T, Small W, Johnston C, Li K, Montaner JSG, & Wood E (2008). Characteristics of injection drug users who participate in drug dealing: Implications for drug policy. *Journal of Psychoactive Drugs*, 40 (2), 147–152. doi:10.1080/02791072.2008.10400624 [PubMed: 18720663]
- Kerr T, Small W, & Wood E (2005). The public health and social impacts of drug market enforcement: A review of the evidence. *International Journal of Drug Policy*, 16(4), 210–220. doi:10.1016/j.drugpo.2005.04.005
- Long C, DeBeck K, Feng C, Montaner J, Wood E, & Kerr T (2014). Income level and drug related harm among people who use injection drugs in a Canadian setting. *International Journal of Drug Policy*, 25(3), 458–464. doi:10.1016/j.drugpo.2013.11.011 [PubMed: 24380808]
- Ezzati Majid, Lopez Alan D., Rodgers Anthony, & Murray Christopher J. L. (2004). Comparative Quantification of Health Risks: GLobal and Regional Burden of Disease Attributable to Selected Major Risk Factors
- Mateu-Gelabert P, Harris S, Berbesi D, Cardona ÁMS, Vélez LPM, Motta IEM, ... Friedman SR (2016). Heroin use and injection risk behaviors in Colombia: Implications for HIV/AIDS prevention. *Substance Use & Misuse*, 1–11. doi:10.3109/10826084.2015.1092989

- Mathers BM, Degenhardt L, Phillips B, Wiessing L, Hickman M, Strathdee SA, ... Mattick RP (2008). Global epidemiology of injecting drug use and HIV among people who inject drugs: A systematic review. *The Lancet*, 372(9651), 1733–1745. doi:10.1016/S0140-6736(08)61311-2
- McCreesh N, Copas A, Seeley J, Johnston LG, Sonnenberg P, Hayes RJ, ... White RG (2013). Respondent driven sampling: Determinants of recruitment and a method to improve point estimation. *PLoS ONE*, 8(10). doi:10.1371/journal.pone.0078402
- Mejía IE, & Gómez AP (2005). La inyección de drogas en Bogotá: una amenaza creciente. *Adicciones*, 17(3), 251–260.
- Nelson PK, Mathers BM, Cowie B, Hagan H, Des Jarlais D, Horyniak D, & Degenhardt L (2011). Global epidemiology of hepatitis B and hepatitis C in people who inject drugs: Results of systematic reviews. *The Lancet*, 378(9791), 571–583. doi:10.1016/S0140-6736(11)61097-0
- Nurco DN (1987). Drug Addiction and Crime: a complicated issue. *British Journal of Addiction*, 82(1), 7–9. doi:10.1111/j.1360-0443.1987.tb01427.x [PubMed: 3470045]
- PAHO. (2009). Epidemiología del uso de drogas en América Latina y el Caribe: Un enfoque de salud pública.
- Perez A (2010). Heroína: Consumo, tratamiento y su relacion con el microtrafico en Bogota y Medellin. Corporacion Nuevos Rumbos Retrieved from <http://nuevosrumbos.org/documentos/El%20consumo%20de%20heroína%20Bogotá%20y%20Medellin.pdf>
- Quintero J (2012). Bogotá's medical care centres for drug addicts (CAMAD). Series on Legislative Reform of Drug Policies No. 22 Amsterdam: Transnational Institute.
- Rhodes T (2002). The “risk environment”: a framework for understanding and reducing drug-related harm. *International Journal of Drug Policy*, 13(2), 85–94. doi:10.1016/S0955-3959(02)00007-5
- Richard H, & Needle DB (2005). Effectiveness of community-based out-reach in preventing HIV/AIDS among injecting drug users. *International Journal of Drug Policy*, 16, 45–57. doi:10.1016/j.drugpo.2005.02.009
- Richardson L, Wood E, Li K, & Kerr T (2010). Factors associated with employment among a cohort of injection drug users. *Drug and Alcohol Review*, 29(3), 293–300. doi:10.1111/j.1465-3362.2009.00141.x [PubMed: 20565522]
- Robles RR, Reyes JC, Colón HM, Sahai H, Marrero CA, Matos TD, ... Shepard EW (2004). Effects of combined counseling and case management to reduce HIV risk behaviors among Hispanic drug injectors in Puerto Rico: A randomized controlled study. *Journal of Substance Abuse Treatment*, 27(2), 145–152. doi:10.1016/j.jsat.2004.06.004 [PubMed: 15450647]
- Sherman SG, & Latkin CA (2002). Drug users' involvement in the drug economy: Implications for harm reduction and HIV prevention programs. *Journal of Urban Health : Bulletin of the New York Academy of Medicine*, 79(2), 266–277. doi:10.1093/jurban/79.2.266 [PubMed: 12023502]
- Small W, Maher L, Lawlor J, Wood E, Shannon K, & Kerr T (2013). Injection drug users' involvement in drug dealing in the downtown eastside of Vancouver: Social organization and systemic violence. *International Journal of Drug Policy*, 24(5), 479–487. doi:10.1016/j.drugpo.2013.03.006 [PubMed: 23664788]
- Soto I, Ramirez C, & Alzate JD (2007). El desempleo, Prioridad de la politica publica Universidad de Manizales Retrieved from http://www.umanizales.edu.co/u/servicios/observatorio/archivos/publicaciones/desempleo_prioridad_politica.pdf
- Substance Abuse and Mental Health Services Administration. (2010). Results from the 2009 National Survey on Drug Use and Health (NSDUH): Volume I Summary of National Findings U.S. Department of Health and Human Services.
- Ti L, Richardson L, DeBeck K, Nguyen P, Montaner J, Wood E, & Kerr T (2014). The impact of engagement in street-based income generation activities on stimulant drug use cessation among people who inject drugs. *Drug and Alcohol Dependence*, 141, 58–64. doi:10.1016/j.drugalcdep.2014.05.003 [PubMed: 24909853]
- Tyndall MW, Currie S, Spittal P, Li K, Wood E, O'Shaughnessy MV, & Schechter MT (2003). Intensive injection cocaine use as the primary risk factor in the Vancouver HIV-1 epidemic. *AIDS (London, England)*, 17(6), 887–893. doi:10.1097/01.aids.0000050859.71999.ae
- UNAIDS. (2006, 5). Report on the Global AIDS epidemic: executive summary. Joint United Nations Programme on HIV/AIDS

- UNODC Colombia. (2015). Colombia: Monitoreo de Cultivos de COCA 2014 Retrieved from <http://www.odc.gov.co/Portals/1/publicaciones/pdf/CO032052015-informe-monitoreo-cultivos-coca-2014.pdf>
- Werb D, Kerr T, Li K, Montaner J, & Wood E (2008). Risks surrounding drug trade involvement among street-involved youth. *The American Journal of Drug and Alcohol Abuse*, 34(6), 810–820. doi:10.1080/00952990802491589 [PubMed: 19016187]
- White RG, Hakim AJ, Salganik MJ, Spiller MW, Johnston LG, Kerr L, ... Hladik W (2015). Strengthening the reporting of observational studies in epidemiology for respondent-driven sampling studies: “STROBE-RDS” statement. *Journal of Clinical Epidemiology*, 68 (12), 1463–1471. doi:10.1016/j.jclinepi.2015.04.002 [PubMed: 26112433]
- Wood E, Spittal PM, Small W, Kerr T, Li K, Hogg RS, ... Schechter MT (2004). Displacement of Canada’s largest public illicit drug market in response to a police crackdown. *Canadian Medical Association Journal*, 170(10), 1551–1556. doi:10.1503/cmaj.1031928 [PubMed: 15136548]

Recruitment waves needed for reaching sample equilibrium for key demographics, median network size, and network member range on each city.

Table 1.

Demographic characteristics	CITY				
	Armenia	Bogota	Cucuta	Medellin	Pereira
Recruitment waves needed for reaching sample equilibrium					
Age	3	2	3	3	3
Gender	2	2	2	2	4
Education	3	3	3	3	2
Civil status	2	3	2	2	4
Socioeconomic status	3	3	2	2	2
Total participants	8	10	9	8	7
Number of participants (% of total sample)	265 (22.8)	193 (17.4)	210 (19.4)	205 (19)	250 (21.5)
Median network size	55	5	10	37	18
Network member range	3–200	2–20	3–50	5–100	5–100

Table 2.

Background sociodemographic characteristics of the sample.

Sociodemographic characteristic	n	%
Age		
Mean	26	–
Median	25	–
Minimum	18	–
Maximum	59	–
Gender		
Male	965	85.9
Female	152	13.5
Transsexual	1	0.1
Socioeconomic status (SES)		
Low	745	66.3
Middle	338	30.1
High	37	3.3
Education		
Primary school (initiated or completed)	98	8.7
Secondary school initiated or completed)	747	66.5
University (initiated or completed)	259	23.1
None	10	0.9

Table 3.

Bivariate and multivariate analyses.

Involvement in drug dealing													
		Yes		No									
		n	%	n	%	Crude OR	CI 95%	p	Adjusted OR	CI 95%	p		
Sociodemographic													
Familial socioeconomic status	Low	401	64.7	329	69.1	1.2	0.9–1.5	0.12	1.07	0.7–1.4	0.63		
	Middle - high	219	35.3	147	30.9	1.0							
Drug-dealing, robbery or other Illegal activity as primary income source	Yes	53	8.5	14	2.9	3.0	1.6–5.6	<0.001	3.2	1.5–6.8	<0.001		
	No	567	91.5	461	97.1	1.0							
Injection risk behaviors													
During the last six months													
Daily injection rate	4	286	47.2	172	36.8	1.5	1.2–1.9	<0.001	1.3	1.0–1.7	0.04		
	1–3	320	63.2	296	52.8	1.0							
Obtained new syringes or needless from a drug dealer	Yes	53	8.5	14	2.9	3.5	1.0–12.4	0.04	3.3	0.7–15.8	0.12		
	No	567	91.5	461	97.1	1.0							
Gave or sold used syringe	Yes	332	53.4	197	41.3	1.6	1.2–2.0	<0.001	1.4	1.0–1.9	0.02		
	No	290	46.6	280	58.7	1.0							
Injection equipment was confiscated by police or by any other authority	Yes	362	62.0	234	53.5	1.4	1.1–1.8	<0.001	1.4	1.0–1.8	0.02		
	No	222	38.0	203	46.5	1.0			1.0				
During last injection													
Shared Syringes	Yes	16	2.7	5	1.1	2.5	0.9–6.8	0.07	1.4	0.4–5.0	0.54		
	No	569	97.3	446	98.9	1.0			1.0				
Shared Paraphernalia	Yes	315	51.1	210	44.7	1.29	1.0–1.6	0.03	1.0	0.7–1.4	0.76		
	No	301	48.9	260	55.3	1.0			1.0				
Injected another person	Yes	35	6.0	13	2.9	2.1	1.1–4.1	0.02	1.2	0.6–2.6	0.51		
	No	550	94.0	439	97.1	1.0			1.0				
Self-paid for injected drug	Yes	445	76.1	373	82.5	0.6	0.4–0.9	0.01	0.6	0.4–0.9	0.01		
	No	140	23.9	79	17.5	1.0			1.0				
Used encapsulated drug or ready for injection vial	Yes	33	5.6	16	3.5	1.6	0.8–2.9	0.11	1.5	0.7–3.2	0.20		
	No	552	94.4	436	96.5	1.0			1.0				

	<u>Involvement in drug dealing</u>										
	<u>Yes</u>				<u>No</u>				Adjusted OR	CI 95%	p
	n	%	n	%							
Injection related harms											
Has ever suffered heroin or opium overdose	Yes	237	39.2	140	30.5	1.4	1.1–1.9	<0.001	1.4	1.1–2.0	0.01
	No	367	60.8	321	69.6	1.0			1.0		
Has ever known someone who died from drug overdose	Yes	450	73.9	305	66.0	1.5	1.1–1.8	<0.001	1.2	0.8–1.6	0.20
	No	159	26.1	157	34.0	1.0			1.0		