Injecting drug use among young people – risk, harm and factors affecting access to services: a systematic review of the evidence

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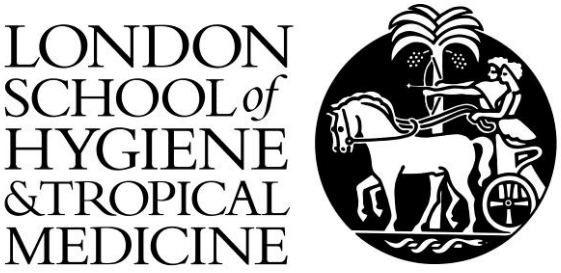

List of abbreviations

BBV	Blood borne virus
CI	Confidence Interval
CINAHL	Cumulative Index to Nursing and Allied Health Literature
EMBASE	Database of International Biomedical Literature
HBV	Hepatitis B virus
HCV	Hepatitis C virus
IBSS	International Bibliography of the Social Sciences
ID	Identification document
MEDLINE	National Library of Medicine's bibliographic database
NSP	Needle and syringe programme
OST	Opiate Substitution Therapy
OR	Odds Ratio
PDI	Peer Driven Intervention
PIED	Performance and image enhancing drugs
PWID	People who inject drugs
RDS	Respondent Driven Sampling
YP	Young person

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EXECUTIVE SUMMARY

1. Aim

1.1 Quantitative Review of Evidence

Aware that published evidence and policy documents on Needle Syringe Programme (NSP) provision to those under 18 is limited, we conducted a systematic review of published and unpublished literature to delineate the profile and key risk behaviours among young people who inject drugs (PWID) to draw out their implications on NSP provision. The research questions framing the review of quantitative evidence are:

Question 1: How do the key harms associated with injecting drug use among PWID under 18 differ to older populations among people who inject drugs?

Question 2: What is the level and uptake of health services including NSPs among young PWID?

Question 3: What are the barriers to service use among young PWID?

1.2 Qualitative Review of Evidence

The aim of this evidence review is to understand the factors that may influence needle and syringe service access among young people who inject drugs. We analysed the reported social meanings, experiences and perspectives of young PWID and the social and environmental factors shaping these, in order to identify key themes with implications for service access. The primary research questions were:

Question 1: What are the social factors shaping patterns of use, perceptions of risk, harm, benefit and pleasure, and help-seeking (especially NSP) among young people who use drugs?

Question 2: What are the implications of the above for future provision and delivery of NSP and linked harm reduction services?

Question 3: What are the processes though which youth influences drug use and injecting risk behaviours and other harms associated with injecting drug use as well as use of needle/syringe programmes and other strategies to manage risks?

2. Methods

A search of electronic bibliographic databases, grey literature, manual searches of key journals and a call for evidence from experts in the field, were used to identify empirical qualitative and quantitative research literature. Studies in English, from 1990-present and based in North America, Australia and Europe were included. Only studies specifically reporting data concerning young people who inject drugs were included.

Each document was assessed for quality, rigour and credibility using a quality appraisal checklist adapted from the NICE public health methods manual (2012) and the Critical Appraisal Skills Programme (CASP) checklist. Each study was rated ('++', '+' or '−') to indicate its quality:

++ All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter.

+ Some of the checklist criteria have been fulfilled, where they have not been fulfilled, or not adequately described, the conclusions are unlikely to alter.

– Few or no checklist criteria have been fulfilled and the conclusions are likely or very likely to alter.

We included all studies meeting our inclusion criteria, however the quality score (Good (++), Average (+), Poor (-)) was taken into consideration in the interpretation of data.

Additional inclusion criteria for quantitative studies included studies examining associations between PWID aged 18 years or less and any of the following outcomes: prevalence/incidence of HIV, HCV, HBV, sexually transmitted infections, bacterial infections, injecting risk behaviours, sexual risk behaviours, use of treatment/ health services including NSPs, poly-drug use, experience of violence, contact with the police, homelessness, vulnerability, living in care and substance misuse of parents.

For each included study, details were extracted by one reviewer (LP) and checked by another (BM). For the quantitative literature, we extracted data on demographic characteristics, sexual and injecting risk behaviours, access to services and social factors associated with increased vulnerability. We compared differences in behaviours by age. We summarised factors associated with the following additional outcomes: infection with HIV or Hepatitis C injecting with used needle/syringes; non-condom use; and access to services. We identified studies that evaluated services for young people injecting drugs to assess the impact on the same outcomes.

The qualitative literature was analyzed using a thematic approach, reading across studies to generate key themes that might influence service access. All papers were read and reviewed by one reviewer (BM) and checked by another (TR) and the key concepts and themes recorded.

In both reviews, contextual details regarding study setting, participants, study design and data collection and analysis methods, were also recorded to aid our understanding of interpretations.

3. Key findings from the quantitative and qualitative reviews

Quantitative review

Twenty six studies were included in the review. We limited studies to include only those from high-income countries to increase comparability with England, although some countries were included that were more comparable to England in relation to harm reduction policies and epidemiology of drug use such as Canada, Ireland and Australia than others including Ukraine, USA, Serbia, Moldova, Albania and Romania. The USA was the most frequently represented country (13), followed by Canada (6) and Ireland (3). Two studies were identified from Australia and Ukraine and one study in Eastern Europe recruited samples from Serbia, Moldova, Albania and Romania.

The evidence highlighted some key differences between younger and older PWID. The review of the quantitative literature highlighted that a substantial proportion of young PWID are homeless (up to 70% in some studies) and this is between 2 to 3 times more frequent than among older populations. The evidence suggests that females represent a large proportion of young PWID (over a third in some samples) and this is consistently higher than in older populations. Over a third of young PWID reported being injecting by someone else, considerably higher than among older populations. One study noted increased odds of hepatitis C (OR=4.1) if they were initiated into injecting by a sex partner

Little difference in experience of prison or arrest was observed by age. Evidence suggests that in some places over a third of young PWID have often experienced prison and arrest. There were few differences in injecting risk behaviours between older and younger populations observed. We found a close link between injecting drug use and sex work among young PWID with up to 44% engaging in sex work in some locations, though inconsistent evidence whether this occurred more often among younger than older populations. Similarly, sexual risk behaviours did not differ by age, with up to 60% of young PWID reporting unprotected sex in Ireland and Australia.

Evidence from Australia suggested that young PWID (mean age 16 years) had higher odds (OR=2.81) of sharing injecting equipment when injecting with a sex partner compared to those who did not. The review also highlighted the effect of prison and policing on injecting risk behaviours. In Eastern Europe young PWID who had shared needles/syringe had increased odds of being in prison in Moldova (OR=4.6) and Romania (OR=2.8) and experiencing police harassment (OR=3.2) compared to those who had not shared.

Some studies noted additional risk associated with being female. In Moldova odds of sharing needles/syringes was higher among females (OR=4.4), as was HIV infection in Vancouver (odds ratio was not reported). A study of female sex workers who inject drugs in Vancouver indicated that younger women had increased odds of being homeless (OR=1.3), injecting heroin daily (OR=1.3) as well as reduced access to methadone maintenance services (OR=0.72) compared to older women.

Evidence from Eastern Europe suggests that young PWID more frequently use pharmacies than needle/syringe programmes to obtain clean needle/syringes. Evidence also points to the protective effect of using pharmacies and/or NSPs to obtain clean needles compared to informal sources (e.g. friends) in reducing odds of sharing of needles/syringes in Romania (OR=0.18), Moldova (OR=0.33) and Serbia (OR=0.28). We found that fewer young PWID had experience of drug treatment than older populations, of less than half.

Evaluation of NSPs in the US suggest that PWID attending an NSP had reduced odds of injecting with a used needle/syringe (OR=0.61; 0.48; 0.32) and injected with fewer people (OR=0.33). One study suggested that attending more than once a month was associated with a reduction in injecting risk behaviours. Evidence from two evaluations of outreach based interventions with provision of NSP to homeless populations was associated with less sharing of needles/syringes for injection. There is some evidence from Ukraine that peer interventions increase use of harm reduction services and reduce injecting risk behaviours.

Findings suggest that interventions specifically need to target multiple vulnerabilities experienced by young PWID including homelessness and sex work, and that they specifically need to consider young girls who inject. The review found some evidence to suggest that NSPs are effective in reducing needle/syringe sharing among young PWID and that there is a positive impact of targeting interventions for homeless populations.

Qualitative Synthesis

Evidence from 25 qualitative studies of young people who inject drugs and street involved youth was analysed in this synthesis. The majority of the reviewed studies were from high-income countries with comparable harm reduction policies and epidemiology of drug use to the UK: Canada (9) Australia (3), Ireland (1), and UK (3). However, nine reviewed studies were conducted in; USA (4) and Central and Eastern Europe (5), and may be less applicable to the UK context. In terms of applicability of the evidence to present circumstances; all studies were conducted since the year 2000, and the majority since 2005, with the exception of one conducted in 1995 and one in 1999.

Six themes emerged: Young people positioning themselves as distinct from older PWID; initiation into injecting; drug use as a function of belonging and peer relationships; trust and mistrust linked to drug using others and services; barriers and facilitators of service use; and environmental constraints to enacting risk awareness.

Young people distinguished themselves from older and more experienced PWID, with potential implications for the self-identification with harm reduction services and the perceived applicability of services. Young people initiated injecting with varying degrees of choice; however injecting equipment was commonly provided by the initiator. Prolonged requirement for assistance with injecting was also documented. These factors may reduce the capacity by which young people can enact harm reduction practices.

Experiences of stigma and discrimination were common and could impact on trust in services. Additional barriers to service access included structural barriers (e.g. location, opening hours) and the wish to avoid authorities or other service users. Facilitators of service access included providing a comprehensive service with trusted staff. Despite a general awareness of the risk of sharing needles, constraints to enacting risk awareness were documented. Sharing equipment within trusted relationships, limits to knowledge regarding transmission, managing everyday concerns, and a perceived inevitability of infection by some, could limit risk reduction practices. Finally, the role of peers was considered in many studies. Contrasting experiences of wanting to belong versus feeling isolated, and perhaps an evolving picture of social versus individualistic drug use, emerged. The analyses stress the importance of a case-by-case approach to addressing the needs of individual young PWID and in understanding the context of their drug use.

Evidence statements

Quantitative Synthesis

Evidence statement 1: Demographic differences by sex

Studies defined younger age of PWID inconsistently: <=15 [1] <=17 [2 3] <18[4] <=23[5] <=24 [6 7] <=25 [8] <=29 [9] <30 [10] and two studies compared a mean age of 23 [11] and median of 18 years[12] with older populations.

[1] Chan et al, 2011 [CS +, USA]
[2] Busza et al, 2013 [CS ++, Romania]
[3] Smyth et al, 2004 [CS + ,Ireland
[4] Hadland et al, 2008 [Cohort ++, USA]
[5] Loxley et al, 1997 [CS +, Australia]
[6] Miller, 2002 [Cohort ++, Canada]
[7] Miller, 2011 [Cohort ++, USA]
[8] Cassin [CS +, Ireland]
[9] Miller, 2007 [Cohort ++, Canada]
[10] Kral et al, 2000 [CS ++, USA]
[11] Diaz et al, 2001[CS +, USA]
[12] Mullen et al, 2003 [CS ++, Ireland]

Evidence statement 2: Differences in homelessness by age

There is strong evidence to suggest that substantial proportion of young PWID are homeless and that homelessness is 2-3 times more common among younger than older populations.[1 2 3 4 5] In the US, 76% of young PWID (median age 23 years) had ever been homeless compared to 41% of their older peers (p=0.001); [1] and in Ireland 6.5% of a sample of adolescent PWID (<=17 years) had been homeless in the last 6 months compared to 1% of adults in the same sample. [4] In Canada multivariate analyses indicated that younger age (<=29 years and <=24 years) was a predictor of homelessness among PWID (n=1598, OR=1.11 95% CI 1.02-1.20) and female sex workers injecting drugs (n=255, OR=1.26, 95% CI 1.07-1.48). [2 3] Interventions need to consider multiple vulnerabilities experience by young PWID including homelessness.

[1]Diaz et al, 2001[CS +, USA]
[2]Miller, 2007 [Cohort ++, Canada]
[3]Miller, 2011 [Cohort ++, Canada]
[4]Smyth et al, 2004 [CS +, Ireland
[5] Loxley et al, 1997 [CS +, Australia]

Evidence statement 3: Differences in experience of prison and policing by age

There is strong evidence to show that a high proportion of young PWID have experienced prison [1 2 3] and been stopped by the police. [1 4] In Moldova 2.9% of young (15-17 years) PWID had ever been in prison, in the US 15% of a sample with a median age of 23 years and in Canada 37% of those aged 29 year or less had been in prison. [1 2 3] In the US, 76% of young PWID (<30 years) had been

stopped by the police in the last year and 37% of a sample of 15-27 year olds in Moldova. [1] [4] These experiences did not differ consistently by age.

[1] Busza et al, 2013 [CS ++, Moldova]
[2] Miller, 2007 [Cohort ++, USA]
[3] Diaz et al, 2001[CS +, USA]
[4] Kral et al, 2000 [CS ++, USA]

Evidence statement 4: Impact of prison and arrest

There is strong evidence from Eastern Europe indicating that young PWID (15-24 years) who had been in prison had increased odds of sharing needles/syringes of 4.6 (95% CI 1.69-12.4) in Moldova and 2.8 (95% CI 1.42-5.55) in Romania. Police harassment was also associated with increased odds of sharing needles/syringe in Romania (OR=3.17 95% CI 1.22-8.19). [1]

[1] Busza et al, 2013 [CS ++, Moldova, Romania]

Evidence statement 5: Prevalence of injecting risk behaviours

There is strong evidence to suggest that more than 25% of young PWID inject with a used needle/syringe. [1] [2] [3] [4] [5] [6] In Ireland among a sample aged less than 25 years, 56% reported ever sharing needles/syringes. [5] In San Francisco 52% of young PWID (less than 30 years) reported this behaviour in the last month. [8] In the US 37% of young PWID aged between 12 and 18 years had ever injected with a used needle/syringe and in Moldova 13% of a similar age range (15-17 years) had shared injecting equipment in the last month. [5] [6] High prevalence (39%) of sharing needles/syringes (time frame not specified) were reported in Dublin among young PWID (median age 18) and 31% in New York (median age 23). [1] [6]

[1] Diaz et al, 2001 [CS +, USA]
[2] Miller, 2002 [Cohort ++, Canada]
[3] Miller, 2007 [Cohort ++, Canada]
[4] Cassin [CS +, Ireland]
[5] Busza et al, 2013 [CS ++, Moldova]
[6] Chan et al, 2011[CS +, USA]
[7] Kral et al, 2000 [CS ++, USA]

Evidence statement 6: Differences in injecting risks by age

The majority of studies suggested no difference in injecting risk behaviours by age. [1] [2] [3] [4] [5] However there is moderate evidence from a study in the US that compared differences in risk between 12-15 and 16-18 year olds. Among the younger group, 37% had ever injected with a used needle compared to 45% of their older peers. Among the younger group 26% reused a needle compared to 45% of older group, suggesting injecting risk increased with age among this very young population. [6] Overall, there is strong evidence that younger PWID more consistently reported being injected by someone else compared to their older counterparts. [2] [3] [4] [7]

[1] Diaz et al, 2001 [CS +, USA]

[2] Miller, 2002 [Cohort ++, Canada]
[3] Miller, 2007 [Cohort ++, Canada]
[4] Cassin [CS +, Ireland]
[5] Busza et al, 2013 [CS ++, Moldova]
[6] Chan et al, 2011[CS +, USA]
[7] Kral et al, 2000 [CS ++, USA]

Evidence statement 7: Sex Work

There is strong evidence to show that many young PWID engage in sex work ranging from 11% to 44% in the US, Canada and Romania. [1 2 3 4 5] Two studies of young PWID in Canada (<=29 years, <=24 years) suggested that proportionally more young PWID were engaged in sex work [2 3] than older peers, though this was not consistent in studies in the US and Romania. [1 4 5]

[1] Diaz et al, 2001 [CS +, USA]
[2] Miller, 2002 [Cohort ++, Canada]
[3] Miller, 2007 [Cohort ++, Canada]
[4] Busza et al, 2013 [CS ++, Romania]
[5] Kral et al, 2000 [CS ++, USA]

Evidence statement 8: Sexual risk behaviours

There is inconsistent evidence that younger PWID were less likely to use condoms compared to their older peers, [1 2 3 5 6 7 8] In Ireland, 61% of a sample of young PWID (median age 18 years) reported never using a condom[6].

[1] Diaz et al, 2001 [CS +, USA]
[2] Miller, 2002 [Cohort ++, Canada]
[3] Miller, 2007 [Cohort ++, Canada]
[4] Busza et al, 2013 [CS ++, Romania]
[5] Kral et al, 2000 [CS ++, USA]
[6] Mullen et al, 2003 [CS ++ Ireland]
[7] Loxley et al, 1997 [CS + Australia]
[8] Cassin [CS +, Ireland]

Evidence statement 9: Risk associated with having a sex partner who injects

There is moderate evidence from Ireland that a large proportion of young PWID (<25 years) had sex partners who also injected drugs. [1] There is moderate evidence from the US to indicate that young PWID (median age 22 years) had higher odds of infection with Hepatitis C (OR=4.06, 95% CI=1.74-9.52) if they were initiated into injecting by a sex partner. [2] There is good evidence from Australia to suggest that young PWID (mean age 16 years) had higher odds (OR=2.81, 95% CI=1.28-6.20) of sharing injecting equipment when injecting with a sex partner. [3]

[1] Cassin [CS +, Ireland]
[2] Hahn et al, 2001 [CS +, USA]
[3] Dean et al, 2010 [CS ++, Australia]

Evidence statement 10: Differences by sex and increased risk among female PWID

Overall there is strong evidence to suggest that proportionally more younger PWID are female compared to their older counterparts.[1 2 3 4 5] Younger age (<=29 years) in a sample of PWID in Vancouver (n=1598) was positively associated with being female (OR=2.0, 95% CI 1.66-2.51). [6] In Moldova increased risk of sharing needles/syringes in the last 4 weeks among 15-24 year olds were higher among female PWID (OR=4.04, 95% CI 1.93-12.87) than males. [2] Among a sample of female sex workers who inject drugs in Vancouver (n=255), younger age (<=24 years) was positively associated with frequent heroin injection (OR=1.35, 95% CI 1.06-1.74); being homeless (OR=1.26, 95% CI 1.07-1.48) and inversely associated with receiving methadone maintenance (OR=0.72, 95% CI 0.62-0.93). [6] Evidence from Vancouver suggested that HIV positivity was significantly associated with being female, among 23 cases of HIV, 20 cases were among female PWID (<=24 years). [7]

[1] Chan et al, 2011 [CS +,USA]
[2] Busza et al, 2013 [CS ++, Romania]
[3] Smyth et al, 2004 [CS +, Ireland
[4] Hadland et al, 2008 [Cohort ++, USA]
[5] Loxley et al, 1997 [CS +, Australia]
[6] Miller, 2007 [Cohort ++, Canada]
[7] Miller, 2002 [Cohort ++, Canada]

Evidence statement 11: Uptake and access to clean needle/syringes

There is strong evidence to indicate a wide variation in use of NSPs for clean needles/syringes ranging from 11% in Moldova among young PWID (15-17 years) [1] and 31% among young PWID (mean age 23 years) to 25% (15-30 years) and 47% (mean age 26 years) in the USA. [2 3 4]

[1] Busza et al, 2013 [CS ++, Moldova]
[2] Diaz et al, 2001 [CS +, USA]
[3] Cronquist et al, 2001[CS ++, USA]
[4] Sherman et al, 2004 [CS ++, USA

Evidence statement 12: Factors associated with use of NSPs among young PWID

There is strong evidence from a study of young PWID (15-30 years) to suggest that use of NSP or pharmacy to obtain clean needles/syringes increased among those who had injected longer than 2 years (OR=2.43, 95% CI 1.23-4.81), who had more education (OR=2.17, 95% CI 1.10-4.28), who were of white/Caucasian ethnicity (OR=3.20, 95% CI 1.36-7.51) and who safely disposed of their equipment (OR=2.28, 95% CI 1.20-4.37). [1]

[1] Sherman et al, 2004 [CS ++, USA]

Evidence statement 13: Factors associated with use of NSPs among young PWID

There is moderate evidence from another US study that younger age (19-25) was associated with inadequate syringe coverage (OR= 6.3, 95% CI 1.2-32.0) compared to those aged >45 years (1.0). Other factors associated with inadequate coverage included being homeless (OR=1.6 1.0-2.5), being male (OR=1.6, 1.0-2.6), injecting in a public place (OR=1.9, 1.2-3.0) and ethnicity Black/African American (OR=3.0, 1.5-6.2) or Latino/Hispanic (OR=2.5, 1.3-4.8) compared to being

white/Caucasian. Inadequate coverage was defined as obtaining fewer needles/syringes than numbers of times injected in the last month. [1]

[1] Heller et al, 2009 [CS +, USA]

Evidence statement 14: Use of pharmacies

There is evidence from Eastern Europe to suggest that young PWID use pharmacies more than NSPs and that use of pharmacies or NSPs rather than informal sources is associated with reduced odds of sharing injecting equipment (Romania OR=0.18, 95% CI 0.68-0.49; Moldova: OR=0.33, 95% CI 0.12-0.93; Serbia: OR=0.28, 95% CI 0.10-0.81). [1]

[1] Busza et al, 2013 [CS ++, Moldova]

Evidence statement 15: Uptake and access to drug treatment

There is strong evidence to suggest that proportionally fewer younger PWID are in drug treatment compared to older populations within the same sample. [1 2 3] In Canada 68% of PWID <=29 years compared to 78% of those older than 30 years had used some form of drug treatment and more younger PWID (23%) reported being denied treatment compared to their older counterparts (18%). [2] In the US, none of a younger sample (<30 years) were currently in drug treatment compared to 17% of the older sample. [3] In Australia 24% of younger PWID (<=23 years) compared to 51% of older PWID were currently receiving drug treatment. [1] There was no difference in attempts to access services between those aged less than 18 years compared to those older from another study in Canada of street involved youth using illicit drugs. [4] Overall in this sample (aged 14-26 years) 32% had attempted to access a drug or alcohol service in the last 6 months.

[1] Loxley et al, 1997 [CS +, Australia]
[2] Miller, 2007 [Cohort ++, Canada]
[3] Kral et al, 2000[CS ++, USA]
[4] Hadland et al, 2009 [Cohort ++, Canada]

Evidence statement 16: Factors associated with access to drug treatment

There is evidence from two studies (++) to suggest that the most vulnerable populations use drug treatment services and age is not associated with use of services. In Canada a study of street involved youth using illicit drugs (median age 22 years) suggested that the most marginalised populations had increased odds of accessing services including those of aboriginal origin (OR=1.66, 95% CI 1.05-2.62), with a history of mental illness (OR=2.25, 95% CI 1.50-3.38), history of sex work in the last 6 months (OR=1.59, 95% CI 0.88-2.88); using crack (OR=2.93, 95% CI 1.76-4.89), bingeing on drugs (OR=1.03, 95% CI 0.64-1.66); and a history of mental illness. [1] Again in Canada a study of a similar population suggested that those who had been in prison (OR=1.04, 1.33-3.14), used crack (OR=2.1, 95% CI 1.35-3.13), or who had injected (OR=1.58, 95% CI 1.0-2.51) had increased odds of using the drug and alcohol service. [2]

[1] Hadland et al, 2009 [Cohort ++, Canada]
[2] Wong et al; 2009 [CS ++, Canada]

Evidence statement 17: Evaluation of NSPs for young people

There is moderate evidence to suggest young PWID (13-25 years) attending NSPs have reduced odds of injecting with a used needle/syringe and shared with fewer partners. [1 2 3] One study in the US of young PWID (mean 20 years) found that NSP attendees had fewer partners with whom they shared a needle/syringe in the last week (>1 vs. <=1) (0.33, 95% CI 0.14-0.78). Young PWID who used the NSP had reduced odds of sharing needle/syringes in the past 30 days (OR=0.61, 95% CI 0.29-1.26); sharing rinse water (OR=0.59, 95% CI 0.27-1.30); and injection by another person (OR=0.62, 95% CI 0.30-1.28). [1] A study among a small population of young PWID (16-24 years) suggested that factors associated with NSP use included: reduced odds of sharing needles (OR=0.48, 95% CI 0.24,0.98); sharing paraphernalia (OR=0.53, 95% CI 0.28-0.99); use of another drug to come down (OR=0.31, 95% CI 1.09, 3.63); using a dirty needle when high (OR=0.27, 0.13-0.56); using a dirty needle when craving drugs (OR=0.41, 95% CI 0.22-0.77). [2]A larger study of an older population (18 to 30 years) suggested that more frequent attendance at an NSP (at least once a month) was associated with reduced odds of ever sharing syringes (OR=0.32, 95% CI 0.19-0.54); sharing cookers, cotton, water (OR=0.51, 95% CI 0.30-0.85); backloading [1] (0.39, 95% CI 0.19-0.81); reusing a needle for injection (OR=0.25, 95% CI 0.13-0.45) and increased odds of always using a condom with a steady sex partner (OR=2.95, 95% CI 1.56-5.56). Attending the NSP less frequently (less than once a month) was not associated with a reduction in risk suggesting that more frequent attendance is needed in order for the NSP to have an effect on risk behaviours. [3]

[1] Guydish et al, 2000 [CS +, USA]
[2] Kipke et al, 1997 [CS +, USA]
[3] Bailey et al, 2003 [CS +, USA]

Evidence statement 18: Homelessness and targeted interventions for homeless young PWID

Two studies were identified evaluating NSP among young PWID experiencing homelessness or engaging with homeless populations. [1 2] One study compared risk behaviours between a sample recruited in a site where secondary needle/syringe exchange and community development activities were implemented with a non-intervention site among a population living in homeless encampments (mean age 20 years). This study recorded higher odds of sharing needle/syringes (OR=3.78, 95% CI 1.41-10.0); reusing the same syringe for injection (OR=1.77, 95% CI 1.12-6.85); and inconsistent condom use with a casual partner (OR=4.8, 95% CI 1.39-16.7) among the population recruited through the non-intervention site.[1] An evaluation of an intervention involving outreach workers and peer health educators disseminating information and condoms in places where street youth congregate alongside targeted NSP provision to young people (38% younger than 18 years) suggested that increased contact with an outreach worker (OR=4.9, 95% CI 1.2-20.6) and use of the NSP (OR=3.1, 95% CI 1.5-6.6) was associated with use of clean needle/syringes. [2]

[1] Sears et al, 2001 [CS +, USA]

[1] Backloading refers to a method of sharing drugs (by injecting them from one syringe into the back of another opened syringe.

[2] Gleghorn et al, 1997 [CS ++, USA]

Evidence statement 19: Evaluation of outreach interventions

Another evaluation of an intervention that included outreach, access to HIV testing and life-management skills among young people (12-24 years) considered at risk of HIV, suggested that the intervention was successful at facilitating access to medical care. Those who had received care at an outreach site had increased odds of using medical care (OR=2.97, 1.19-7.39). Findings suggested younger age predicted use of medical care (OR=0.89, 95% CI 0.84-0.94); being HIV positive (OR=8.3, 95% CI 2.25-30.3), homeless (or=3.64, 95% CI 2.06-6.43), those who had a sex partner who injected drugs (OR=5.14, 95% CI 1.06-24.9). There were some differences by sex, women having sex with an HIV positive partner (OR=9.9, 95% CI 1.01-97.1) or a history of previous pregnancy (OR=2.97, 95% CI 1.2-7.4) were positive predictors of medical service use for women but not men.[1]

[1] Woods et al, 2000 [CS +,USA]

Evidence statement 20: Evaluation of peer driven interventions

Some moderate evidence from Ukraine suggests that peer driven interventions (PDI) that involve the recruitment of PWID via their peers through social networks can increase attendance of younger PWID at NSPs. On average, each PDI recruited 6.3 times more respondents that prior to the intervention. Overall, and in each site separately, the mean age of recruits was significantly lower for those recruited via PDI, dropping from 34 years to 27.4 years ($p<0.01$). Some evidence suggests that PDI was successful at recruiting a more varied type of drug user: pre PDI 99% were opiate users, post PDI only 65.9%. The mean age of participants was 34 years prior to the peer-driven intervention and 27 years post intervention. [1] Another studyfound that the addition of a health education component into the peer recruitment strategy was successful in reducing injecting risk behaviours. A reduction in front/back loading was noted (31%-21%, $p=0.002$), using a common container (20%-11%, $p<0.001$) injecting with a used needle/syringe decreased (19%-6%, $p<0.001$). However these injecting risk behaviours remained high following the intervention and were more common among younger PWID.[2]

[1] Smyrnov et al, 2012 [CS +, Ukraine]
[2] Booth et al, 2006 {CS ++, Ukraine]

Qualitative Synthesis

Evidence statement 1: Distinction from older PWID

There is evidence from 7 studies that street-involved young people distinguished themselves from older and more experienced PWID.[1,2,3,4,5,6,7] Sometimes fear of older PWID was expressed,[4] but more often they were linked with expressions of disgust, distain and suspicion.[1,2,3,4,5,6,7] There is evidence of a core distinction made between respondents' own use of drugs for pleasure, as opposed to older 'junkies' who are positioned as using drugs as a consequence of their drug dependency.[3,5] Three studies explored young people's drug use in the context of experimentation and pleasure seeking among peers.[3,8,9] There is evidence from 5 studies that young people saw older PWID as more entrenched in their drug use and expressed a sense of derision towards regular drug users.[3,4,5,7,9.] One study explicitly illustrated the avoidance of services due to a perception that it was not intended for young people.[1] More implicitly, we can hypothesise that younger PWID who envision services to cater primarily for older drug users with more entrenched and dependent patterns of use may not perceive such services to cater directly to their needs.

[1]Barnaby, 2010 [+, Canada]
[2]Fast, 2010 [++, Canada]
[3]Harocopos 2009 [++, USA]
[4]Krusi, 2010 [++, Canada]
[5]Roy, 2008 [++, Canada]
[6]Sherman, 2002 [++, USA]
[7]Small, 2009 [++, Canada]
[8]Lankenau, 2007 [+, USA]
[9]Mayock, 2004 [+, Ireland]

Evidence statement 2: Initiation into injecting

Evidence suggests that for many young people injecting drugs was actively sought and planned for.[1,2,3,4] However, despite articulations of agency and choice, the evidence suggests that young peoples' interest in experimenting with drug injecting as well as capacity to influence this process, is embedded in social relationships, especially that of their peer and social networks. For instance, most young people described their initiation in the context of prolonged exposure to injecting among peers or relations.[1,3,4,5,6,7,8,9] Eight studies identified the role of older PWID and sex partners in influencing the decision to start injecting. [3,4,5,6,7,9,12,13] The role of peers and the observation of drug use by peers was also important.[1,3,5,7,8,10,12] Some evidence pointed to a lack of choice in the circumstances of their initiation into injecting.[3,4,6,9,10,11,12] For example, situations where needle and syringes are provided by the initiator as was frequently reported, [1,3,4,8,12,14] along with sharing injecting equipment at the point of initiation.[3,4,14] Taken together, these data suggest that the active role that most young people exercise in their experimentation and initiation to injecting is shaped by their immediate social relationships and networks.

[1]Harocopos 2009 [++, USA]
[2]Lankenau, 2007 [+, USA]
[3]Rhodes, 2011 [++, Moldova]
[4]Small, 2009 [++, Canada]
[5]Fast, 2010 [++, Canada]

[6]Fast, 2009 [++, Canada]
[7]Roy, 2008 [++, Canada]
[8]Pierce, 1999 [+, USA]
[9]Sherman, 2002 [++, USA]
[10]Preda, 2009 [-, Romania]
[11]McCalman, 2001 [-, Australia]
[12]UNICEF, [-, Central and Eastern Europe]
[13]Trudgeon, 2010 [++, UK]
[14] Mayock, 2004 [+, Ireland]

Evidence statement 3: Requiring assistance with injecting

Evidence from 7 studies describes young PWID requiring assistance with injecting.[1,2,3,4,5,6,7] Two studies report prolonged requirement for assistance with injecting.[2,6] However, it is unclear from the evidence if this continued reliance on others for injecting equates to a reliance on others for the supply of clean injecting equipment.

[1]Sherman, 2002 [++, USA]
[2]Harocopos 2009 [++, USA]
[3]Small, 2009 [++, Canada]
[4]Rhodes, 2011 [++, Moldova]
[5]Pierce, 1999 [+, USA]
[6]Racz, 2005 [++, Hungary]
[7]Lankenau, 2007 [+, USA]

Evidence statement 4: Trust and Mistrust

Trust and mistrust emerges as a common theme across reviewed studies, and is expressed both in relation to other drug users as well as services encountered. Experiences of stigma and discrimination, for instance, were described by many as having a fundamental bearing on trust relations, including with helping services.[1,2,3,4,5,6,7] Young PWID felt excluded from amenities (shops and washrooms),[3] housing and services,[1,3] and discriminated against by authorities intended to assist them.[1,5,6,7] Assault or mistreatment by police was described by three studies,[1,4,7] and could result in more general mistrust of authorities.[1] Evidence from three studies suggests a mistrust of older service users.[3,8,9] Concerns about confidentiality and its importance to young people were explored by three studies.[1,2,10] Our findings suggest that mistrust of other drug users and of helping services can be reproduced by instances of experienced stigma and discrimination, which implies that building more trusting relationships with young people, combined with stigma reduction interventions, might have potential in increasing service access and use.

[1]Barnaby, 2010 [+, Canada]
[2]Buzducea, 2011 [-, Romania]
[3]Krusi, 2010 [++, Canada]
[4]Preda, 2009 [-, Romania]
[5]Roy, 2007 [++, Canada]
[6]Roy, 2008 [++, Canada]
[7]UNICEF, [-, Central and Eastern Europe]

[8]Fast, 2010 [++, Canada]
[9]Pierce, 1999 [+, USA]
[10]McCalman, 2001 [-, Australia]

Evidence statement 5: Barriers to service use

Other structural barriers were identified in the form of: rules and regulations;[1,2] requirements to provide identification;[3,4] concerns about waiting lists and resource issues;[2,3,4,5] inconvenient opening hours;[3,6] and location of services.[3] There was some evidence of individuals staying away from services in order to avoid police.[6,7] Two studies discuss the avoidance of services in order to prevent confrontations and violence or as a strategy for reducing drug use.[3,8] The importance of mobile outreach and service delivery programmes was also discussed in these studies.[3,8] Findings pointing to barriers to service use highlight the potential role of systemic changes as well as outreach to foster ease of access, but broader structural changes are also required, especially regarding fear of police and violence.

[1]Krusi, 2010 [++, Canada]
[2]Roy, 2008 [++, Canada]
[3]Barnaby, 2010 [+, Canada]
[4]Buzducea, 2011 [-, Romania]
[5]Buccieri, 2010 [-, Canada]
[6]Racz, 2005 [++, Hungary]
[7]Preda, 2009 [-, Romania]
[8]Fast, 2010 [++, Canada]

Evidence statement 6: Facilitators to service use

There is evidence from 3 studies that the provision of comprehensive health services was viewed as valuable as well as having low-threshold services that did not require the presentation of identification[1,2,3] There is also evidence to suggest that confidentiality, discretion and a non-judgmental approach by staff were key to engagement with services.[1,2,4] There was evidence from 2 studies supporting the provision of more needles than immediately required,[1,2] and one in support of peer distribution.[2] Services involving people with previous personal experience of injecting drug use was also helpful for some young people.[1,3]

[1]Barnaby, 2010 [+, Canada]
[2]Buzducea, 2011 [-, Romania]
[3]McCalman, 2001 [-, Australia]
[4]Buccieri, 2010 [-, Canada]

Evidence statement 7: Constraints to enacting risk awareness

Evidence from 14 studies suggests a general awareness of the risk of sharing needles[1,2,3,4,5,6,7,8,9,10,11,12,13,14] however sharing equipment within trusted relationships, long-standing friends, family relations or sex partners,[1,5,6,11,10] were documented. Three studies document more limited knowledge regarding how HCV is transmitted.[3,8,14] Evidence from 6 studies described the inevitability of infection making risk reduction practices redundant.[3,5,6,10,11,12] In addition to these constraints, the need to deal with every day issues such as securing food and housing,[1] avoiding

conflict,[4,11,16] and maintaining drug and income supply, as well as managing heroin withdrawal[1,5,7,10,12,14,16] emerged as immediate concerns for young PWID, and could constrain the ability to practice safe injecting.[5,7,12] These findings highlight health and risk reduction as relative concerns given other multiple and competing concerns which may appear more immediate or important to young people.

[1]Barnaby, 2010 [+, Canada]
[2]Buzducea, 2011 [-, Romania]
[3]Davis, 2004 [++, UK]
[4]Fast, 2009 [++, Canada]
[5]Hughes, 2000 [+, UK]
[6]Loxley, 1995 [+, Australia]
[7]Mayock, 2004 [+, Ireland]
[8]McCalman, 2001 [-, Australia]
[9]Pierce, 1999 [+, USA]
[10]Preda, 2009 [-, Romania]
[11]Racz, 2005 [++, Hungary]
[12]Roy, 2007 [++, Canada]
[13]Treloar, 2005 [+, Australia]
[14]Trudgeon, 2010 [++, UK]
[15]Lankenau, 2007 [+, USA]
[16]Roy, 2008 [++, Canada]

Evidence statement 8: Belonging and peer relationships

There was evidence to suggest that the involvement of peers in young people's drug use contributed to the pleasure experienced.[1,2] Six studies explored the sense of belonging, which was expressed in terms of feeling accepted, secure and supported.[2,3,4,5,6,7] One study reported that sharing injecting equipment was used to form friendships.[8] One study reported that acquiring HCV contributed to the sense of belonging among peers.[6] In contrast, evidence from 5 studies document feelings of isolation, alienation and solo drug use.[2,3,4,7,9] Some evidence suggested that the importance of the peer group reduced over time and the role of peers evolved as drug use became more established and less of a social event.[2,9] There is evidence from 3 studies reporting the apportioning of roles within peer groups, such as obtaining drugs, obtaining money, providing knowledge.[2,10,11] However, procurement of injecting equipment by individuals for peers was not discussed in the data.

[1]Barnaby, 2010 [+, Canada]
[2]Racz, 2005 [++, Hungary]
[3]Fast, 2009 [++, Canada]
[4]Harocopos 2009 [++, USA]
[5]Mayock, 2004 [+, Ireland]
[6]Roy, 2007 [++, Canada]
[7]Roy, 2008 [++, Canada]
[8]Hughes, 2000 [+, UK]
[9]Sherman, 2002 [++, USA]
[10]Lankenau, 2007 [+, USA]
[11]Pierce, 1999 [+, USA]

BACKGROUND

1.1 Background and Rationale

There are no national estimates of the number of people who inject drugs aged under 18 years in England and Wales. Among the estimated 103,000 people who inject drugs (PWID) aged 15-64 years in England and Wales recorded in 2010, drug use is higher among the 25-34 age group (17.9/1000) compared to 6.9/1000 among 15-24 year olds. (Davies et al., 2010). Data from the unlinked anonymous survey of PWID administered by the HPA suggested that in 2011 out of 2838 participants, 0.6% of the participants were under 18, (n=16) and 23% of the participants report first injecting before age 18, (n=509). These numbers will represent a minority of young PWID, as evidence suggests in the UK, only 25% of PWID are in treatment at any one time (Hickman et al., 2004)and this proportion may be smaller for PWID under 18. Data from the USA suggests that of an estimated 1.4million youth 12-17 years who required treatment for substance abuse in 2002, only 10% received services. Only 7% of substance abuse treatment centres provide services for individuals under 18. (Committee on Pediatric AIDS, 2006)

It is evident from self-reported data on age of first injection that young people inject drugs. A community survey among PWID in Wales (n=500) suggested that 40% of the sample had started injecting aged 18 or less.(Wales, 2006) Data from the National Drug Treatment Monitoring Survey suggested age of first injection to be as young as 10 years, with over 500 people starting injecting aged 13, 1500 aged 14 and almost 3000 aged 15 years. (Donmall and Jones, 2005) More recent data from the National Treatment Agency suggests that between 2011-2012 there were 156 young people (aged 17 or less) in treatment in England who reported injecting at the start of their treatment and 257 with experience of injecting. This is a decrease from 2010-2011 when there were 231 who reported injecting at the start of their treatment and 326 with a history of injection. Among these people 76% reported using opiates in 2011-2012, although the data cannot confirm whether they were injecting these drugs. (The National Treatment Agency for Substance Misuse, unpublished data, 2013)

Evidence also suggests that that injecting is concentrated among vulnerable populations of young people including young offenders, homeless, those involved in sex work, (Cusick et al., 2003) those excluded from school, (Melrose, 2004) those with parents with drug or alcohol problems (Advisory Council on Misuse of Drugs, 2003) or those who have been in care. (Ward et al., 2003). Research has shown that prevalence of injecting to be as high as 11% (5.44) among a sample of disadvantaged 13-18 year olds (Melrose, 2004) and lifetime use of heroin was 9% among young people leaving care (Ward et al., 2003) compared to <1% among a general population sample of 16 to 18 years old. In the UK, it is thought that around 335, 000 children live with a drug dependent user, 72000 with an injecting drug use (Manning 2009)

2.1 Objectives

We aim to review and synthesise published research evidence (quantitative and qualitative) as well as unpublished 'grey' literature and policy reports on the use of drugs among young people and their implication for risk, harm and health service responses, especially needle and syringe programmes (NSP).

Accordingly, our objectives are fivefold:

Objective 1: To describe the profile of young people who use drugs, patterns of injected use, and associated risk, harm and service need, especially in relation to NSP

Objective 2: To describe perceptions of risk and the individual and social factors shaping patterns of injecting among young people, risk practices and help-seeking, especially in relation to NSP

Objective 3: To assess evidence of help-seeking and uptake in relation to NSP, and the individual, social and systemic barriers and facilitators to accessing helping services

Objective 4: To conduct a consensus development exercise using nominal group technique and Delphi consultation to obtain consensus on the optimal provision of NSPs to young PWID.

Objective 5: To disseminate the findings of the review to NICE and relevant policy-makers, drug service, harm reduction and community networks, as well as through peer reviewed academic publication.

METHODS

3.1 Identification of Evidence

We reviewed English language peer-reviewed empirical studies and grey literature concerning the lived experience of young people who inject drugs, published since 1990. We included any study reporting empirical data focusing on young people under the age of 25 who inject drugs. To ensure coverage of all the available literature, we employed several search methods, including: searches of electronic medical, sociological and psychological databases (MEDLINE, EMBASE, CINAL Plus, Web of Science, Global Health, IBSS, Social Policy and Practice, PsychINFO, PsychEXTRA); manual searching of selected journals (*Addiction, Children and Society, Drug and Alcohol Review, Drug and Alcohol Dependence, Journal of Adolescence, Drugs Education, Prevention and Policy, Int. J of Drug Policy, J of Adolescent Health, J of Youth Studies, Substance use and misuse, Contemporary Drug Problems*); exploration of references listed in searched papers; and the use of PubMed to identify related papers to those identified by electronic search. We also contacted experts in the field, including authors of key articles to identify any other relevant literature. We included multiple papers from studies, and we excluded reviews and editorials.

3.1.1 Searches

The database searches were conducted using search terms related to needle and syringe exchange and harm reduction, injection drugs, performance or image enhancing drugs and young people (see appendix A for full search strategy).

3.1.2 Inclusion of relevant evidence

In summary, the inclusion criteria were:

- Empirical studies
- Qualitative studies - those exploring the lived experience of young people who inject drugs
- Quantitative studies - those examining associations between PWID aged 18 years or less and any of the following outcomes: prevalence/incidence of HIV, HCV, HBV, sexually transmitted infections, bacterial infections, injecting risk behaviours, sexual risk behaviours, use of treatment/ health services including NSPs, poly-drug use, experience of violence, contact with the police, homelessness, vulnerability, living in care and substance misuse of parents
- Focus on young people (mean age 25 years or less)
- Studies from North America, Australia/New Zealand or Europe
- English Language, 1990-present

All titles and abstracts were screened by one of two reviewers. A sample of 10% of abstracts was screened by a second reviewer (LP or BM). A predefined checklist was used to assess whether or not sources met the inclusion criteria (outlined below). If the abstract provided insufficient information to assess for inclusion, or if no abstract was available and the report was not clearly excludable on the basis of the title alone, then the full text of the report was obtained.

3.2 Inclusion and Exclusion criteria

Studies were included in the review if they met the following criteria were: a) in English; b) published from 1990 onwards; and c) focused on young people who inject drugs. 1990 was selected as a cut-off date to be consistent with the original review of the effectiveness and cost-effectiveness of NSPs for PWID published in 2008 (Jones et al., 2008) and as NSPs were first used in the UK as an intervention in 1988, there are unlikely to be any evaluations published prior to this. The review was limited to studies conducted in Australia, North America and Europe. Additional inclusion criteria for quantitative studies included studies examining associations between PWID aged 18 years or less and any of the following outcomes: prevalence/incidence of HIV, HCV, HBV, sexually transmitted infections, bacterial infections, injecting risk behaviours, sexual risk behaviours, use of treatment/ health services including NSPs, poly-drug use, experience of violence, contact with the police, homelessness, vulnerability, living in care and substance misuse of parents.

Studies excluded were commentaries or editorials, review papers containing no primary data, and epidemiological studies which do not stratify by age. Since published literature and policy guidelines use a diverse range of definitions to define young people. For example, UNAIDS focus on under 25 years when disaggregating by age and transitional care services in England work with young people up to the age of 21. We did not impose a strict age restriction, but selected papers if the sample included a substantial proportion of PWID under 25 years and specifically examined the effect of age.

3.3 Quality assessment

Each document was assessed for quality, rigour and credibility using a quality appraisal checklist adapted from the NICE public health methods manual (2012) and the Critical Appraisal Skills Programme (CASP) checklistQuality was assessed by scoring each study for the appropriateness of the study design, recruitment strategy and data collection methods, to address the research aims. Scientific rigor was assessed on the level of discussion of data collection, participant selection, analysis methods and data presented. Additionally, the extent to which a critical examination of the role of the researcher, bias, influence, credibility and limitations were discussed was also assessed. Each criteria was given a score, and a final overall assessment was made (good ++, average +, poor -). See Appendix B for the Quality Assessment criteria.

++ All or most of the checklist criteria have been fulfilled, where they have not been fulfilled the conclusions are very unlikely to alter.

+ Some of the checklist criteria have been fulfilled, where they have not been fulfilled, or not adequately described, the conclusions are unlikely to alter.

– Few or no checklist criteria have been fulfilled and the conclusions are likely or very likely to alter.

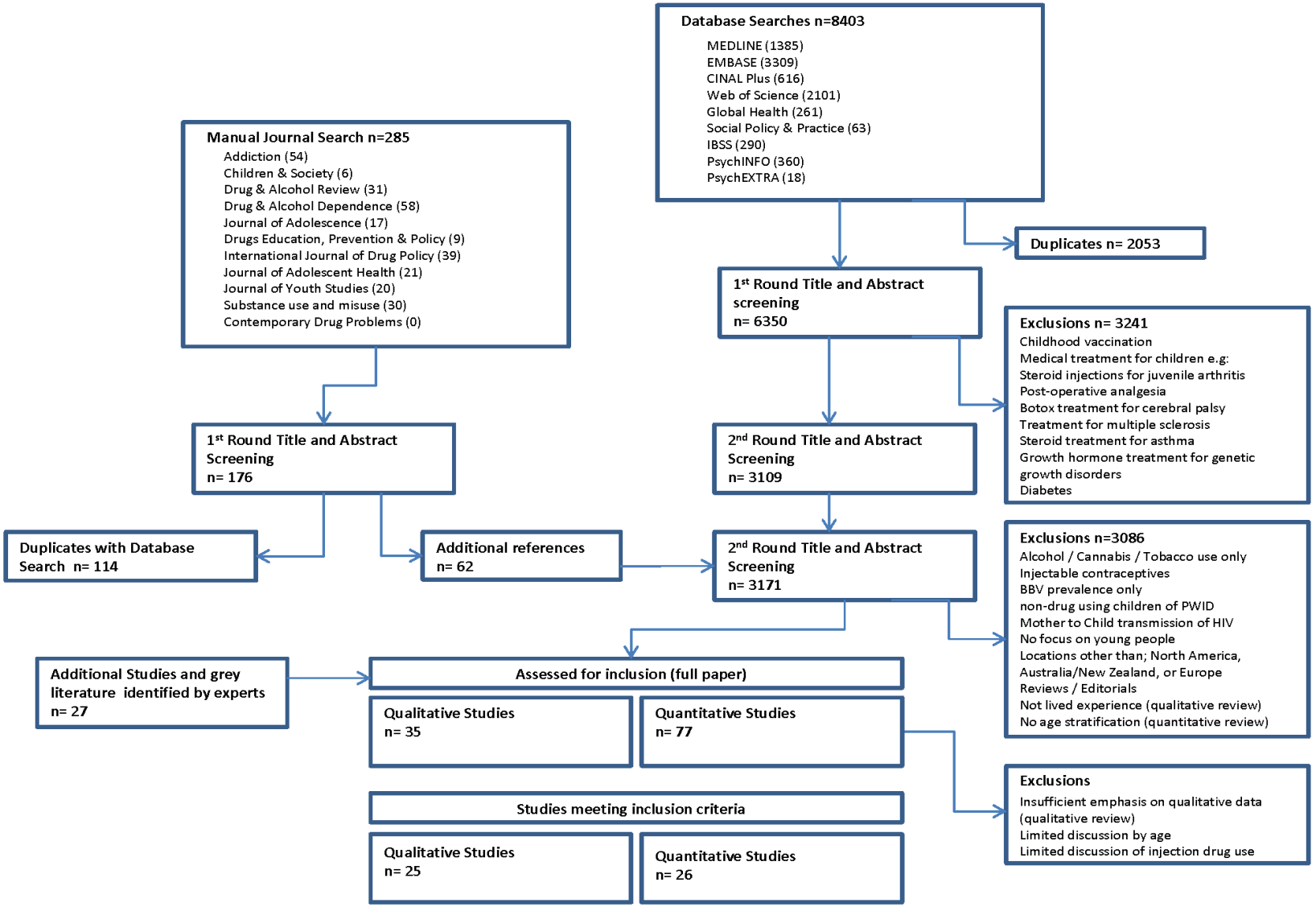
We included all studies meeting our inclusion criteria, however the quality score (Good (++), Average (+), Poor (-)) was taken into consideration in the interpretation of data.

Quality was assessed based on:

- Appropriateness of study design
- Transparency of recruitment, data collection and analysis
- Extent to which bias and limitations are taken into account
- Whether the data presented support the findings
- Contribution of the study to existing knowledge

We defined evidence to be strong if the majority studies it originated from were graded as ++. We defined evidence to be of moderate quality if the majority studies were graded as + and we defined evidence to be weak if the majority of studies were graded (-).

Figure 1: Flow Diagram of Identified Studies



QUANTITATIVE SYNTHESIS

Injecting risk behaviours among young people who inject drugs

1. Aim

We conducted a systematic search of published and unpublished quantitative literature on the provision of NSP to young people aged 18 years or less. Aware that published evidence and policy documents on NSP provision is limited, we used the literature review to delineate the profile and key risk behaviours among young PWID to draw out their implications on NSP provision. The research questions framing the review of quantitative evidence are:

1. How do the key harms associated with injecting drug use among PWID under 18 differ to older populations among people who inject drugs?

2. What is the level and uptake of health services including NSPs among young PWID?

3. What are the barriers to service use among young PWID?

2. Methods

2.1 Data extraction, analysis and synthesis

For each included study, details were extracted by one reviewer (LP) and checked by another (BM). We extracted data on demographic characteristics, sexual and injecting risk behaviours, access to services and social factors associated with increased vulnerability. We compared differences in behaviours by age. We summarised factors associated with the following additional outcomes identified from the literature; infection with HIV or Hepatitis C injecting with used needle/syringes; non-condom use; and access to services. We identified studies that evaluated services for young people injecting drugs to assess the impact on injecting risk behaviours.

3. Included studies

A total of 26 papers were included: 13 papers were included that compared characteristics and risk behaviours between young and older populations of PWID; 6 papers that examined uptake of services by young PWID, 4 that examined risk factors among young populations of PWID and 8 that summarised an intervention for young PWID or at-risk youth (these categories are not mutually exclusive).

3.1 Quality of included studies

The majority of studies identified were cross-sectional, with four prospective cohort studies and 1 quasi experimental. The geographical spread of included studies encompassed: Albania; Australia; Canada; Ireland; Moldova; Romania; Serbia; USA; and Ukraine. These studies are summarised in Table 1.

We limited studies to include only those from high-income countries to increase comparability with England, although some countries were included that were more comparable to England in relation to harm reduction policies and epidemiology of drug use such as Canada, Ireland and Australia than others including Ukraine, USA, Serbia, Moldova, Albania and Romania. The USA was the most frequently represented country (13), followed by Canada (6) and Ireland (3). Two studies were identified from Australia and Ukraine and one study in Eastern Europe recruited samples from Serbia, Moldova, Albania and Romania.

Comparison by age

Among the 12 papers identified that compared characteristics between younger and older populations of PWID, only 7 were designed for this purpose (Busza et al., 2013, Cassin et al., Kral et al., 2000, Miller et al., 2011, Miller et al., 2002, Miller et al., 2007, Smyth and O'Brien, 2004) and only four of these specifically compared young PWID aged less than 18 years with older populations. (Busza et al., 2013, Chan et al., 2011, Hadland et al., 2009, Smyth and O'Brien, 2004) Other studies included aggregated samples to include young PWID under 18 but overlapping with older age groups including <=23 (Loxley et al., 1997) <=24 (Miller et al., 2011, Miller et al., 2002) <=25 (Cassin et al.) <=29 (Miller et al., 2007) <30 (Kral et al., 2000)and two studies compared a mean age of 23 (Diaz et al., 2001) and median of 18 years (Mullen and Barry, 2001) with older populations. Three studies reported multivariate analyses examining differences in age adjusting for a range of confounders. (Kral et al., 2000, Miller et al., 2011, Miller et al., 2007) Two studies comprising a slightly older age group (<29 years and <=30 years) were included since they included multivariate analyses focused specifically on the effect of age. (Kral et al., 2000, Miller et al., 2007) Seven studies were rated ++ and five studies were rated +. These scores are summarised in Table 1.

Adverse health outcomes associated with injecting

We identified three studies (rated ++) that examined risk factors associated with sharing needles/syringes among young PWID, conducted in Eastern Europe, Ireland and Australia. (Busza et al., 2013, Dean et al., 2010, Mullen and Barry, 2001) One study in the USA examined risk factors

associated with hepatitis C and one in Dublin examined factors associated with non-condom use. (Hahn et al., 2001, Mullen and Barry, 2001)

Barriers and Facilitators to services

Among the 5 studies identified that examined use of services by young PWID: two studies examined factors associated with accessing or attempted access to drug or alcohol addiction services among street involved youth (Hadland et al., 2009, Wong et al., 2009); two studies examined factors associated with accessing needles/syringes from an NSP or pharmacy (Heller et al., 2009, Sherman et al., 2004) and one study examined access to general health services. (Cronquist et al., 2001) All these studies were among PWID. Four of these studies were rated ++ and one was +.

Evaluation

Among the 8 studies that evaluated harm reduction or HIV prevention interventions among young PWID, none exclusively targeted young PWID aged 18 years or less, although five targeted younger populations of street youth or PWID ranging between 12 and 24 years. (Gleghorn et al., 1997, Guydish et al., 2000, Kipke et al., 1997, Sears et al., 2001, Woods et al., 2000) Three included samples aged 18 to 30 years that either explicitly examined the effect of age or contained a larger proportion of younger (<25 years) PWID in the sample. (Bailey et al., 2003, Booth et al., 2006, Smyrnov et al., 2012) Interventions evaluated included: street based outreach for street youth and PWID; peer driven interventions to recruit PWID into harm reduction services or disseminate HIV information (Booth and Strathdee, 2007, Smyrnov et al., 2012); multi-faceted interventions for street youth including outreach, peer health educators and underground NSPs (Gleghorn et al., 1997); needle/syringe exchange (Bailey et al., 2003, Kipke et al., 1997) including one youth-specific NSP (Guydish et al., 2000) and one targeting homeless youth (Sears et al., 2001); and a multi-pronged HIV intervention for young people including testing, counseling and referral to linked services. (Woods et al., 2000) No studies were experimental in design with the exception of one quasi-experimental design (Gleghorn et al., 1997), all others drew on cross-sectional data and one cohort. Only two studies were rated as ++ (Booth et al., 2006, Gleghorn et al., 1997) and the remaining +.

Table 1

Included studies: comparison by age

Aim	Study design	Location	Recruitment	n	Population	Age (years)	Outcome	Reference	Score
Examine rates and correlates of HCV infection among young adult PWID in two sites	Cross-sectional survey	USA, New York	Community recruited, large sample	557	Injection in the last 6 months	18-29	Descriptive comparison by age (mean 23 vs 26 years)	Diaz, 2001	+
To examine estimates of HIV risk behaviour and association with mental health	Cross-sectional survey	New York, national	Substance misuse treatment	153	Ever injected	12-18	Descriptive comparison by age (12-15 vs 16-18 years)	Chan, 2011	+
To compare drug injection and sex related risk behaviours of younger and older injectors	Cross-sectional survey	USA, San Francisco	Targeted sampling informed by ethnographic research	172	Injecting in the last 30 days	range not specified	Factors associated with younger Age (<30 years)	Kral, 2000	++
To provide empirical data about younger injectors (under 25 years) levels of injecting risk behaviour by comparing with older injectors	Cross-sectional survey	Ireland, Dublin	Convenience sample	770	Attendees at NSP	Not specified but 63% under 25 years	Descriptive comparison by age (<25 vs. >25 years)	Cassin	+
To determine socio-demographic, drug and sexual differences between younger and older PWID and to investigate risk factors for HIV infection among young PWID	Cross-sectional survey taken from baseline on established cohort (VIDUS).	Canada, Vancouver	Community recruitment	1437	Injecting in the last month	Younger PWID 13-24 years and median older PWID =36	Descriptive comparison by age ((<=24 vs. 24+) and factors associated with HIV+ among female PWID	Miller, 2002	++
To investigate whether age differences found in 1989 persisted in 1994 and whether young PWID were at particular risk of BBVs	Cross-sectional survey	Australia (Sydney, XX, XX, XX)	Recruited via advertisements, snowball sampling and networking	872	Injection and sexual activity at least once in the last month	30% under 23 years	Descriptive comparison by age (<=23 vs. 23+)	Loxley, 1997	+
To establish demographic characteristics, drug taking characteristics and risk behaviours of first time attendees at NSPs	Cross-sectional survey	Ireland, Dublin	NSP attendees	1224	Attendance at NSP		Descriptive comparison by age (median 18 vs. 23 years) Factors associated with sharing a needle/syringe in previous year and non-condom use at registration	Mullen, 2003	++

Aim	Study design	Location	Recruitment	n	Population	Age (years)	Outcome	Reference	Score
3 aims: 1) describe characteristics 2) examine the differences between adults and children 3) to examine temporal trends 1990-1999	Analysis of National Drug Treatment Reporting System	Ireland, Dublin	Treatment attendees	9874	Attendees at addiction services, 14% of children injected	14-adults (not defined)	Descriptive comparison by age (10-17 vs. Adults)	Smyth et al, 2004	+
To describe the characteristics and behaviours of PWID in Albania, Moldova, Romania and Serbia, to compare characteristics between youth (18-24) and adolescents (<18)	Cross-sectional surveys	Romania, Moldova, Serbia, Albania	Recruited via respondent driven sampling	121, 250, 248, 350.	Not specified, other than PWID	15-24	Descriptive comparison by age (15-17 vs. 18-24). Factors associated with sharing needles/syringes	Busza et al, 2013	++
To identify barriers encountered as street youth attempt to access addiction services	Cohort (At risk youth study)	Canada, Vancouver	Community recruited, large sample	529	Use of an illicit drug other than marijuana in the last 30 days	14-26 years	Descriptive comparison by age (<18 vs. >=18 years) Factors associated with accessing of attempting to access on at least 1 occasion drug or alcohol addiction services in the last 6 months prior to interview	Hadland, 2008	++
To determine individual, social and structural risk factors associated with younger age (<=24)	Cohort	Canada, Vancouver	Community recruited, large sample	255	Female sex workers using illicit drugs	Median=36 (IQR=25-41)	Factors associated with younger age (<=24 vs. >=25 years)	Miller, 2011	++
To examine longitudinal drug use and sexual risk associated with younger age	Cohort	Canada, Vancouver	Community recruited, large sample	1598	Injection of illicit drugs at least once in the previous month	>=14	Factors associated with younger age (<=29 vs. >=30 years)	Miller, 2007	++

Samples of PWID under 18 very small in Albania (7) Romania (19) and Serbia (21)

Table of Included studies: risk factors for HCV and needle/syringe sharing

Aim	Study design	Location	Recruitment	n	Population	Age (years)	Outcome	Reference	Score
To estimate prevalence of HCV in PWID aged 29 or less in San Francisco and to examine risk factors for HCV	Cross-sectional survey	San Francisco	Community recruited	312	Injecting in the last month	15-29 (median=22)	HCV	Hahn et al, 2001	+
To describe a clinical sample of Australian adolescents admitted to a substance withdrawal service and to examine gender differences in substance use characteristics and risk behaviours in this group	Cross-sectional survey	Australia	Attendees at the Adolescent Drug and Alcohol Withdrawal Service (ADAWS)	272	Injecting not specified but 19% heroin users	13-18 years (mean=16)	Needle/syringe sharing and heroin as primary drug.	Dean et al, 2010	++

Table of Included studies: access and uptake of health services

Aim	Study design	Location	Recruitment	n	Population	Age (years)	Outcome	Reference	Score
To assess access to addiction treatment among a cohort of street-involved youths and young adults	Baseline data from prospective study	Vancouver	Street Youth	478	Use of illicit drugs in last 30 days	14-26 years	Had ever accessed some form of alcohol or drug (AOD) treatment (including methadone maintenance)	Wong et al, 2009	++
Two aims: 1) examine extent to which NSP participants receive adequate numbers of sterile N/Ss relative to injection frequency; and 2) Identify reasons why PWID do not receive adequate number of n/s	Cross-sectional survey	New York	PWID	504	NSP attendees	19-45+	Inadequate syringe coverage (defined as receiving fewer syringes in past month than numbers of times injecting	Heller et al, 2009	+
To explore health care utilisation patterns of young adult PWID: to describe frequency of use, level of insurance coverage and type of health care used and identify whether use of NSPs was associated with increased use of health services	Cross-sectional survey (baseline from longitudinal cohort)	New York	PWID	206	Injecting in the last 6 months	18-29 (median=26)	Using health services in the last 6 months (any health care excluding drug treatment and NSP)	Cronquist et al, 2001	++
To examine syringe acquisition and disposal practices among young PWID and to examine the relationship between syringe acquisition and disposal practices and risky injection behaviours	Cross-sectional survey	Baltimore	PWID	294	Initiated into injected in the last 5 years, injected in the last 6 months	15-30	Safe acquisition of needle/syringes defined as from an NSP or pharmacy	Sherman et al, 2004	++

Table of Included studies: Evaluation

Aim	Study design	Location	Recruitment	n	Population	Age (years)	Outcome	Reference	Score
To assess factors associated with change in needle-related risk behaviours as well as predictors of continued high-risk behaviour following intervention efforts	Cohort (96% retention from n=300)	Ukraine	PWID	269	Injection in the last 30 days	Mean 28 (SD=7.2)	Indigenous Leader Outreach Model -Former PWID act as outreach workers to access target population and conduct a baseline interview. During next 5 months participants receive HIV interventions	Booth	++
To determine whether a peer driven intervention could recruit 500 'new' PWID to each of five selected Harm Reduction sites within 6 months of implementation	Cross-sectional	Ukraine	PWID		Not specified	2273 (mean=33.4 pre PDI; 27.9 post PDI)	Projects that had been unsuccessful in recruiting new participants were selected (n=5 sites), 3 health educators were trained in each site to test a peer driven intervention (PDI). HEs recruited 'seeds' among PWID, seeds recruits other PWID and those PWID recruit others in a chain referral sampling strategy (respondent driven sampling). Each recruit is provided HIV intervention information and actively referred to services. Each recruit is provided an opportunity to become a recruiter. Those who agree are given a baseline survey to assess what they have learnt on HIV prevention. They are provided with more enhanced training, then continue further recruiting via Respondent Driven Sampling technique.	Smyrnov	+
1) To determine whether the intervention was successful in increasing youth contact and frequency of contact with outreach workers, 2) To assess the impact of the intervention on youth HIV risk behaviours and access to prevention services; and 3) to explore the relationship between the amount of outreach contact and youth participation in HIV prevention activities	Serial cross-sectional (2.2% included in both studies) quasi experimental	USA	Street Youth	1210	Homeless currently, or have been in past 12 months, engaged in street economy including prostitution, drug sales, theft	~38% less than 18 years	Geographical location where street youth congregate. Basic street outreach by outreach workers and peer health educators, presented information on services at youth centre, distribution of condoms, bleach and flyers. Subculture specific intervention tools including posters, t-shirts, condom packets, stickers, harm reduction cards and a video also produced in collaboration with youth. Underground youth NSP advertised through word of mouth to youth only.	Gleghorn, 1997	++
To examine the prevalence and correlates of NSP use among young PWID	Cross-sectional	USA	PWID	700	Injection in the last 6 months	18-30 years (64% <26 years)	NSP	Bailey, 2003	+

Aim	Study design	Location	Recruitment	n	Population	Age (years)	Outcome	Reference	Score
To assess utilisation of health services by clients of the Boston HAPPENS programme	Cross-sectional	USA	HIV+ and at risk youth	1044	Only minority PWID (<2%)	12-24 years	Boston HAPPENS (HIV Adolescent Provider and Peer Education Network for Services) Programme. Includes: outreach and risk reduction counselling; access to developmentally and culturally appropriate HIV testing and counselling ; life management counselling; health status screening and needs assessment; client-focussed comprehensive, multi-disciplinary care and support; follow-up and outreach to ensue continuing care; and integrated care and communication between providers in the area.	Woods, 2000	+
To determine whether street youth using NSP differed demographically or injecting risk behaviours to non-NSP users 2) to determine whether use of NSP was associated with lower HIV-risk behaviours	Cross-sectional	USA, Hollywood	PWID	195	Injection in the last 30 days	16-24	NSP	Kipke, 1997	+
To describe the characteristics and behaviours of young injectors and compare how use of NSPs impact this group.	Cross-sectional	USA, San Francisco	PWID	161	Injecting at least 3 times in last 30 days	13-23 (mean=20 years)	Youth-specific NSP offering street based outreach, secondary distribution and 'home delivery' services	Guydish, 2000	+
To assess the proportion of homeless young PWID reached by the intervention and to describe the association between the intervention and HIV risk behaviour	Cross-sectional	USA, San Francisco	PWID	122	Injection in the last 30 days	15-25 Mean =20.9	Intervention targeting a population living in homeless encampments. Three components of intervention: 1) population-subculture specific media; 2) community development activities; and 3) enhanced model of secondary NSP distributed by young PWID who had gained respect from their peers, including daily contact with supporting community based project that provided n/s supplies and other services as necessary.	Sears, 2001	+

4. Findings

4.1 Differences between younger and older populations

Demographic characteristics

Two studies suggested that age at initiation into drug use and injection was younger among younger populations of PWID. In Vancouver 38% of the younger sample (n=582, aged <=29 years) started injecting aged 16 years or less compared to 33% of the older sample (n=1016, >=30 years). In Ireland the mean age of initiation was 18.9 years among those aged <25 years (n=485,) compared to 22.6 years among those aged 25 and above (n=285). (Cassin et al., Miller et al., 2007)

In the majority of studies there were a significantly higher proportion of females among younger PWID than in older populations. For example two studies in Ireland noted that 30.5% (148/485 and 586/1953) of the younger sample compared to 15% (44/285) and 24% (1904/7902) of the older population were female. In Vancouver, 50% (116/232) and 47% (274/582) of the younger sample compared to 32% (305/1016 and 386/1205) of older PWID were female. (Miller et al., 2002, Miller et al., 2007, Smyth and O'Brien, 2004) Female PWID were no more frequently represented in two studies in the USA. Approximately 28% of PWID were female across older and younger PWID in New York (96/357 compared to 58/200 among younger and older) and 36% in San Francisco (21/56 vs. 41/116 among younger and older). (Diaz et al., 2001, Kral et al., 2000) Female PWID were less frequently represented in Moldova among younger than older populations (21/105 vs. 172/245) (Busza et al., 2013) All data are presented in Table 2.

Social factors

Experience of homelessness ranged from 77% in New York among young PWID (n=357, mean age 23 years) and between 26 and 68% in Vancouver (n=582, aged less than 29 years and n=232, <=24 years respectively). (Diaz et al., 2001, Miller et al., 2011, Miller et al., 2007) Among a sample of 10 to 17 year olds in Dublin, 6.5% (127/1953) had been homeless in the last 6 months. (Smyth and O'Brien, 2004) In all studies, where it was reported, higher proportions of younger PWID reported being homeless than their older counterparts. For example in New York 77% of younger PWID (274/357) compared to 41% of their older counterparts had ever been homeless (82/200, p<0.001), and in Ireland 6.5% (127/1953) compared to 1.9% (150/7921, p<0.001). In Vancouver 68% (38/56) of FSWs (aged<=24 years) had been homeless in the last 6 months compared to 36% (72/199, p<0.001) of their older counterparts. Among PWID aged <=29 years, and 26% (151/582) had been homeless compared to 6% of those aged >=30 years (61/1016, p<0.001). (Diaz et al., 2001, Miller et al., 2011, Miller et al., 2007, Smyth and O'Brien, 2004) In Australia the mean number of addresses reported by a sample of PWID aged less than 23 years was 4.7 (n=160) compared to 3.5 among their older peers (n=368, p<0.001). (Loxley et al., 1997)

Experience of prison was high among young PWID with 15% reporting being in prison in New York (54/357) among younger PWID, and more among older PWID (49%, 98/200, P<0.001); 3% in Moldova (2/105) among 15-17 year olds compared to 12% (30/245, 0.002) among older PWID. In Vancouver, 37% (215/582) of younger PWID (<=29 years) had been in prison compared to 30% of their older counterparts (>30 years, 315/1016, p=0.06). (Busza et al., 2013, Diaz et al., 2001, Miller et al., 2007) Similarly a high proportion reported being stopped by the police or arrested. In Moldova 37.5% of young PWID (15-17 years, 40/105) had ever been stopped by the police and 86% in San Francisco among young PWID (<30 years, 48/56). Similar high levels were reported among older populations. And differences were non-significant. (Busza et al., 2013, Kral et al., 2000) I

Injecting risk behaviours

Levels of injecting with a used needle/syringe were high among all samples of young PWID (>25%) but varied by location. In Ireland among a sample aged less than 25 years, 56% (274/485) reported ever sharing needles/syringes. (Cassin et al.) In San Francisco 52% (29/56) of young PWID (less than 30 years) reported this behavior in the last month. (Kral et al., 2000)

There was no consistent difference in levels of sharing by age: one US study suggested higher levels of sharing among younger populations (52% among <30 years vs. 10%, among >30 years p=0.05) In another study, 37% (1532/4147) of young PWID aged between 12 and 15 years and 45% of those aged 16-18 years (2410/5372) had ever injected with a used needles/syringe (p=0.05). (Chan et al., 2011, Kral et al., 2000) In Moldova injecting with used needles/syringes was 13% (14/105) among young PWID (15-17 years) with little difference with the older population (18-24 years, NS). (Busza et al., 2013)High prevalence of sharing needles/syringes (time frame not specified) were reported in Dublin at 39% (475/1219) among young PWID (median age 18) and in New York at 31% (111/357) (median age 23). (Diaz et al., 2001, Mullen and Barry, 2001) In Vancouver borrowing of injecting equipment was high at 36% (209/582) among those aged 29 years or less and 42% (97/232) among those aged 24 or younger. (Miller et al., 2002, Miller et al., 2007)

Many young PWID reported being injected by someone else ranging from between 27% (197/485) in Ireland among those aged less than 25 years and 53% (123/232) in Vancouver (aged 24 years or less). (Cassin et al., Miller et al., 2002) Younger PWID (aged 23 or less) were also more likely to report injecting in a larger group in Australia (mean=1.9 people vs. 1.3, p<0.01) (Loxley et al., 1997); 64% (310/485, aged 25 years or less) shared other injecting paraphernalia in Ireland, (Cassin et al.) 46% (22/56) of PWID in the US (aged 30 years or less) reported a recent overdose, (Kral et al., 2000)and 46% (268/582) of PWID (aged 29 years or less) reported daily injection of heroin. (Miller et al., 2007) All these risk behaviours occurred more frequently among younger populations than their older counterparts and these differences were significant (see Table 2)

A study in the US among young people with a history of injecting aged 12-18 years compared differences in injecting risk between 12-15 year olds and 16-18 year olds. This study suggested that risk behaviours increased by age: among the younger group 37% (1532/4147) reported ever injecting with a used needle compared to 45% (2410/5372) of their older peers (p=0.05); 63% (2614/4147) of the younger group reported being injected by someone else and 65% (3514/5372) of the older group (p=0.05); and 26% (1082/4147) of younger group vs. 45% (2410/5372) of older group reused a needle (p<0.001). (Chan et al., 2011) These findings were statistically significant.

Sexual risk behaviours

High proportions of young PWID engaged in sex work ranging from 11% (39/357) of PWID with a mean age of 23 years, 41% (95/232) of PWID aged 24 years or less in Canada and 33% (35/105) of PWID aged 15-17 years in Moldova. (Busza et al., 2013, Diaz et al., 2001, Miller et al., 2002) There was some evidence from Canada that higher proportions of younger PWID engaged in sex work than their older peers and that this was significant. (Miller et al., 2002, Miller et al., 2007) However, this was not reflected in data from the USA or Moldova. (Busza et al., 2013, Diaz et al., 2001, Kral et al., 2000) High levels of sexual risk behaviours are reported with up to 77% (43/56) of samples reporting unprotected sex in San Francisco, 62% (99/160) in Australia, 39% (475/1219) in Dublin but only 8% (215/582) in Vancouver. (Kral et al., 2000, Loxley et al., 1997, Miller et al., 2007, Mullen and Barry, 2001) Two studies suggested that more than a third of young PWID in Romania (9/19, aged 15-17 years) and Ireland (203/485, aged 25 years or less) had sex partners who were also injectors. (Busza et al., 2013, Cassin et al.) In most sexual risk indicators, there was little consistent difference between younger and older populations.

Blood borne viruses

Prevalence of HIV was consistently lower among younger than older populations of PWID. For example in Australia and New York, prevalence was estimated to be 1.3% (2/160) and 3% (11/357) among younger PWID (mean age 23 years) compared to 3.4% (13/368, not significant) and 10% (20/200, p<0.001) among older PWID in the same samples. (Diaz et al., 2001, Loxley et al., 1997)This pattern was repeated in all locations. Prevalence of hepatitis C was high at 22.8% (36/160) among younger populations in New York and 42% (150/357) in Australia (mean age 23 years), but higher among older PWID in the same studies (63.8%, 235/368 in New York, p<0.001, and 52% 104/200 in Australia, p<0.001, respectively). (Loxley et al., 1997, Miller et al., 2007) In Australia prevalence of hepatitis B was four times higher among older (21%, 78/368) than younger PWID (5.7%, 36/160, p<0.001) (Loxley et al., 1997) In Ireland fewer younger populations (25 years or less) compared to older populations reported being tested for HIV (38% 186/485 vs. 61%, 173/285, p<0.001) or being vaccinated against hepatitis B (11% 53/485 vs. 30% 86/285, p<0.001) . (Cassin et al.)

Access to clean needle/syringes

Almost a third of PWID (162/557) had used an NSP in the last 6 months in New York, and this did not differ by age. (Diaz et al., 2001) In Moldova 79% (83/105) of young PWID (15-17 years) used

pharmacies for new needles/syringes compared to 68% (167/245) of 18 to 24 year olds and 11% (12/105) of younger PWID used NSPs compared to 29% (70/245) of older populations. (Busza et al., 2013)

Uptake and access to drug treatment

The proportion of young PWID in drug treatment ranged from 25% (38/160) in Australia to 68% (396/582) in Vancouver and 0% in San Francisco (n=58). Fewer younger PWID reported being in drug treatment than older populations. (Hadland et al., 2009, Kral et al., 2000, Loxley et al., 1997, Miller et al., 2007) Younger PWID (23% 134/582) more often reported being denied treatment in Vancouver than older populations (18%, 183/1016) and fewer received methadone maintenance (6%, 35/582 vs. 14% 142/1016). (Miller et al., 2007) There was no difference in attempts to access services between those aged less than 18 compared to those older from another study in Canada of street involved youth[2] using illicit drugs. (Hadland et al., 2009) Overall in this sample (n=529, aged 14-26 years) 32% had attempted to access a drug or alcohol service in the last 6 months.

Multivariate analyses of factors associated with younger age

In a sample of PWID in Vancouver (n=1598), multivariate analyses suggested that young age (<29 years) was positively associated with being female (OR=2.0, 95% CI 1.66-2.51); homeless (OR=1.1, 95% CI 1.02-1.20); experience of prison (OR=1.16, 95% CI 1.08-1.24); borrowing needles/syringes (OR=1.08, 95% CI 1.01-1.16); engaging in sex work (OR=1.35, 95% CI 1.23-1.48); daily injection of heroin (OR=1.11, 95% CI 1.03-1.19) and cocaine (OR=1.07, 95% CI 1.00-1.15) among PWID in Vancouver. However younger PWID had reduced odds of receiving drug treatment (OR=0.93, 95% CI 0.86-0.99), being HIV positive (OR=0.75, 95% CI 0.63-0.90) or HCV positive (OR=0.37, 95% CI 0.29-0.47) and in receipt of methadone maintenance (OR=0.77, 95% CI 0.68-0.87). (Miller et al., 2007)

Among a sample of female sex workers who inject drugs also in Vancouver (n=255), younger age (<=24 years) was positively associated with frequent heroin injection (OR=1.35, 95% CI 1.06-1.74); being homeless (OR=1.26, 95% CI 1.07-1.48) and inversely associated with receiving methadone maintenance (OR=0.72, 95% CI 0.62-0.93). Younger female sex workers also had increased odds of servicing clients in cars and public spaces than their older counterparts. (OR=1.28, 95% CI 1.04-1.57) (Miller et al., 2011) In San Francisco, younger PWID (<30 years) had increased odds of sharing needles/syringes (OR=5.2, 95% CI 2.1-13.1), engaging in sex work (OR=4.5, 95% CI 1.6-12.7) and having unprotected sex (OR=3.0, 95% CI 1.3-7.0). (Kral et al., 2000) These data are summarised in Table 3.

[2] The term street-involved youth is used rather than street youth since being homeless was not an eligibility requirement for recruitment, only that youth spent a large proportion of time on the street.

4.2 Risk factors associated with other harms among young PWID

HIV/HCV

A sub analysis of risk factors associated with being HIV positive among a sample of young PWID (n=232, median age 21, range=13-24) found that 87% of positive cases were among female PWID (20/23). In a risk factor analysis examining factors associated with HIV positivity among young female PWID (n=117) taking a speedball[3] more than once a day was positively associated with testing positive for HIV among female PWID (OR=7.5, 95% CI 1.9-30.0), as was older age (OR=1.7, 95% CI 1.3-2.3). Education (OR=0.3, 95% CI 0.1-0.9) and having a regular sex partner (OR=0.2 95% CI 0.02-0.6) were inversely associated with being positive. (Miller et al., 2002)

Among a sample of young PWID (median age=22 year, n=312), risk factors associated with HCV included older age (OR+1.17, 1.05-1.30) and longer duration of injecting (OR=1.21, 95% CI 1.10-1.34). Increased risk was also associated with being initiated into injecting by a sex partner (OR=4.06, 95% CI 1.74-9.52), daily injection (OR= 3.85, 95% CI=2.07-7.17) and ever borrowing a needle (OR=2.56, 95% CI 1.18-5.53). Reduced risk of HCV was associated with cleaning a needle with bleach the last time one was borrowed (OR=0.50, 95% CI, 0.24-1.04), snorting drugs in the last year (OR=0.48, 95% CI 0.26-0.89) and being injected by someone else in the last 30 days (OR=50, 95% CI 0.25-0.99). (Hahn et al., 2001) These findings are summarised in Table 4.

Injecting risk behaviours

In the Eastern European study, analyses suggested that increased risk of sharing needles/syringes in the last 4 weeks among 15-24 year old PWID included: being female (OR=4.04, 95% CI 1.93-12.87) and from an ethnic minority (OR=4.98, 95% CI 1.93-12.87) (Moldova); experiencing police harassment (OR=3.17, 95% CI 1.22-8.19) (Romania) and experience of prison (OR=4.58, 95% CI 1.69-12.42 in Moldova and OR=2.81, 95% CI 1.42-5.55 in Romania). In all three countries reduced odds of sharing was associated with obtaining needles/syringes from a formal source (NSP, outreach or pharmacy) compared to informal only (friends, dealers) (in Moldova OR=0.33, 95% CI 0.12-0.93; in Romania OR=0.18. 95% CI 0.68-0.49 and in Serbia OR=0.28, 95% CI 0.10-0.81). (Busza et al., 2013) In Ireland odds of needle/syringe sharing in the last year was higher among young PWID aged 15-19 attending an NSP who had more than one sex partner in the last year (OR=1.47 95% CI 1.08-1.99) and those reporting hepatitis or jaundice (OR=1.75, 95% CI 1.12-2.72); odds were lower among those injecting for less than a year (OR=0.7, 95% CI 0.51-0.95) and those using condoms. (OR=0.48, 95% CI 0.35-0.65) (Mullen and Barry, 2001)In Australia, factors associated with sharing injecting equipment among a sample of 13-18 year olds attending a Drug and Alcohol Withdrawal service suggested increased odds associated with using heroin (OR=5.33, 95% CI 2.13-13.4) and using drugs with a partner (OR=2.81, 95% CI 1.28-6.20). (Dean et al., 2010)

[3] Speedballing refers to the injecting of cocaine and an opiate in the same syringe.

Sexual risk behaviours

One study reported risk factors associated with non-condom use among a sample of 15-19 year olds in Ireland. Findings suggest lower risk among those with more than one sex partner in the last year (OR=0.33, 95% CI 0.25-0.45) and among those who had ever taken condoms while attending the NSP (OR=0.33, 95% CI 0.25-0.45). Increased risk was associated with sharing a needle/syringe in the last year (OR=2.13, 95% CI 1.70-3.16). (Mullen and Barry, 2001)

4.3 Barriers and Facilitators to services

Needle/Syringe Programmes

In New York higher proportions (79% 15/19) of younger injectors (19-25 years) had inadequate syringe coverage (defined as obtaining fewer needle/syringes than number of times injected in the last month) compared to their older counterparts (26 and older, 246/459). Other factors increasing risk of inadequate coverage included being homeless (OR=1.6, 95% CI 1.6-2.5), male (OR=1.6, 95% CI 1.0-2.6), injecting in a public place (OR=1.9, 95% CI 1.2-3.0) and being of Black/African American ethnicity (OR=3.0, 95% CI 1.5-6.2) or Latin American (OR=2.5, 95% CI 1.3-4.8) compared to white/Caucasian. (1.0). (Heller et al., 2009) Again in the US, 47% (98/209) of PWID (median age 26 years) reported using a NSP for at least 25% of their clean needles (Cronquist et al., 2001)and 25% (73/294) of a sample aged 15-30 years used NSPs or pharmacies. (Sherman et al., 2004)

Drug Treatment Services

Among young street-involved youth[4] (aged 14-26 years) in Vancouver, 32% (131/529) had attempted to access a drug or alcohol service in the last 6 months. Among these 32% who had attempted (131), 68% had been unsuccessful or reported difficulties in accessing services. Most commonly cited barriers included a long waiting list, behavioural problems, programme fees, the service not providing the treatment needed, or inconvenient location of service. (Hadland et al., 2009) A different study drawing from the same cohort (n=478) reported that 51% had ever accessed some form of Alcohol or other drug (AOD) treatment (including methadone maintenance). (Wong et al., 2009)People of aboriginal ethnicity (OR=1.66, 95% CI 1.05-2.62), with high school education (OR=1.66, 95% CI 1.09-2.55), a history of mental illness (OR=2.25, 95% CI 1.50-3.38), who had engaged in sex work in the last 6 months (OR=1.59, 95% CI 0.88-2.88) or used crack (OR=2.93, 95% CI 1.76-4.89) or had a drug binge (OR=1.03, 95% CI 0.64-1.66) as well as spending more than $50 (Canadian) had increased odds of accessing services in the last 6 months (OR=2.13, 95% CI 1.41-3.22). (Hadland et al., 2009)Those who had been in prison (OR=2.04, 95% CI 1.33-3.14), had overdosed (OR=2.84, 95% CI 1.82-4.42) used crack (OR=2.06, 95% CI 1.35-3.13) or injected drugs (OR=1.58, 95% CI 1.0-2.51) had increased odds of ever accessing AOD services, but neither age nor heroin use was associated with service use. (Wong et al., 2009) These findings are summarised in Table 5.

[4] The term street-involved youth is used rather than street youth since being homeless was not an eligibility requirement for recruitment, only that youth spent a large proportion of time on the street.

In New York, 49% (102/209) of young PWID (median age 26 years) had used a health service, 60% (125/209) had been in drug treatment and 47% (98/209) had used an NSP for obtaining at least 25% of syringes. Those who had used health care had increased odds of being in drug treatment (OR=2.57, 95% CI 1.31-5.04), being gay/bisexual (OR=3.86, 95% CI 1.40-10.76) and reduced odds of injecting cocaine (OR=0.45, 95% CI 0.22-0.92). Increased odds of using health services were also associated with use of an NSP, and odds were far higher among those with health insurance (OR=10.66, 95% CI 1.46-77.6) than those without (OR=2.45, 95% CI 1.04-5.76). (Cronquist et al., 2001) In Baltimore, 25% (74/294) of young PWID (15-30 years) reported acquiring needles/syringes safely (though an NSP or pharmacy and defined as safe acquisition). Those who had injected for longer than two years (OR=2.43, 95% CI 1.23-4.81), who reused their equipment (OR=2.57, 95% CI 1.17-5.64) and obtained more equipment per pickup (or =16.7, 95% CI 5.97-46.8), safely disposed of their equipment (OR=2.28, 95% CI 1.20-4.37), had attended education beyond high school (OR=2.17, 95% CI 1.10-4.28) and were White/Caucasian vs. African American (OR=3.20, 95% CI 1.36-7.51) had increased odds of obtaining needles/syringes through a pharmacy of NSP. (Sherman et al., 2004)

4.4 Evaluation of services

Needle syringe programmes

An evaluation of a youth specific NSP in San Francisco, USA encompassing street outreach and secondary distribution of needles/syringes compared risk behaviours between those attending the intervention at least 3 times in the past 6 months with those attending less frequently. The mean age of the sample was 20 years (n=161, 13-23 years), 50% reported sharing needles/syringes in the last month and the average duration of injection was 3 years. NSP attendees had fewer partners with whom they shared needles/syringes in the last week (>1 vs. <=1) (0.33, 95% CI 0.14-0.78). Use of the NSP was not associated with sharing needle/syringes in the past 30 days (OR=0.61, 95% CI 0.29-1.26); sharing rinse water (OR=0.59, 95% CI 0.27-1.30); and injection by another person (OR=0.62, 95% CI 0.30-1.28). (Guydish et al., 2000)

An evaluation in the USA of a community based intervention comprising youth friendly media and secondary distribution of needles/syringes targeted to young people (n=122, aged 15-25 years) living in a homeless encampment against a non-intervention site recorded higher odds of sharing needle/syringes (OR=3.78, 95% CI 1.41-10.0); reusing the same syringe for injection (OR=1.77, 95% CI 1.12-6.85); and inconsistent condom use with a casual partner (OR=4.8, 95% CI 1.39-16.7) among the population recruited through the non-intervention site. (Sears et al., 2001) An evaluation of a youth targeted NSP operating out of a mobile van, found that the intervention was associated with decreased risk behaviours among young PWID (n=195, 16-24 years) .Factors associated with NSP use included: reduced odds of sharing needles (OR=0.48, 95% CI 0.24,0.98); sharing paraphernalia (OR=0.53, 95% CI 0.28-0.99); use of another drug to come down (OR=0.31, 95% CI 1.09, 3.63); using a dirty needle when high (OR=0.27, 0.13-0.56); using a dirty needle when craving drugs (OR=0.41, 95% CI 0.22-0.77). (Kipke et al., 1997) Sample sizes for all three studies were small.

A larger study in the US of an older sample (n=700, 64% were younger than 26 years) suggested that more frequent attendance at an NSP (at least once a month) was associated with reduced odds of ever sharing syringes (OR=0.32, 95% CI 0.19-0.54); sharing cookers, cotton, water (OR=0.51, 95% CI 0.30-0.85); backloading (0.39, 95% CI 0.19-0.81); reusing a needle for injection (OR=0.25, 95% CI 0.13-0.45) and increased odds of always using a condom with a steady sex partner (OR=2.95, 95% CI 1.56-5.56). Attending less than once a month was not associated with a reduction in risk. (Bailey et al., 2003)

Youth targeted outreach

Two studies were identified in the US that evaluated the effect of multi-faceted interventions targeting youth. One study (n=1210) that was quasi-experimental in design comprised a youth centre, the distribution of condoms and bleach for safe injecting and an underground NSP that was compared with similar sites with no interventions. The evaluation examined several aspects of the programme: whether the intervention was successful in increasing youth contact and frequency of contact with outreach workers; whether it had an impact on HIV risk behaviours and increased access to prevention services; and to examine the relationship between outreach contact and participation in HIV prevention activities. Findings suggested that those in intervention sites and those who injected recently had increased odds of talking to an outreach worker in the past 6 months (OR=4.9, 95% CI 1.2-20.6) and those who attended the youth centre had increased odds of receiving an HIV referral (OR=4.6, 95% CI 1.4-15.0). Higher levels of contact with an outreach worker resulted in a greater number of referrals, improved follow-through on HIV-related referrals, and increased odds of using a clean needle/syringe at last injection or reusing needles for injection (OR=3.1, 95% CI 1.5-6.6). (Gleghorn et al., 1997)

The second multi-faceted peer education programme for youth vulnerable to HIV infection encompassing outreach and risk reduction counselling, access to HIV testing and life-management skills was evaluated to assess access to medical care through the programme. Those who had received care at an outreach site had increased odds of using medical care (OR=2.97, 1.19-7.39). Findings suggested younger age predicted use of medical care (OR=0.89, 95% CI 0.84-0.94); being HIV positive (OR=8.3, 95% CI 2.25-30.3), homeless (OR=3.64, 95% CI 2.06-6.43), those who had a sex partner who injected drugs (OR=5.14, 95% CI 1.06-24.9). There were some differences by sex, women having sex with an HIV positive partner (OR=9.9, 95% CI 1.01-97.1) or a history of previous pregnancy (OR=2.97, 95% CI 1.2-7.4) were positive predictors of use for women but not men. (Woods et al., 2000)

Peer driven interventions

Two evaluations of a peer driven interventions conducted in Ukraine, suggested that recruitment of PWID by their peers were successful at increasing attendance at NSPs by younger PWID. One study suggested (n=2273) that on average, each PDI recruited 6.3 times more respondents that prior to the intervention. Overall, and in each site separately, the mean age of recruits was significantly lower for those recruited via PDI, dropping from 34 years to 27.4 years ($p<0.01$). Some

evidence suggests that PDI was successful at recruiting a more varied type of drug user: pre PDI 99% were opiate users, post PDI only 65.9%. The mean age of participants was 34 years prior to the peer-driven intervention and 27 years post intervention. (Smyrnov et al., 2012) A similar intervention was implemented in another site that incorporated a brief HIV intervention component into the peer recruitment strategy. The evaluation (n=300, mean age 28 years) noted a reduction in front/back loading (31%-21%, p=0.002), using a common container (20%-11%, p<0.001) and injecting with a used needle/syringe decreased (19%-6%, p<0.001). However these injecting risk behaviours remained high after the intervention. Factors associated with injecting risk behaviours after the intervention suggested that young age was a significant predictor of backloading or frontloading[5], using a common container for drawing up drugs, using a dirty needle/syringe for injection as well as giving a needle/syringe to another PWID. (Booth et al., 2006)

5. Discussion

5.1 Social factors increasing vulnerability

Key areas of vulnerability among young PWID that emerged as important from the review include homelessness; experience of prison and being stopped by the police. The review confirms the close interplay between injecting drug use and homeless youth that has been documented in other studies. (Hadland et al., 2011, Kissin et al., 2007) The review highlighted consistently high levels of homelessness among younger PWID and this was higher than their older counterparts. In general evidence shows a high frequency of homelessness among samples of PWID irrespective of age of up to 40% in South Wales and 77% in England and Wales. (Craine et al., 2009, Health Protection Agency Health Protection Services and Microbiology Service, July 2012) A study in Wales suggested that incidence of hepatitis C was four times higher among PWID who reported being homeless in the last 12 months than among those who were housed. (Craine et al., 2009) Homelessness was also associated with increased injecting and sharing of needles/syringes in this same study. In Vancouver, a study of street involved youth, found homelessness to be a significant predictor of initiation into injecting. (Feng et al.) **Provision of NSPs need to target the multiple vulnerabilities of young PWID working in tandem with social services and criminal justice services to support young PWID who are homeless and with prison or police records that may further entrench their marginalisation.** We found some evidence to show that targeted outreach and secondary distribution of needle/syringes to homeless young people is successful at reducing injecting risk behaviours (Gleghorn et al., 1997, Sears et al., 2001) and facilitating access to health services. (Woods et al., 2000)

[5] The transfer of a drug solution from one syringe into another by removing the needle of the receiving syringe.

5.2 Injecting risk behaviours

High levels of injecting risk behaviours were reported among young PWID, although ranges varied across sites. There were no consistent differences between sharing needle/syringes between younger and older populations, suggesting that injecting risk behaviours within those sites are more likely to reflect normative injecting risk behaviours within populations of PWID. An extremely high prevalence of injecting with a used needle/syringe among young PWID (aged 18 or less) in the US (37% and 45%) as well as in Ireland, Romania, Serbia and Moldova is of particular concern. High prevalence of sharing needles/syringe among younger populations may occur as a result of requiring help with injection. Studies examining factors associated with initiation into injection suggest that the majority (>90%) of young initiates (mean ages 16-18 years) are injected by someone else the first time. (Abelson et al., 2006, Roy et al., 2002) Some evidence suggests that PWID initiating into injecting at a younger age take more health risks than other PWID by sharing needles/syringes and other injecting equipment. (Battjes et al., 1992, Fennema et al., 1997) **Interventions need to provide young PWID information on safe injecting practices.**

5.3 The effect of gender

Overall the proportion of young women/girls was high among the samples, up to 50% in studies in Vancouver and two studies finding younger age to be associated with being female. (Miller et al., 2002, Miller et al., 2007) The review suggested women are more represented among younger PWID than in older populations and that young women had higher odds of injecting with a used needle/syringe (Busza et al., 2013), and being HIV positive. (Miller et al., 2007) Younger FSWs were more frequently homeless, injecting heroin and servicing clients in cars. (Miller et al., 2011) Some studies note distinct gender differences with girls on average younger than boys when they first injected and girls relying on others (close friends or acquaintances) to be injected the first time. (Roy et al., 2002) There is considerable evidence showing the overlap between sex work and injecting drug use among female PWID and the review pointed to a high proportion of young PWID engaging in sex work. **Interventions specifically need to consider gender differences including in relation to assistance with injecting and sex work.**

5.4 Evaluation of pharmacies and NSPs

The review suggested that in Eastern Europe, pharmacies were the preferred source of needles/syringes over NSPs and outreach among young PWID. This might in part reflect the ubiquity of pharmacies selling needle/syringes in the region and the relative recent establishment of NSPs which have yet to achieve good coverage of populations. The review also found some evidence of effect of NSP use on reduced injecting risk and sexual risk behaviours among young PWID in the US (Guydish et al., 2000, Kipke et al., 1997, Sears et al., 2001) along with some evidence to suggest that more frequent use is necessary (once a month or more) for a significant effect. (Bailey et al., 2003) **There is a need for a robust epidemiological evidence documenting the key harms associated with injecting drug use among young people and how risks change over time that could effectively inform service provision. Good examples of cohorts monitoring risk among young people is taking place in Vancouver.**

Our review highlighted a lack of robust evaluations of interventions targeting young PWID, possibly reflecting the lack of targeted interventions. The three evaluations of NSP that were identified suggest that integrated interventions combining NSPs specifically for youth alongside outreach and innovative health promotion strategies, can reduce injecting risk behaviours, but the strength of this evidence is limited by the small sample sizes and cross-sectional design of the studies. Previous reviews examining effectiveness of HIV interventions among adolescents support a comprehensive approach advocating the use of needle/syringe exchanges, alongside access to reproductive health services and educational programmes to reduce HIV risk. (Kline et al., 2006, Nyamathi et al., 2005, Toumbourou et al., 2007) They draw on evidence of evaluation of NSPs in reducing HIV and injecting related harms among adult population to support their case in the light of insufficient evidence among adolescents.

Recent reviews and meta-analyses examining the effectiveness of NSPs on reducing HIV, HCV and injecting risk behaviours have not considered the effect of age when measuring impact. (Aspinall et al., 2013, MacArthur et al., 2012, Palmateer et al., 2010, Palmateer et al., 2012, Turner et al., 2011) The previous review of NSP effectiveness published by NICE, identified a few studies that demonstrated differences in service use by age, (Masson et al., 2007, Miller et al., 2002, Obadia et al., 1999) though only one focusing specifically on a younger age group that was included in this review. (Sears et al., 2001)

5.5 Outreach

Our review highlights the importance of outreach in engaging young people into services, as well as reducing injecting risk behaviours. (Gleghorn et al., 1997, Woods et al., 2000) The importance of outreach in contacting populations of homeless youth has been noted in other reviews. (Nyamathi et al., 2005, Denno et al., 2012) Considering the small numbers of young people using services, innovative approaches including outreach and peer-recruitment schemes should be incorporated into NSPs. The use of peers to engage other young people into services or provide harm reduction advice emerged as one of the more contentious issues in the policy review, but evidence suggests a beneficial role of peers in recruiting young PWID into services and reducing injecting risk behaviours. (Booth et al., 2006, Smyrnov et al., 2012) Evidence from Australia suggests that young PWID (aged <25 years) receive the majority of information on safe injecting from formal sources such as NSPs/pharmacies, although the majority also pass on information to their peers, qualitative work among this same group suggests that the accuracy of information passed on cannot always be assured further supporting the need for improved peer education building on the existing information exchange. (Treloar and Abelson, 2005) **Any service employing outreach or peers to encourage young people into services needs to be carefully evaluated.**

5.6 Methodological limitations

Studies defined younger age of PWID inconsistently and therefore age ranges were not always comparable when comparing older and younger samples across studies. Only three studies use multivariate analysis to examine the effect of age, the majority of analyses presented do not account

for the potential confounding effect of duration of injection. All the evaluation studies were cross-sectional in design with the exception of one quasi-experimental study. This study did not discuss strategies used to ensure that participants recruited from the non-intervention sites had not attended the intervention site at some point, plus there were some demographic differences between those recruited from the intervention and non-intervention site and over time. (Gleghorn et al., 1997) All studies relied on self-reported data and are therefore subject to recall and social desirability biases. Some studies attempted to reduce social desirability by using computer assisted self-interviewing - (CASI) (Booth et al., 2006, Thiede et al., 2007), trained interviewers (Bailey et al., 2003, Busza et al., 2013, Cronquist et al., 2001, Hadland et al., 2009, Kipke et al., 1997, Loxley et al., 1997, Miller et al., 2011, Miller et al., 2007, Wong et al., 2009) or peer interviewers. (Sherman et al., 2004) Strategies to minimize recall bias included limiting recall of risk behaviours to the last month or 6 months. (Bailey et al., 2003, Busza et al., 2013, Cronquist et al., 2001, Diaz et al., 2001, Kral et al., 2000) Inclusion criteria were limited to include studies of PWID, though definition of current injector varied from injection in the last four weeks to last 6 months. This criterion was extended to include samples of street involved youth that included non-injecting drug users in order to include evaluation of youth specific interventions that included needle/syringe programmes or drug treatment. (Brands et al., 2005, Gleghorn et al., 1997, Hadland et al., 2009, Woods et al., 2000)

Table 2: Differences between younger and older populations

Characteristic/ Risk factor	Location	Younger % or mean (range)		Older % or mean (range)		p value	Author
Needle/Syringe Sharing							
Needle/syringe sharing (6 months)	New York	31%	111/357	26%	52/200	0.208	Diaz, 2001
Ever injected with used needle	USA	37%	1536/4147	45%	2410/5372	0.05	Chan, 2011
Borrowed needles/syringes *	Vancouver	36%	209/582	37%	375/1016	0.552	Miller, 2007
Sharing syringes in past month	San Francisco	52%	29/56	10%	12/116	<0.05	Kral, 2001
Ever shared needle/syringes	Ireland	56%	273/485	53%	151/285	NS	Cassin et al,
Needle borrowing *	Vancouver	42%	97/232	38%	458/1205	0.971	Miller, 2002
Shared injecting equipment (last month)	Romania	26%	5/19	19%	52/281	N/A	Busza, 2013
	Serbia	35%	7/21	35%	80/227	N/A	Busza, 2013
	Moldova	13%	13/105	16%	40/245		Busza, 2013
	Albania	0%	0/7	22%	25/114		Busza, 2013
Sharing needles*	Dublin	39%	475/1219	39%	2258/5791	0.83	Mullen, 2003
Other injecting risk behaviours							
Injected by someone else	USA	63%	2614/4147	65%	3514/5372	0.05	Chan, 2011
Received help injecting	Vancouver	46%	268/582	39%	396/1016	0.005	Miller, 2007
Receiving injections	San Francisco	53%	29/56	24%	28/116	<0.05	Kral, 2001
Not injecting yourself	Ireland	27%	131/485	14.10%	40/285	<0.001	Cassin
Required help injecting	Vancouver	53%	123/232	39%	470/1205	0.001	Miller, 2002
Reused a needle before	USA	26%	1081/4147	45%	2410/5372	0.001	Chan, 2011
Injecting group size in the last month	Australia	1.9 (0-9)		1.3 (0-7)		<0.01	Loxley, 1997
Smoked prior to injecting	Ireland	93.10%	452/485	75.80%	216/285	<0.001	Cassin
Lent n/s	Ireland	18.10%	88/485	12.20%	35/285	<0.05	Cassin
Shared injecting paraphernalia	Ireland	64%	310/485	44%	125/285	<0.001	Cassin
Recent overdose	San Francisco	39%	22/56	7%	8/116	<0.05	Kral, 2001
Daily injection of heroin	Vancouver	46%	268/582	28%	284/1016	<0.01	Miller, 2007
Daily injection of cocaine	Vancouver	33%	192/582	35%	356/1016	0.347	Miller, 2007
Demographic characteristics							
Age <16 at initiation into injection	Vancouver	38%	221/582	33%	335/1016	0.039	Miller, 2007
Age first drug use	Ireland	16.9		22.6		<0.001	Cassin
Age first injection	Ireland	18.9		24.8		<0.001	Cassin

Characteristic/ Risk factor	Location	Younger		Older		p value	Author
		% or mean (range)					
Female	San Francisco	38%	21/56	35%	41/116	NS	Kral, 2001
	Ireland	30.50%	148/485	15.40%	44/285	<0.001	Cassin et al
	Vancouver	50%	116/232	32%	386/1205	0.001	Miller, 2002
	Vancouver	47%	274/582	30%	305/1016	<0.001	Miller, 2007
	Romania	26%	4.94/19	19%	53/281	N/A	Busza, 2013
	Serbia	4.80%	1.008/21	25.60%	58/227	N/A	Busza, 2013
	Moldova	20.00%	21/105	76.70%	188/245	N/A	Busza, 2013
	Ireland	30%	586/1953	24%	1390/5791	<0.001	Smyth, 2004
	USA	27%	96/357	29%	58/200	0.692	Diaz, 2001
Engaging in sex work	USA	11%	39/357	14%	28/200	0.367	Diaz, 2001
	Vancouver	44%	256/582	20%	203/1016	<0.001	Miller, 2007
	San Francisco	18%	10/56	11%	13/116	NS	Kral, 2001
	Vancouver	41%	95/232	24%	289/1205	0.001	Miller, 2002
	Moldova	33%	35/105	42.10%	103/245	NS	Busza, 2013
Sexual risk behaviours							
Never used condom with steady partner	New York	38%	136/357	59%	118/200	0.001	Diaz, 2001
Never use condom with non-steady partner	New York	15%	55/357	29%	58/200	0.001	Diaz, 2001
Unprotected sex	Vancouver	8%	47/582	70%	711/1016	<0.001	Miller, 2007
Unprotected vaginal sex	San Francisco	77%	43/56	53%	62/116	<0.05	Kral, 2001
Did not use protection during last sexual encounter	Australia	61.90%	99/160	71.90%	265/368	<0.05	Loxley, 1997
No condom use	Dublin	61%	744/1219	55%	3185/5791	<0.001	Mullen, 2001
No condom use	Ireland	30.90%	150/485	41.80%	119/285	<0.001	Cassin
No condom use with last casual partner	Vancouver	74%	172/232	85%	1024/1205	0.001	Miller, 2002
Multiple sexual partners	Ireland	28.50%	138/485	21.30%	61/285	<0.05	Cassin
Sex partner in injects drugs	Ireland	41.90%	203/485	33.60%	96/285	<0.05	Cassin
Sex partner in injects drugs	Romania	47.40%	9/19	74.40%	209/281	N/A	Busza, 2013

*Time frame not specified

Characteristic/ Risk factor	Location	Younger		Older		p value	Author
		% or mean (range)					
Experience of homelessness							
Homeless	New York	77%	275/357	41%	82/200	0.001	Diaz, 2001
	Vancouver	26%	151/582	6%	61/1016	<0.001	Miller, 2007
Number of addresses	Australia	Mean=4.7 (1-40)		Mean=3.5 (1-40)		<0.05	Loxley, 1997
Homeless last 6 months	Vancouver	68%	38/56	36%	72/199	<0.001	Miller, 2011
	Dublin, Ireland	6.50%	127/1953	1.90%	110/5791	<0.001	Smyth, 2004
Experience of prison/police							
Ever been in prison	New York	15%	54/357	49%	98/200	<0.001	Diaz, 2001
Jail/Youth detention	Vancouver	37%	215/582	31%	315/1016	0.016	Miller, 2007
Arrested past year	San Francisco	86%	48/56	87%	101/116	NS	Kral, 2001
Stopped by the police	Moldova	37.10%	39/105	53.50%	131/245	0.005	Busza 2013
	Albania	66.70%	5/7	67.60%	77/114		
	Romania	57.90%	11/19	77.30%	217/281		
	Serbia	42.90%	9/21	62.60%	142/227		
Been in prison	Moldova	2.90%	3/105	12.20%	30/245	0.002	
	Albania	50.00%	3/7	47.40%	54/114		
	Romania	21.10%	4/19	29.30%	82/281		
	Serbia	33.30%	7/21	50.70%	115/227		
Blood Borne Viruses							
HIV	New York	3%	11/357	10%	20/200	0.001	Diaz, 2001
	San Francisco	5%	3/56	10%	12/116	NS	Kral, 2001
	Australia	1.30%	2/160	3.40%	12/368	NS	Loxley, 1997
	Vancouver	10%	23/232	24%	285/1205	N/A	Miller, 2002
	Vancouver	18%	10/56	24%	48/199	0.361	Miller, 2011
HCV	New York	42%	150/357	52%	104/200	0.031	
	Australia	22.80%	36/160	63.80%	235/368	<0.001	Loxley, 1997
HBV	Australia	5.70%	9/160	21.20%	78/368	<0.001	

Characteristic/ Risk factor	Location	Younger		Older		p value	Author
		% or mean (range)					
Use of health services							
Used NSP in past 6 months	New York	31%	111/357	26%	52/200	0.259	Diaz, 2001
Drug treatment*	Vancouver	68%	396/582	78%	792/1016	0.048	Miller, 2007
Denied treatment	Vancouver	23%	134/582	18%	183/1016	<0.001	Miller, 2007
Received methadone maintenance therapy	Vancouver	6%	35/582	14%	142/1016	<0.01	
Currently in drug treatment	San Francisco	0%	0/56	17%	20/116	<0.05	Kral, 2000
Receiving drug treatment	Australia	23.80%	38/160	50.80%	187/368	<0.01	Loxley, 1997
% had HIV test	Ireland	38.40%	186/485	60.80%	173/285	<0.001	Cassin
% vaccinated for HBV	Ireland	10.90%	53/485	30.20%	86/285	<0.001	Cassin
Attempting to access drug or alcohol addiction service in last 6 months at least once	Vancouver	26.50%	13/49	32.10%	154/480	0.426	Hadland,2009
Source of syringes in last 4 weeks:	Vancouver						
Pharmacy	Albania	100.00%	7/7	91.20%	104/114		Busza, 2013
NSP/Outreach	Albania	0.00%	0/7	22.70%	26/114		
Pharmacy	Moldova	79.10%	83/105	68.20%	167/245		
NSP/Outreach	Moldova	11.40%	12/105	28.60%	70/245		
Pharmacy	Romania	21.10%	4/19	43.70%	123/281		
NSP/Outreach	Romania	57.90%	11/19	72.20%	203/281		
Pharmacy	Serbia	76.20%	16/21	85.00%	193/227		
NSP/Outreach	Serbia	4.70%	1/21	25.10%	57/227		

* Drug treatment includes methadone maintenance therapy and other drug treatment services

Table 3: Risk factors associated with younger age

Location	Age	Sample	Age	%	Factors associated with younger age	Author
USA, San Francisco	172	PWID injecting in the last 30 days	<30	<30 years vs. >=30 years	Risk factors associated with younger age included: sharing needles/syringes (5.3, 2.1-13.1); unprotected sex (3.0, 1.3-7.0); and sex work (4.5, 1.6-12.7)	Kral, 2001
Canada, Vancouver	1598	Injection of illicit drugs at least once in the previous month	>=14	<=29 vs. >=30	Increased risk associated with younger age included the following factors: being female (2.04, 1.66-2.51); homeless (1.11, 1.02-1.20); borrowing needles/syringes for injection (1.08, 1.01-1.16); history of prison (1.16, 1.08-1.24); daily injection of heroin (1.11, 1.03-1.19); and daily injection of cocaine (1.07, 1.0-1.15). Reduced risk associated with younger age included testing positive for antibodies to HIV (0.75, 0.63-0.90); testing positive for antibodies to HCV (0.37, 0.29-0.47); receiving OST (0.77, 0.68-0.87); or drug treatment (0.93, 0.86-0.87).	Miller, 2007
Canada, Vancouver	255	Female sex workers using illicit drugs	>=14	Median=36 (IQR=25-41) (<=24 vs. >=25 years)	Increased risk associated with younger age among FSWs included the following factors: injecting heroin frequently (1.35, 1.06-1.74); being homeless (1.26, 1.07-1.48) servicing clients in cars and public spaces (1.28, 1.04-1.57). Reduced odds were associated with receiving OST (0.72, 0.62-0.93).	Miller, 2011

Table 4: Other risk factor analysis among young PWID

Location	Population	Sample	Risk behaviour	%	Factors associated with risk behaviour	Author
Moldova	PWID (15-24 years)	275	Sharing needles/syringes in the last 4 weeks	15%	Risk factors associated with sharing included: being female (4.04, 1.71-9.50); being from an ethnic minority (Bulgarian, Gaguzian, Roma or mixed) (4.98, 1.93-12.87); experience of prison (4.58; 1.69-12.42). Reduced odds were associated with obtaining needles/syringes from a formal source only (NSP, outreach, pharmacies) (0.33, 0.12-0.93) or a combination of formal and informal (0.33, 0.12-0.93) compared to informal only.	Busza, 2013
Romania		290		19%	Risk factors associated with sharing included: experiencing police harassment in the last 12 months (3.17, 1.22-8.19); experience of prison (2.81, 1.42-5.55). Reduced odds of sharing were associated with obtaining needles/syringes from a formal source only (0.18, 0.68-0.49) compared to informal only.	
Serbia		242		35%	Risk factors associated with sharing included reduced odds associated with obtaining needles/syringes from a formal source only (0.28, 0.10-0.81) compared to informal only.	
San Francisco	PWID (15-29, median=22)	312	Anti-HCV positive	45%	Factors associated with HCV included: age (1.17, 1.05-1.30); duration of injection (1.21, 1.10-1.34); initiation into injecting by a sex partner (4.06, 1.74-9.52); daily injection in the past month (3.85, 2.07-7.17); injected by someone else in the last 30 days (0.50, 0.25-0.99); ever borrowed a needle (2.56, 1.18-5.53); snorted other drugs in last year (0.48, 0.26-0.89); and cleaned needle with bleach last time borrowed (0.50, 0.24-1.02).	Hahn, 2001
			ever borrowed someone else's needle	66%		
			shared paraphernalia	78%		
			obtained n/s from NSPs	49%		
			from secondary exchangers	60%		
			used alternative sites	40%		

Location	Population	Sample	Risk behaviour	%	Factors associated with risk behaviour	Author
Ireland, Dublin	PWID (15-19 years)	1219	Sharing a needle/syringe in previous year	39%	Multivariate analysis of risk factors associated with needle/syringe sharing include lower odds among those injecting for less than a year (0.70 0.51-0.95), among those using condoms (0.48, 0.35-0.65). Increased odds of sharing reported among those with more than one sexual partner in the previous year (1.47, 1.08-1.99) and among those reporting hepatitis or jaundice (1.75, 1.12-2.72).	
			Reported non condom use at first attendance	49%	Risk factors associated with lack of condom use include sharing a needle in the last year (2.13, 1.70-3.16), lower odds associated with having more than one sex partner in the previous year and taking condoms during attendance at NSP (0.33, 0.25-0.45). 8% (79/1010) were currently receiving methadone and 23% (282/1223) had ever had an HIV test.	Mullen, 2001
Australia	Attendees at the Adolescent Drug and Alcohol Withdrawal Service (ADAWS) Injecting not specified but 19% heroin users (13-18 years; mean=16)	272	Heroin as primary drug and Needle/syringe sharing		Associations between heroin use as primary drug included: female sex (4.70, 1.90-11.60); use for emotional stress (0.42, 0.18-0.99). Factors not associated with heroin use included: age; number of drugs used; homeless; using with partner; use to self harm. Factors associated with sharing injecting equipment included: using heroin (5.33, 2.12-13.40); using with a partner (2.81, 1.28-6.20). Factors not associated with sharing included: age, number of drugs use, being homeless, currently using cannabis or psychostimulants; injecting drug use; using for emotional stress, using to self harm.	Dean, 2010
Vancouver, Canada	Young female PWID (<=24 years)	117	Anti-HIV positive	17%	Risk factors associated with being HIV positive among female youth included: Increased age per year (1.7, 1.3-2.3); Speedball >=1/day (7.5,1.9-30.0) having a regular sex partner yes vs. no (0.2, 0.-0.6); Education yes vs. no (0.3, 0.1-0.9)	Miller, 2002

Table 5: Barriers and facilitators to services

Location	Population	Sample	Type of service	Uptake	Factors associated with service use	Author
Vancouver	Street involved youth (14-26 years; median= 22 year)	529	Accessing or attempted access on at least 1 occasion drug or alcohol addiction services in the last 6 months prior to interview	32%	Factors associated with attempted service use included: aboriginal ethnicity (1.66, 1.05-2.62); high school education (1.66, 1.09-2.55); history of mental illness (2.25, 1.50-3.38); history of sex work in last 6 months (1.59, 0.88-2.88); non-injection crack use in last 6 months (2.93, 1.76-4.89); drug bingeing behaviour in last month (1.03, 0.64-1.66); Money spent/day on drugs >=$50 (2.13, 1.41-3.22).	Hadland, 2008
Vancouver	Street involved youths (14-26 years; median=22)	478	Had ever accessed some form of alcohol or drug (AOD) treatment (including methadone maintenance)	51%	Factors associated with accessing AOD services included: a history of prison (2.04, 1.33-3.14), overdose (2.84, 1.82-4.42), crack use (2.06, 1.35-3.13), experience of injecting (1.58, 1.00-2.51). Factors not associated with AOD included: age or heroin use.	Wong, 2009

Location	Population	Sample	Type of service	Uptake	Factors associated with service use	Author
New York	PWID (19-45+ years)	504	Inadequate syringe coverage (defined as receiving fewer syringes in past month than numbers of times injecting		In multivariate analysis younger age (19-25) was associated with inadequate syringe coverage compared to those aged >45 years, Other factors included, being homeless (OR=1.6 1.0-2.5), being male (OR=1.6, 1.0-2.6), injecting in a public place (OR=1.9, 1.2-3.0) and ethnicity Black/African American (3.0, 1.5-6.2) or Latino/Hispanic (OR=2.5, 1.3-4.8) compared to white/Caucasian	Heller et al, 2009
			19-25 years	15/19 (79%)		
			26-35 years	54/85 (64%		
			36-45 years	95/169 (56%)		
			>45 years	97/205 (47%)		
New York	PWID (18-29; median=26)	209	Used health services	49%		Cronquist et al, 2001
			In drug treatment	60%		
			Used an NEP for at least 25% of syringes	47%		
					Associations between using health care included experience of drug treatment (2.57, 1.31-5.04) being gay/bisexual (3.86, 1.40-10.76) injecting cocaine (0.45, 0.22-0.92) Using NEPs among those with insurance (10.66, 1.46-77.6) Using NEPs among those without insurance (2.45, 1.04-5.76).	
USA, Baltimore	PWID (15-30 years)	294	Safe acquisition of needle/syringes defined as from an NSP or pharmacy	25%	Safe acquisition of needles/syringes	Sherman et al, 2004
				2	Median number of n/s obtained at one time	
				47%	Safe disposal (NSP, break it or throw it away)	
					Factors associated with safe acquisition of n/s included: injecting for longer than two years (2.43, 1.23-4.81), five or more injections per syringe (2.57,1.17-5.64), obtaining more than two syringes per pickup (16.7, 5.97-46.8); safely disposing of syringes (2.28, 1.20-4.37); attended education beyond high school (2.17, 1.10-4.28); White ethnicity vs. Africa American (3.20, 1.36-7.51).	

Table 6: Evaluation of youth interventions

Population	n	Follow up	Intervention	Findings	Author
PWID (13-23, mean=20 years)	161	Cross-sectional	Youth-specific NSP offering street based outreach, secondary distribution and 'home delivery' services	Respondents attending NSP at least 3 times in the past 6 months defined as NSP users, those visiting less frequently or never as non-NSP users. Multivariate logistic model showed that NSP attendees had fewer partners with whom they shared n/s in the last week (>1 vs. <=1) (0.33, 0.14-0.78); lower odds of using a single syringe more than once (0.42, 0.18-0.98); and lower odds of owning fewer than 5 syringes (0.20, 0.09-0.43). Use of NSP was not associated with sharing n/s in the past 30 days (0.61, 0.29-1.26); sharing rinse water (0.59, 0.27-1.30); inconsistent skin cleaning prior to injection (1.41, 0.54-3.69); and injection by another person (0.62, 0.30-1.28).	Guydish, 2000
PWID (15-25 Mean =20.9)	122	Cross-sectional	Intervention targeting a population living in homeless encampments. Three components of intervention: 1) population-subculture specific media; 2) community development activities; and 3) enhanced model of secondary NSP distributed by young PWID who had gained respect from their peers, including daily contact with supporting community based project that provided n/s supplies and other services as necessary.	Multivariate analysis of risk factors associated with those recruited from the non-intervention site suggested higher odds of sharing needle/syringe (3.78, 1.41-10.0); reusing the same syringe (1.77,1.12-6.85); and inconsistent condom use with casual partner (4.8, 1.39-16.7)	Sears, 2001
PWID (16-24 years)	195	Cross-sectional	NSP	Factors associated with NSP use included: reduced odds of sharing needles (0.48, 0.24, 0.98); sharing paraphernalia (0.53, 0.28-0.99); use another drug to come down (0.31, 1.09, 3.63); using a dirty needle when high (0.27, 0.13-0.56); using a dirty needle when craving drugs (0.41, 0.22-0.77).	Kipke, 1997

Population	n	Follow up	Intervention	Findings	Author
PWID (18-30 years; 64% <26 years)	700	Cross-sectional	NSP	PWID who injected daily had increased odds of attending the NSP 1-6 times (1.64, 1.10-2.42) or >=7 time (2.88, 1.6904.91) compared to non-daily injectors. For all other factors there was no effect on attending the NSP between 1-6 times on injecting risk behaviours. PWID who attended the NSP >=7 time had reduced odds of ever sharing syringes (0.32, 0.19-0.54); sharing cookers, cotton, water (0.51, 0.30-0.85); backloading (0.39, 0.19-0.81); reuse a needle for injection (0.25, 0.13-0.45) and increased odds of always using a condom with a steady sex partner (2.95, 1.56-5.56).	Bailey, 2003
HIV+ and at risk youth (12-24 years)	1044	Cross-sectional	Boston HAPPENS (HIV Adolescent Provider and Peer Education Network for Services) Programme. Includes: outreach and risk reduction counselling; access to developmentally and culturally appropriate HIV testing and counselling ; life management counselling; health status screening and needs assessment; client-focussed comprehensive, multi-disciplinary care and support; follow-up and outreach to ensue continuing care; and integrated care and communication between providers in the area.	Analysis to assess access of medical care through the programme. Younger age predicted use of medical care (0.89, 0.84-0.94), being HIV positive (8.26, 2.25-30.29), homeless (3.64, 2.06-6.43), Hispanic (6.08, 3.75-9.88) or Black ethnicity (2.93, 1.96-4.39), sex with IDU (5.14, 1.06-24.88), previous pregnancy (3.74, 1.54-9.12), care at an outreach site (10.04, 6.88-14.65). There were differences by sex: among women having sex with an HIV+ person (9.88, 1.01-97.06) and previous pregnancy (2.97, 1.19-7.39) was a significant predictor but not for men.	Woods, 2000
Street Youth (~38% less than 18 years)	1210	6 surveys over 24 months	Geographical location where street youth congregate. Basic street outreach by outreach workers and peer health educators, presented information on services at youth centre, distribution of condoms, bleach and flyers. Subculture specific intervention tools including posters, t-shirts, condom packets, stickers, harm reduction cards and a video also produced in collaboration with youth. Underground youth NSP advertised through word of mouth to youth only.	Attending the intervention (OR 4.0, 1.7-9.3) and recent injecting drug use (1.7, 1.1-2.7) were significant predictors of talking to an OW in the past 6 months. Youths attending the intervention had increased odds of receiving referrals (4.6, 1.4-15.0). Number of outreach contacts was associated with numbers of HIV-related referral (effect increases with 4 levels of contacts). The intervention was no longer significant predictor. Youth with 30 or more outreach worker contacts in last 6 months, had increased odds of using clean n/s at last injection (4.9, 1.2-20.6). PWID with youth NSP available had increased odds of using a new syringe at last injection (3.1, 1.5-6.6).	Gleghorn

Evaluation of peer driven interventions (Ukraine)

Population	n	Follow up	Intervention	Findings	Author
PWID (Mean=28; SD=7.2)	300	6 months (269 followed up)	Indigenous Leader Outreach Model - Former PWID act as outreach workers to access target population and conduct a baseline interview. During next 5 months participants receive HIV interventions	Reduction in injecting risk behaviours pre and post intervention: Used preloaded syringe in past 30 days. Front/back loaded 30.6% to 20.9% (0.002); Used common container 19.7% to 11.2% (0.002); Used dirty n/s 19% to 6% (<0.001); Composite risk 45.7% to 25.3% (<0.001). Multivariate logistic regression model was developed for each outcome using significant predictors from univariate analysis. Young age was associated with front or back loading (0.88, 0.81-0.94); use a common container (0.91, 0.84-0.99); use dirty n/s (0.88, 0.78-0.98); as well as give their n/s to another PWID (0.92, 0.85-0.99).	Booth
PWID			Projects that had been unsuccessful in recruiting new participants were selected (n=5 sites), 3 health educators were trained in each site to test a peer driven intervention (PDI). HEs recruited 'seeds' among PWID, seeds recruits other PWID and those PWID recruit others in a chain referral sampling strategy (respondent driven sampling). Each recruit is provided HIV intervention information and actively referred to services. Each recruit is provided an opportunity to become a recruiter. Those who agree are given a baseline survey to assess what they have learnt on HIV prevention. They are provided with more enhanced training, and then continue further recruiting via Respondent Driven Sampling technique.	On average, each PDI recruited 6.3 times more respondents that prior to the intervention. Overall the proportion of female PWID recruited was 6% points greater than the 26% recruited by traditional outreach; this difference was statistically significant in 3 sites. Overall, and in each site separately, the average age of recruits was significantly lower for those recruited via PDI, dropping from 34 years to 27.4 years (P<0.01). Some evidence to suggest that PDI was successful at recruiting more varied type of drug user. Pre PDI 99% were opiate users, post PDI only 65.9%.	Smyrnov, 2012

All interventions are location in the US with the exception of the peer driven interventions

QUALITATIVE SYNTHESIS

Factors influencing access to needle and syringe programmes among young people who inject drugs

1. Aim

The aim of this evidence review is to understand the factors that may influence needle and syringe service access among young people who inject drugs. The primary research questions were:

Question 1: What are the social factors shaping patterns of use, perceptions of risk, harm, benefit and pleasure, and help-seeking (especially NSP) among young people who use drugs?

Question 2: What are the implications of the above for future provision and delivery of NSP and linked harm reduction services?

Question 3: What are the processes though which youth influences drug use and injecting risk behaviours and other harms associated with injecting drug use and how might these shape the use of needle/syringe programmes and other strategies to manage risks?

We analysed the reported social meanings, experiences and perspectives of young PWID and the social and environmental factors shaping these, in order to identify key themes with specific implications for service access.

2. Methods

2.1 Data extraction, analysis and synthesis

There is a lack of research specifically investigating access and uptake of needle and syringe services by young PWID. We therefore drew on literature concerning young people who inject drugs and 'street-involved'[6] youth more broadly in order to develop a comprehensive account of the reported social meanings, experiences and perspectives of young PWID, the social and environmental factors shaping these, and their implications on NSP service provision. Studies were examined with a focus on data exploring: access to welfare services; perceptions of risk (and thus perceptions of NSP need); circumstances surrounding injection initiation; and the social and structural environment within which young PWID live and use drugs that have relevance to the provision of NSPs. We took a thematic approach to our analysis, reading across studies to generate key themes that might have theoretical relevance for exploring service access. This process involved synthesizing key 'first order' themes identified in the original analysis of papers included in the review, supplemented by the creation of new 'second order' themes developed inductively[7] from the synthesis (Rhodes and Treloar, 2008). All papers were read and reviewed by BM and TR. Contextual details regarding study setting, participants, study design and data collection and analysis methods, were recorded to aid our understanding of interpretations.

3. Included Studies

We included 25 papers, summarised in Table 7. These included: 18 papers studying the social factors shaping patters of drug use, perceptions of risk, benefit and pleasure, and help-seeking among young people who inject drugs; 6 papers focusing more specifically on perceptions of blood borne virus risk or the circumstances surrounding initiation to injecting; and one evaluation of services providing NSP specifically to young people. We excluded 8 papers where analysis of data by age or injection drug use was limited, and two papers for placing insufficient emphasis on qualitative data. Papers represented work conducted in USA (4), Canada (9) Australia (3), Central and Eastern Europe (5), Ireland (1), and UK (3). All studies were conducted since the year 2000, and the majority since 2005, with the exception of one conducted in 1995 and one in 1999.

Among the included papers, thirteen were judged to be of good quality, seven were of average quality, and five were of poor quality due to limited descriptions of methodology. Quality was assessed by scoring each study for the appropriateness of the study design, recruitment strategy and data collection methods, to address the research aims. Scientific rigor was assessed on the level of discussion of data collection, participant selection, analysis methods and data presented. Additionally, the extent to which a critical examination of the role of the researcher, bias, influence, credibility and limitations were discussed was also assessed. Each criteria was given a score, and a

[6] 'street-involved' youth were young people with experience of homelessness, and self-reported illicit drug use other than marijuana. Participants were involved in numerous income generation activities including street-level drug dealing, sex work, theft and exchange of stolen goods, recycling activities, begging and street performing (busking).

[7] Inductively – patterns or hypotheses emerge from the data (as opposed to deductive, where an existing hypothesis is tested using the data).

final overall assessment was made (good ++, average +, poor -). See Appendix B for the Quality Assessment criteria.

In excess of 600 PWID were included across the studies represented in included papers. However, due to age ranges exceeding 25 years, we were not able to determine the precise numbers of young PWID included. The mean or median age of study participants was equal to or less than 25 years in all studies, with the following exceptions: Davis et al., 2004; median age 29.8 years; and Pierce et al., 1999; age range 19-31 years (no average stated). However for both of these studies, many of the data extracts reported were among those aged less than 25 years and these were therefore included in our analysis.

Data collection for most studies was by in-depth semi-structured interview. Five studies also drew on focus group data and five also drew on ethnographic fieldwork. One study primarily reported ethnographic fieldwork data, presented as a narrative of the researcher. The majority of studies solely interviewed PWID, however nine studies presented data from ‘street-involved’ young people – a mixed population of injection and non-injection illicit drug (other than marijuana) users.

Table 7 Included Studies

Reference	Year	Setting	Participants	Data collection method	Quality Assessment
Barnaby, L	**2010**	Toronto / Canada	27 street-involved young people who had used crack, speed, opiates (not prescribed) and/or injected any drug in past 6 months. Aged 16-24years.	3 focus group discussions. Also a quantitative survey, with some open-ended questions.	Average (+)
Buccieri, K	**2010**	Ontario/Canada	6 male, 4 female street-involved young people aged 16-24years, and 3 male, 6 female service providers at a drop-in centre for homeless young people.	Semi-structured interviews	Poor (-)
Buzducea, D	**2011**	Bucharest, Timisoara, Iasi and Constanta / Romania	20 PWID, 10 MSM, 15 FSW and 11 programme managers from NGOs providing outreach services for marginalised groups. The PWID population was aged 13-21years.	Semi-structured interviews	Poor (-)
Davis, M	**2004**	London / UK	19 current PWID, aged 17-50years (mean 29.8 years), many quotes were from those aged <25 years.	In-depth interviews	Good (++)
Fast, D	**2009**	Vancouver/ Canada	38 street-involved young people with self-reported current use of illicit drugs other than marijuana. Aged 16-26years (median 22 years)	In-depth semi-structured interviews	Good (++)
Fast, D	**2010a**	Vancouver/ Canada	38 street-involved young people with self-reported current use of illicit drugs other than marijuana. Aged 16-26years (median 22 years)	Semi-structured in-depth interviews and ethnographic fieldwork	Good (++)
Fast, D	**2010b**	Vancouver/ Canada	38 street-involved young people with self-reported current use of illicit drugs other than marijuana. Aged 16-26years (median 22 years)	Semi-structured in-depth interviews and ethnographic fieldwork	Good (++)

Harocopos, A	**2009**	New York City / USA	54 PWID. Aged 16-42 (median 22 years). All but two quotes from people <24 years, mostly teenagers.	In-depth semi-structured bi-monthly interviews for 2 years.	Good (++)
Hughes, R	**2000**	NE England/ UK	14 PWID with experience of imprisonment. 7 aged 16-24 years and 7 aged 25-36 years.	In-depth interviews using a vignette, focus groups and ethnographic fieldwork	Average (+)
Krusi, A	**2010**	Vancouver/ Canada	38 street-involved young people with self-reported current use of illicit drugs other than marijuana. Aged 16-26 years (median 22 years)	In-depth semi-structured interviews	Good (++)
Lankenau, S	**2005**	New York City / USA	40 PWID. Aged 18-25 years (median 21 years).	Semi-structured survey with open and closed-ended questions	Average (+)
Loxley, W	**1995**	Perth / Australia	105 illicit drug users. Aged 14-20 years (median 18 years). 79 current injectors and 26 non-injectors.	Quantitative data and qualitative interviews	Average (+)
Mayock, P	**2005**	Dublin / Ireland	1998: 57 participants aged 15-19 years; 18 non-illicit drug users, 21 illicit drug users, 18 people with 'problem drug use'. Follow-up 2001: 42 of these participants (almost all heroin smokers transitioned to injecting).	Longitudinal ethnographic study. Individual in-depth interviews and six focus group discussions	Average (+)
McCalman, J	**2001**	Cairns / Australia	PWID with past experience of homelessness. Aged 12-22 years.	Mixed methods: Focus groups, questionnaire and interviews	Poor (-)
Pierce, T	**1999**	Washington, DC / USA	12 affluent Caucasian PWID. Aged 19-31 years. 8 other and 25 peripheral network members were also studied.	Ethnographic research and network analysis	Average (+)
Preda, M	**2009**	Bucharest / Romania	7 PWID aged 17-24 years (focus group), and 10 people who have taken part in commercial sex work within the past month, aged 16-22 years.	Focus group and semi-structured interviews	Poor (-)
Racz, J	**2005**	Budapest & Pecs / Hungary	33 PWID aged 17-30 years (majority aged 22-25 years).	Semi-structured interviews	Good (++)

Rhodes, T	**2011**	Various sites/ Moldova	42 predominantly urban (88%), male (76%) PWID. Aged 16-37 years (average 25 years).	Semi-structured interviews	Good (++)
Roy, E	**2008**	Montreal / Canada	42 street-involved young people. 17 never injected, 8 tried injecting but not continued, 8 stopped following regular injecting, 9 current injectors. Aged 15-25 years.	In-depth semi-structured interviews	Good (++)
Roy, E	**2007**	Montreal / Canada	39 HCV antibody positive, HIV negative street-involved young PWID. Aged 18-27 years.	In-depth interviews	Good (++)
Sherman, S	**2002**	Baltimore / USA	19 PWID who had initiated injecting within the past 3 years. Aged 19-29 years (mean 24 years).	Open-ended interviews	Good (++)
Small, W	**2009**	Vancouver/ Canada	26 street-involved young people, including 8 people who initiated injecting in past 24 months. Aged 16-26 years (median 23 years).	In-depth interviews	Good (++)
Treloar, C	**2005**	Brisbane and Sydney / Australia	24 PWID aged 16-25 years.	Semi-structured interviews	Average (+)
Trudgeon, H	**2010**	Plymouth / UK	5 PWID, currently in drug treatment, who initiated injection <18 years. Aged 16-19 years.	In-depth semi-structured interviews	Good (++)
UNICEF		Bosnia & Herzegovina, Moldova, Montenegro, Romania, Serbia, Ukraine	Service users and providers of UNICEF's 'most-at-risk-adolescents' (MARA) programmes.	Qualitative Interviews	Poor (-)

4. FINDINGS

We generated six themes across the 25 papers, representing 21 unique studies. Key themes identified in the individual studies clustered into the following over-arching themes: distinction from older, more experienced PWID; initiation into injecting; trust and mistrust; barriers and facilitators to service use; constraints to enacting risk awareness; belonging and peer relationships.

4.1 Distinction from older PWID

A key theme emerging in studies among street-involved young people was that participants may distinguish themselves from PWID perceived to be older and more experienced. Older PWID were linked with expressions of disgust, distain and suspicion, and in some cases were also feared (Krusi et al., 2010, Barnaby, 2010, Fast et al., 2010a, Harocopos et al., 2009, Roy et al., 2008, Sherman et al., 2002, Small et al., 2009). The older more experienced person who injects drugs is thus commonly constructed as 'Other' by young people relatively new to injecting, who see themselves as distinct, especially in relation to their drug dependency and related harms:

> *'...It [low-threshold housing] was just like a lot of junkies, crackheads and cockroaches and mice... People want to rob you. It's unsafe there' (Female, 16-26 years) (Krusi et al., 2010)*

> *'[location in Vancouver] is just not nice... I don't want HIV shoved in my face. And everyone's a crackhead... I don't need to see those people scratching the fucking pebbles on the ground [i.e. 'tweaking', or repetitive fidgeting with objects in the surrounding environment as a result of stimulant use], like the guy in the park with the needle hanging out of his arm [i.e. 'nodding off', or falling asleep as a result of opiate use] ...I'm sorry, I just really don't want to see that.' (Female, 16-26 years) (Fast et al., 2010a)*

In tending to represent older PWID as more entrenched in their drug use, young people's accounts also expressed a sense of derision towards regular drug users and injectors and those who conform to popular images of addiction. As one occasional cocaine injector explains: *'There's a different standard for anyone who shoots heroin…I guess it's more of an addiction factor, like the idea that you are a junkie if you do it…' (Female, 16 years) (Harocopos et al., 2009).* We find here a core distinction made between respondents' own use of drugs for pleasure, as opposed to older 'junkies' who are positioned as using drugs as a consequence of their drug dependency (Roy et al., 2008).

> *'I'm a tripper more than someone who's going to get hooked on a drug, like a junkie. I'm not really like that... If I don't have any drugs, I don't have any. Period. You know, I'm not gonna go punch some guy's lights out to empty his pockets...' (Male, 17 years)(Roy et al., 2008).*

Other studies discussed young people's drug use in the context of social events or in terms of experimentation and pleasure seeking among peers (Harocopos et al., 2009, Lankenau and Clatts, 2005, Mayock, 2005): *'The last time I injected ketamine I was with two friends*

and we mixed it with heroin to increase the high. It's crazy we mix a whole bunch of stuff everyday…' (Male, 23 years)(Lankenau and Clatts, 2005); Harocopos and colleagues, describe injecting as part of a continuum of experimenting with a variety of street drugs: *It's not like it's a big deal: I guess a lot [of people] are concerned with their own safety but it's trial and error…seeing what we like and what we don't'. (16-42 years) (Harocopos et al., 2009)*. This more experimental approach to drug use, rooted in a narrative of pleasure seeking rather than risk management or drug dependency, therefore emerges as an important feature of the accounts of young people in contrast to those with more established patterns of drug use.

The accounts of young people involved in drug use thus tend to accentuate a desire not to progress to entrenched drug injecting and addiction, with many describing that they do not want to 'end up like that' (Krusi et al., 2010, Roy et al., 2008, Small et al., 2009). As depicted in the following account:

> *I: Thinking back to that time when you just tried that injection just once, what stopped you from injecting again?*
> *R: Um, seeing junkies. And plus hearing about junkies, people disliking junkies and, like man, I don't want to be them' (Male, 23 years) (Small et al., 2009)*

Yet it is important to note that such accounts are themselves subject to change over time, including in light of young people's ongoing engagement in injecting drug use: '*I used to despise people who shot it. I thought it was stupid, I thought it was nasty, I thought it was a horrible thing to do*' (16-42yrs) (Harocopos et al., 2009). Young people then, are also reflexive to the likelihood that they their patterns of drug use risk becoming, over time, that which they seek to avoid. It is important to note that the distinction drawn between being a younger, less experienced, user of drugs for pleasure in contrast to the older, more experienced, addict may also be a feature of accounts which is open to question in practice. As noted in one study: *'Everyone says, "I won't get strung out, I know when to stop", everyone says that. Fucking hell, "Ah now I wouldn't get strung out 'cos I'm not like that. But we always get strung out"...'* (*Female, 18yrs) (Mayock, 2005).*

The non-identification with older PWID may in turn limit self-identification with harm reduction services if these are perceived to represent the interests of older more experienced PWID by younger people. Even if young PWID identify a need for services, the distinction between how they perceive themselves and older PWID may act as a barrier to access:

> *'Most youth don't go to them [services] because it's not in their category. They're more older people and everybody... when you go into detox its mostly older people in them.' (16-24 years) (Barnaby, 2010)*

4.2 Initiation into injecting

The second key theme of particular concern for young PWID is initiation into injecting. The circumstances of injection initiation including the extent to which it is planned and prepared for, as well as assistance needed for injection, and the influence of peers, partners and older PWID may all have implications for harm reduction strategies. For example, the extent to

which a young person may feel that they are in a position to enact choices regarding safer injection practices may be compromised in situations where others are providing the injecting equipment. Young people may be particularly vulnerable due to their relative immaturity in terms of personal and social skills, and more limited access to resources, as compared to older PWID (Roy et al., 2008). The reviewed evidence links the capacity to enact choice in relation to initiation into injecting with the decision to start injecting; getting help with injections; and, the role of others.

4.2.1 Decision to start

For many young people, injecting drugs was actively sought and planned for (Harocopos et al., 2009, Lankenau and Clatts, 2005, Rhodes et al., 2011, Small et al., 2009): *'...But I really wanted to try it – I always had. I had a needle on me just in case I came across something cool.' (Male, 20 years) (Lankenau and Clatts, 2005); 'I wanted to do it, I kind of insisted on it' (16-37 years) (Rhodes et al., 2011).* Despite such articulations of agency[8] and choice, it is important to note that young peoples' interest in experimenting with drug injecting as well as capacity to influence this process, is embedded in social relationships, especially that of their peer and social networks. For instance, most interviewees described prolonged exposure to injecting from peers or relatives (Fast et al., 2010b, Fast et al., 2009, Harocopos et al., 2009, Pierce, 1999, Rhodes et al., 2011, Roy et al., 2008, Sherman et al., 2002, Small et al., 2009). Active, independent and informed decisions are thus nonetheless shaped by their environmental contexts (Mayock, 2005, Rhodes et al., 2011):

> *'Well I knew that my boyfriends mom had been doing it for years and years... she knew how to inject it. And I didn't know anything about it, but ...I had bought heroin, and I knew I wanted to try it for some reason. So, I asked her to do it for me. And she did do it for me...(Female, 22 years) (Small et al., 2009)*

> *'We always said we would NEVER do that [heroin]. Like never. But about four months ago, I don't know, I just started seeing people doing heroin and I just wanted to try it... I mean, I had always been around it ... (Female, 22 years) (Fast et al., 2010b)*

> *'My whole yard were drug addicts, I grew up with it' (16-37 years) (Rhodes et al., 2011)*

In contrast, to this theme of relative agency linked to initiation, other studies represent young people's account which emphasizes a lack of choice and/or 'pressure', in their initiation (Fast et al., 2009, McCalman and Gilbert, 2001, Preda, 2009, Rhodes et al., 2011, Sherman et al., 2002, Small et al., 2009, UNICEF, 2013). Here, accounts are more likely to position the transition to injecting as a 'giving-up' of resistance to it rather than a desire to experiment. For instance:

> *'...Male and female friends who persistently said, "Take it, take it." Almost two months they nagged me – "Take it, you will feel better, why do you think you are any different?... and I had an aversion to heroin. I thought that was rock bottom, the black hole that sucks up everything, the family, yourself... then I succumbed, I just put out my arm. I took it intravenously right away.' (Female, adolescent) (UNICEF, 2013)*

[8] Agency – the capacity of individuals to act independently and to make their own free choices

Whether articulated in terms of 'pressure' to initiate or as part of the social context shaping decisions to experiment, several studies identified older PWID and sexual partners (Fast et al., 2010b, Fast et al., 2009, Rhodes et al., 2011, Roy et al., 2008, Sherman et al., 2002, Small et al., 2009, Trudgeon and Evans, 2010, UNICEF, 2013), as having a key role in influencing initiation decisions:

> *'We weren't getting along when, you know, when we weren't doing drugs, when he was doing the drugs [injecting] and I weren't doing the drugs we couldn't get along. So once I started doing them then, we were getting along just fine. It kind of kept us together.' (Female, 27 years) (Sherman et al., 2002)*

> *R: 'Andy was 25, Kate was 26, I was 15. But I'll tell you one thing right, to be honest. You were worried about that, but [key worker] was more worried about the um, the other people like Steve. He was like, 36.*
> *I: So a lot older than you then?*
> *R: Yeah, 40 year old people, you know. // But he [key worker] was concerned because there was 40 year olds to 30 year olds, giving me free drugs (Male, 16-19 years) (Trudgeon and Evans, 2010)*

Curiosity and the observation of the pleasurable effects of heroin among their peers were cited by some as reasons for initiating injecting: *'Then I contradicted myself and actually did what she [friend] did, just to know what she felt, just curiosity pretty much... And she looked like she was having a really good time...' (Female, 19 years) (Harocopos et al., 2009).*

Importantly, whether participants viewed their initiation as self-directed or influenced by others, the needle and syringe was most commonly provided by the initiator:

> *'She's [friend] been an intravenous drug user for years, and she never wanted me to…because she doesn't want me to get like her…but she saw that I was going to do it anyway… Then she's like "Okay, fine. Let's get the heroin, let's get the needles. We'll do this." She taught me how to do it…' (Female, 20 years) (Pierce, 1999).*

> *'…My friend, my good friend, who I grew up with, offered it to me. He said that I would feel better if I shot up… He had some left from the night before… And he pulled out his syringe…and offered it to me…So, he injected me for the first time. I liked it straight away.' (Male, 26 years) (Rhodes et al., 2011)*

> *'I asked her [friend] if she had any clean needles and she had a couple and I was like is there any way I could give you some money... if you let me shoot up a little bit. And she's like 'Yeah, sure... So I'm like 'You're going to have to show me how to do this.' (Male, 17 years) (Harocopos et al., 2009)*

4.2.2 Assistance with injecting and unplanned initiation

The capacity to choose and make active decisions in relation to safer injecting may be particularly constrained by the need for practical assistance. Technical difficulties led many participants to seek help with injecting: *'He had to do it for me. He seen me poking myself*

full of holes and he said "give me the damn thing before you end up hurting yourself or killing yourself." (Female, 27 years) (Sherman et al., 2002). In some circumstances study participants described concealing their novice status (Harocopos et al., 2009), or using persuasion (Harocopos et al., 2009, Rhodes et al., 2011, Small et al., 2009), in order to obtain assistance with initial injection:

> *Bernadette, 24, recruited her injection initiator directly via the Internet through an email discussion group. ...This led to a correspondence with Rebecca, 4 years her senior and already an experienced heroin injector. Concerned that she would not agree to meet her if knew she was a novice, Bernadette was careful to present herself as an experienced user even though she had never previously tried heroin. Further into their correspondence, Bernadette revealed that she was brand new to injection leaving Rebecca hesitant to take on the role as initiator. However, she was persuaded and made all the necessary preparations... (Bernadette provided her own syringe which she had purchased online) (Extract from text) (Harocopos et al., 2009)*

> *'...and I was SO so out of my mind by the third day [following methamphetamine and crack use]. I hadn't slept... I told him [ex-boyfriend who injects heroin], "I'm way too high ...can I do some heroin?" He was like, "no, no, no" and I was like, "Please. I need to like, settle down." ...that's the excuse, cause I'm not going to say, "Can I do some heroin? I've always wanted to do it." So then he's like, "fine". And he was going to give me some tinfoil to smoke it in. And I was like, "no, no, no, if I'm gonna do it, I want to shoot it"... and then he shot me up.' (Female, 19 years) (Small et al., 2009)*

Both of the extracts above demonstrate *'bounded'* agency[9] shaping the circumstances of initiation. However, unplanned initiation, as depicted in the second extract, carries particular risks due to the necessary reliance on others for clean equipment and safer injecting practices. Moreover, where unplanned initiation occurs in the context of withdrawal from other drugs (Mayock, 2005, Small et al., 2009) or alcohol (Roy et al., 2008), this may place additional pressure on the individual's capacity to ensure safety:

> *'I was up on the landings and had no money and there were people there that didn't smoke gear [i.e., they were injectors] and offered me 2ml in a barrel, so I took it. Stuck for the gear, no money, nothing. At that stage I didn't care. I just wanted the drug anyway I could. You don't think about all the things that can happen. People that are dying sick that bad, they wouldn't even think of AIDS, they would just do it, end of story.' (Female, 18 years) (Mayock, 2005)*

> *'And it was raining, and then my best buddy...he comes along and he's like, you okay man? I'm like so, really choked, depressed. And he had a bunch of heroin on him. And he used to give me something to smoke too, right? But all this heroin was in one rig. He had a rig full... so I guess it was just meant to be. ..he had a shit load, he had all the supplies and everything like that. He did a little short for me..' (Male, 24 years) (Small et al., 2009)*

[9] bounded agency – where the capacity to choose is influenced by the environmental context, past experiences and imagined future possibilities.

Prolonged requirement for assistance with injecting was also described by several studies (Harocopos et al., 2009, Lankenau and Clatts, 2005, Rácz, 2005). It is unclear if this continued reliance on others for injecting equates to a reliance on others for the supply of clean injecting equipment, however this may be an important consideration for the delivery of harm reduction services:

> *It took James over 100 injections before he could inject himself (Extract from text) (Harocopos et al., 2009)*

> *'[Someone else fixed it for you?]. Well, for a couple of months maybe. Three or four months. ...Well at the beginning you are clumsy, and cannot do as it should be done. And many times I blew the fix. My arm got swollen and everything. So these times I asked somebody. I made another dose and asked someone to fix it because I couldn't.' (Male, 21 years) (Rácz, 2005)*

4.3 Trust and Mistrust

Trust and mistrust emerge as common themes across reviewed studies, and are expressed both in relation to other drug users as well as services encountered. Experiences of stigma and discrimination, for instance, were described by many as having a fundamental bearing on trust relations, including with helping services (Krusi et al., 2010, Barnaby, 2010, Buzducea and Lazar, 2011, Preda, 2009, Roy et al., 2008, Roy et al., 2007, UNICEF, 2013). Young PWID may feel excluded from amenities (shops and washrooms), housing and services, and also voiced being discriminated against by authorities intended to assist them:

> *'A male nurse... said "junkie, let her drop dead, she got what she deserved ...let her arm burst up".(Female, adolescent) (UNICEF, 2013)*
> *'it's the medical community. There's really a stigma against people who use drugs... you can't always be truthful with your doctor.' (16-24 years)(Barnaby, 2010)*

Previous experiences of assault or mistreatment by police were described by several study participants (Barnaby, 2010, Preda, 2009, UNICEF, 2013), with the effect of reproducing or reinforcing a generalized sense of social stigma and mistrust in relation to authorities. By extension, helping services - including harm reduction services - were mistrusted and/or avoided by some:

> *'The police are supposed to be there as an authority figure and they're supposed to be there to help you out and if you're being assaulted by them you're not going to trust anybody' (16-24 years)(Barnaby, 2010)*
> *'we don't want society or the community to look down on us so we just don't reach out for the help' (16-24 years) (Barnaby, 2010)*
> *'some of them are scared to come out and say they are using. They are too scared to access them [Harm Reduction services].' (16-24 years)(Barnaby, 2010)*

In a similar fashion, young people's past experiences of failure in social welfare, education, and youth justice services acted as an important contextual backdrop to their accounts of fragile trust in relation to health and harm reduction services as well as their transitions towards injecting drug use (Barnaby, 2010, Roy et al., 2008).

> *'To begin with, from the age of two and a half on, I was placed in youth centres, foster homes, about 30 homes, no exaggeration...' (Male, 22 years)*
> *'I was the last in the class... I didn't do my homework, I never listened to the teacher,…I was always getting into trouble.' (Male, 19 years)*
> *'First, I did shoplifting, breaking and entering real young, stealing cars. Then, I got caught a bunch of times, so I wound up in a lot of institutions. So that's how it was, in, out, in, out, until the age of 18.' (Male, 22 years)*
> *Extracts from: (Roy et al., 2008)*

In addition, a specific concern of street-involved young people was mistrust regarding other service users and older or more experienced PWID (Krusi et al., 2010, Fast et al., 2010a, Pierce, 1999). For example, some young people described fear and mistrust of the people they encountered in low-threshold housing (single-room occupancy hotels). These fears were again often rooted in a narrative which distinguished younger people using drugs from older more experienced 'addicts' :

> *'...It was just like a lot of junkies, crackheads and cockroaches and mice... People want to rob you. It's unsafe there' (Female, 16-26 years) (Krusi et al., 2010)*

> *'...I had to put big bolts through the door frame... Everything there, the security guards there are all on the sly.' (Male, 16-26 years)(Krusi et al., 2010)*

Finally, doubts concerning confidentiality and its management by services are noted by a number of studies (Barnaby, 2010, Buzducea and Lazar, 2011, McCalman and Gilbert, 2001). This combines with a lack of privacy at some services *('you don't get any privacy…Everything sucks about it [housing shelters]' (Male, 16-26 years) (Krusi et al., 2010)*, and weak trust with service providers, exacerbated by a high turnover of staff *('when you go to a place, you always speak to different people...' (16-24 years) (Barnaby, 2010),* to reinforce the importance of peer rather than service provider support for many young people. A number of studies note the importance of peers as a trusted source of information (Barnaby, 2010, McCalman and Gilbert, 2001): *'You don't want to talk to someone who doesn't know nothing… you can't learn about heroin or speed from a book… you can't understand it unless you've actually done it…' (13-30 years) (McCalman and Gilbert, 2001); 'Like, hire other youth that have been into certain situations and have went through it. The only way to get to the other youth and stuff is to have people who have been through things similar to them' (16-24 years) (Barnaby, 2010).* This trust in peers may stem from feelings of acceptance and support; explored further in section 4.6.

4.4 Barriers and Facilitators to service use

4.4.1 Barriers

In addition to fragile trust with services, studies identified a variety of systemic factors as potential barriers to service access or use. These include regulations or administrative procedures perceived to be restrictive, thereby limiting low threshold access (Barnaby, 2010, Buzducea and Lazar, 2011, Krusi et al., 2010, Roy et al., 2008), as well as concerns about waiting lists and resource issues (Barnaby, 2010, Buccieri, 2010, Buzducea and Lazar, 2011, Roy et al., 2008), including the need to prove personal identification to manage long waiting lists:

> *'Being homeless and going through all this drug things and what not you tend to lose your ID and your OHIP [health insurance] card... so you're not able to get the resources 'cause you don't have your card.' (16-24 years) (Barnaby, 2010);*

> *'…we want to get into rehab but we know that it's going to take anywhere up to two to three months just to get in you know? Rehab should be open and there should be no waiting list…'(Female, 16-24 years) (Buccieri, 2010).*

Inconvenient or inappropriate opening hours also emerges as an important systemic factor shaping service access (Barnaby, 2010, Rácz, 2005), as does the location of services (Barnaby, 2010):

> *'hours are a big thing. For drug addicted street youth, your thing is you wake up at twelve and then you are out 'til twelve so nine to five isn't always the best hours necessarily for people like us' (16-24 years) (Barnaby, 2010)*

> *'Night time comes and it all shuts down (NSP services). And then you don't have anything so all right...I'll use yours.' (16-24 years) (Barnaby, 2010)*
>
> *'the nearest harm reduction site is at least a streetcar ride away. There's nothing within walking distance...' (16-24 years) (Barnaby, 2010)*

The faith placed in low threshold service access may be further weakened by a sense of restricting resources made available to services. For instance:

> *'X (local youth service site) did have housing workers..they got pulled. So it was like, pointless! I lose confidence that I'm getting anywhere' (Female, 16-26 yrs) (Krusi et al., 2010)*

Studies also identify perceived risks linked to service access. Of primary concern here are accounts which link service avoidance with broader structural factors, such as a fear of police contact (Preda, 2009, Rácz, 2005):

> *They [participants] do not like to collect needles for needle-exchange programmes because this also increases the risk of attracting the attention of the police. (Extract from text) (Rácz, 2005)*

> *At the pharmacy, the police were there, you couldn't buy a syringe 'cause the cops would take you in, that was last year. I go to the pharmacy and come out with the*

syringe and you'll see what kick in the teeth I get from the pigs.' (17-24 years) (Preda, 2009)

In addition, avoiding contact with other PWID was also cited as a factor influencing service use, especially when respondents were attempting to avoid peer confrontations and possible violence (Barnaby, 2010, Fast et al., 2010a):

'Everybody knows where everyone is... When I first came down here, right, this chick, she was the same size as me. She used to intimidate me with bear spray [a type of pepper spray used to minimise bear-human conflict] and a knife... No matter where I went, she found me. No matter how hard I tried to run, she found me.' (Fast et al., 2010a)

'I don't like anybody knowing where I am. It's like, I'm all over. I'm not in one place. I'm everywhere.' (Fast et al., 2010a)

Avoidance of other PWID as a strategy for minimizing drug use or to avoid relapse following a period of abstinence, was also described (Barnaby, 2010, Fast et al., 2010a, Pierce, 1999), and could influence service access:

'*I've got a hole in my tooth that's like this big... I can see a dentist – you can go down to X [Downtown Eastside] and get a free dental care but I'm just going to waste my time going down there, and probably end up relapsing.' (Fast et al., 2010a)*

There was limited discussion within the studies concerning procurement of injecting equipment. However, one ethnographic study of affluent white PWID in Washington D.C, USA, explicitly described the way in which young PWID procure needles and syringes, and suggested that there were no problems in obtaining needles from pharmacies as long as they did not appear as an injector:

Syringe procurement was usually done by buying the needles off the street or from a pharmacy ...it was easily done by a well-dressed young White person. ...the IDU cleaned themselves up, dressed up in their finest clothes, and came up with a line for why they needed needles. One informant said she needed them to inject vitamin B. In most cases the pharmacist took the line and made them sign a waiver, releasing the pharmacy of any legal responsibilities they might have for selling the works to someone without a prescription. (Extract from text) (Pierce, 1999)

However, this was an exceptional case and for the majority of street-involved young people, many of whom are homeless, this method of syringe procurement may not be feasible.

4.4.2 Facilitators

A number of studies explored perceived facilitators to, and positive experiences of, service use by young PWID (Barnaby, 2010, Buzducea and Lazar, 2011, McCalman and Gilbert, 2001). Two key features identified were the delivery of a *comprehensive* service (including, for example, medical tests, treatment, vaccinations, sexual health services, counselling, food

stamps), and the delivery of services with *low threshold* access (Barnaby, 2010, Buzducea and Lazar, 2011). For instance, the removal of administrative hurdles to access was noted:

> *'there needs to be more places like Shout Clinic... where you don't necessarily have to go in with all these pieces of ID... they're going to take you either way.' (16-24 years) (Barnaby, 2010)*

Confidentially, discretion and a non-judgmental approach by staff (Buzducea11, Barnaby10, Buccieri10) were also key to engagement with services:

> '*some places that if you go in and tell them that you don't want other people to see what they're giving to you, they'll put it in a bag and give it to you off to the side.' (16-24 years)(Barnaby, 2010)*

Services involving people with previous personal experience of injecting drug use was also helpful for some (Barnaby, 2010, McCalman and Gilbert, 2001).

> *'If I'm going somewhere to get help with something, I want someone who's legitimately been through it. I don't want to hear what you learned in a book' (16-24 years)(Barnaby, 2010)*

Finally, the issue of needle and syringe provision was considered (Barnaby, 2010, Buccieri, 2010, Buzducea and Lazar, 2011). The provision of more needles than immediately required was cited as beneficial. The potential for peer delivery was also discussed:

> *'what's really working well is that you guys pretty much give out unlimited amounts of stuff so that you can stock up.' (16-24 years)(Barnaby, 2010)*
> *'I [service provider] give you more syringes so that you can give them too, but maybe next time we can reach them directly...' (Buzducea and Lazar, 2011)*

4.5 Constraints to enacting risk awareness

Across the studies young people were found to have a general awareness of the viral risks of sharing needles, particularly HIV (Barnaby, 2010, Buzducea and Lazar, 2011, Davis and Rhodes, 2004, Fast et al., 2009, Hughes, 2000, Loxley and Ovenden, 1995, Mayock, 2005, McCalman and Gilbert, 2001, Pierce, 1999, Preda, 2009, Rácz, 2005, Roy et al., 2007, Treloar and Abelson, 2005, Trudgeon and Evans, 2010). However the capacity to enact protective behaviours was also contextualized by varying and sometimes incomplete knowledge about viral transmission risks, particularly regarding hepatitis C, strategies to avoid transmission routes as well as overdose avoidance strategies which may inadvertently increase viral risk transmission (Davis and Rhodes, 2004, Lankenau and Clatts, 2005, McCalman and Gilbert, 2001, Rácz, 2005, Trudgeon and Evans, 2010):

> *'...I haven't got a clue what it [HCV] is... I've no idea why, how you get it, and how you get rid of it, if you can get rid of it..' (22 years)* (Davis and Rhodes, 2004)

'[Did you share the filter?] Well yes, of course. We drew it up together, at the same time. Sometimes when the whole lot had to go between two or three of us, everybody drew it up quickly so it wouldn't evaporate, and in this case I suppose the needles could have come in to contact with each other'(Female, 20 years) (Rácz, 2005)

'One of my friends [female, 15 years old] showed up with a lick [vial of ketamine] and some needles. We had nothing to do so we stood in the corner of the place and I did two small shots in my vein. I'm constantly afraid that I'm going to do too much of a shot. I just like going halfway. She did one shot. I did mine [injected self], she did hers, and then I did mine.' (Male, 18 years) (Lankenau and Clatts, 2005)

Some young PWID described how sharing equipment within trusted-relationships; long-standing friends, family relations or sexual partners carried less risk (Barnaby, 2010, Hughes, 2000, Loxley and Ovenden, 1995, Preda, 2009, Rácz, 2005): '*Oh not very risky, oh the people that I shared with I've know known since in primary school and I think they're pretty safe.' (14-20 years) (Loxley and Ovenden, 1995).* In contrast, others described a perceived inevitability of infection, and among some an apparent risk fatalism, making risk reduction practices appear redundant or ineffective, especially in relation to hepatitis C (Davis and Rhodes, 2004, Hughes, 2000, Loxley and Ovenden, 1995, Preda, 2009, Rácz, 2005, Roy et al., 2007):

'It's almost normal to have hepatitis C for us. It's almost sure that if you're gonna inject, you'll get it one day.' (Female, 25 years) (Roy et al., 2007);

'Oh I'd share with a sexual partner. Because you are already transmitting bodily fluids, so if you're going to catch it, you're going to catch it.'(14-20 years) (Loxley and Ovenden, 1995)

Beyond these constraints, the need to deal with every day issues such as securing food and housing (Barnaby, 2010), avoiding conflict (police and interpersonal) (Fast et al., 2009, Rácz, 2005, Roy et al., 2008), and maintaining drug and income supply, as well as managing heroin withdrawal (Barnaby, 2010, Hughes, 2000, Mayock, 2005, Preda, 2009, Roy et al., 2008, Roy et al., 2007, Trudgeon and Evans, 2010) emerged as more immediate concerns for young PWID, and could constrain the ability to practice safe injecting (Hughes, 2000, Mayock, 2005, Roy et al., 2007):

'When you're having cravings, if you have a quarter [gram] in your hands... Even if you're aware of the risks, your body's obsession makes you do things that your mind wouldn't do normally. It's really because of coke that hepatitis is spreading.' (Male, 20 years) (Roy et al., 2007)

'When you take drugs all the time, you don't really think you'll live long enough to die of hepatitis C, it's something that lasts a long time... I've had 7 overdoses, and I told myself that I would die of that much sooner than I would die of hepatitis C.' (Female, 24 years) (Roy et al., 2007)

4.6 Belonging and peer relationships

The final theme generated from the data concerns the influence of peers, benefit, pleasure, and belonging. Across all of the studies, where documented, young people's use of injection drugs occurred primarily in the context of peers who inject drugs. The physical pleasure experienced from the effects of heroin was well documented (Barnaby, 2010, Harocopos et al., 2009, Lankenau and Clatts, 2005, Mayock, 2005, Pierce, 1999, Rácz, 2005, Roy et al., 2008, Sherman et al., 2002, Small et al., 2009). However, the actual involvement of peers in the experience could also contribute to the pleasure: *'We shot up for each other there, and then a kiss on the lips and we felt great.' (Female, about 20 years) (Rácz, 2005)*, and was actively sought by some:

> *'I try to get high with people I love' (16-24 years) (Barnaby, 2010).*

> *'…I thought it was really glamorous and pretty and I don't know, I just thought it was really cool.'(17 years) (Harocopos et al., 2009)*

The sense of belonging was explored in several studies and expressed in terms of feeling accepted, secure and supported (Fast et al., 2010a, Harocopos et al., 2009, Mayock, 2005, Rácz, 2005, Roy et al., 2008, Roy et al., 2007).

> *'...[and if you buy stuff, can those who could not give money get some?] Yes, sometimes. [Why..?] Because of the good mood. We've all scored when we didn't have the money, and so sometimes it happens to other people too.' (Male, 20-25 years) (Rácz, 2005)*
>
> *'It felt good because for once I was with people who didn't judge me, who didn't give a fuck about my past, who would help me out.' (Male, 23 years) (Roy et al., 2008)*
>
> *'They're all people who, when I was hungry, or when I needed to sleep, well they've always been there for me.' (Female, 23 years) (Roy et al., 2008)*

Establishing friendships with other PWID also conveyed risk when the desire to belong extended to risk behaviours. One young female described sharing injecting equipment as *'one way of making a friendship' (Female, 16-36 years) (Hughes, 2000),* and another participant described only truly belonging once infected with hepatitis C (Roy et al., 2007):

'It's almost like another stage you go through. Once you have hepatitis C ... you'll be like ... you'll be one of the gang, like.' *(Male, 22 years)* (Roy et al., 2007)

In contrast to this sense of belonging felt by some young people; isolation, alienation and individualistic drug use was also documented (Fast et al., 2009, Harocopos et al., 2009, Rácz, 2005, Roy et al., 2008, Sherman et al., 2002).

> *'It's a really rough place [the street]; it's hard. Especially psychologically, because you find yourself all alone. You can't count on anyone, anyone, anyone. Because you know your life depends on it. Whether it's for a place to sleep or a place to eat.' (Female, 23 years) (Roy et al., 2008)*

Some evidence suggested that the importance of the peer group changed over time (Rácz, 2005, Sherman et al., 2002), and the role of peers evolved:

> *'Yeah, well, most of the time [injecting heroin] it's by myself, because I'm greedy, I don't like sharing with nobody... ...When you have your drugs, well at first it is kind of social and then after it progresses... ...it becomes to where every little bit counts... so for me, I don't really use it as like a friendly gathering kind of thing anymore.' (Male, 19 years) (Sherman et al., 2002)*

A final consideration regarding access to clean needles/syringes, which may be particularly important for young injectors, is the apportioning of roles within peer groups. Different members of the peer group might contribute different ingredients required for drug use (Lankenau and Clatts, 2005, Pierce, 1999, Rácz, 2005). This may include obtaining money, drugs, syringes or providing knowledge on how to use drugs or space to hang out afterwards. Although not discussed in the studies, it follows that in these circumstances; there may be a requirement for an individual to procure needles/syringes for more than their own use, and for some individuals to be reliant on others for access to clean needles/syringes. Such circumstances may have implications for service delivery.

> *Often, each person in the group contributed something to the drug using event: ketamine, other drugs, syringes, money, knowledge, or space to use drugs or hang out afterwards. In most cases, a polydrug using event would not have occurred if it depended upon the resources of one individual alone.* Extract from text.(Lankenau and Clatts, 2005)

5. DISCUSSION

This synthesis draws upon a descriptive thematic analysis of published qualitative research literature focusing on the injecting drug use of PWID. Working across the 25 unique papers included in the review, we identified a number of second-order themes which clustered into the following categories: young people positioning themselves as distinct from older PWID; initiation into injecting; drug use as a function of belonging and peer relationships; trust and mistrust linked to drug using others and services; barriers and facilitators of service use; and environmental constraints to enacting risk awareness. We summarise our main findings and their implications below.

5.1 Qualitative evidence on young people's service access

Our primary interest was investigating young people's access to services to help them reduce the health risks of their injecting drug use, especially through access to needle and syringe distribution programmes (NSP). Given that few qualitative studies we identified specifically or explicitly focused on access to needle and syringe distribution services, we have explored themes in the published literature which have indirect as well as theoretical relevance. **The relative lack of qualitative evidence which directly focuses on young people's access to needle and syringe programmes and other harm reduction services, including in the UK, points to the need for future targeted qualitative**

studies. This review has identified a relative evidence gap in qualitative research focused specifically around young people and injecting drug use in the UK, and such studies would build upon, as well as fill the gaps, of this review. We recommend that **future qualitative work in the UK systematically unpacks NSP (and other harm reduction) help-seeking pathways, and the systemic factors at the level of services which can make a difference** to service access, use and adherence.

5.2 Building trusting relationships with services

Trust and mistrust emerged as core themes. We find that lived experiences of stigma and discrimination may reproduce the sense of fragile trust young people have in drug using others as well as helping services. This fragile trust appears to combine with systemic barriers, operating at the level of services, which may further limit young people's confidence regarding service access or use. Systemic barriers reported included services requiring the presentation of personal identity information as a condition of access, waiting list arrangements, and inflexible opening times and locations. Our findings point to the importance of building trust relations with young people, noting that these also need to be framed by broader intervention approaches which encourage systemic as well as structural changes. Perceptions of anticipated or felt stigma and discrimination, for instance, may be reproduced by systemic practices (such as showing proof of identity prior to admission) but also feature as part of the wider social environment in which young people's drug use takes place. Young people's concerns regarding police contact, and for some a wider sense of exclusion from welfare and other state services, also combine to create a fragile environment regarding the trust young people may place in helping services.

Taken together, **we emphasise the need for interventions to build trusting relationships between young people and helping services, recognizing that this not only requires systemic changes at the level of services to facilitate the building of therapeutic relationships but also requires broader social interventions to reduce the sense of social stigma and exclusion that many young people can feel**. The role of **outreach** interventions may have particular potential in building trusting and lasting relationships with young people, including as a conduit to agency-based service use. Services which adopt **flexible approaches** to service delivery, incorporate **peer involvement** as element, and emphasise **confidentiality** and discretion, appear to facilitate service use.

5.3 Social and structural intervention approaches

The relevance of broader interventions to reduce social stigma, increase trust relationships between young people and helping services, and increase young people's sense of social inclusion underscores the potential of 'structural intervention' approaches. We emphasise an approach to intervention which not only targets young people as a means of maximizing their risk reduction and service awareness but that also targets systemic changes at the level of services and broader change in the environments which influence risk linked to injecting drug use (Rhodes, 2009, Rhodes, 2002). Findings suggest that structural interventions might include interventions which seek to: **scale-up the availability of young people specific harm reduction services** and/or help-seeking pathways specific to young people; develop

partnerships between services and policing agencies to prevent a fear of police contact acting as a disincentive to services access; and build **social network interventions among young people** to foster collective responsibility in relation to drug-related risk reduction.

Moreover, the findings of the qualitative studies reviewed emphasise young people's agency as 'bounded' by their immediate situational and social contexts. What this means is that young people's capacity to risk reduction is mediated by the social situations and relationships in which they find themselves. Despite a **general awareness of the health risks of sharing injecting equipment**, for example, such **sharing may be 'bounded' by the patterns of trust and intimacy operating within long-standing friendships or sexual partnerships**. Day-to-day priorities linked to **accessing drugs, preventing withdrawal, food, and housing may be more immediate than concerns to reduce risks** linked to shared syringe use, especially among young people more 'street-involved'. This emphasizes that **risk awareness initiatives alone are insufficient** without interventions which also seek to cater for young people's other, often more immediate, needs. However, one particular area of need regarding risk awareness concerns **hepatitis C**, and the potential to envisage this as beyond prevention and as an inevitability of injection.

5.4 Making services young people relevant

A core finding across the reviewed studies was the theme of young people envisaging themselves as **distinct from older and more experienced drug injectors**, whose drug use was commonly viewed as more dependent and as more problematic. A common narrative here was young people presenting their **drug use as primarily framed by recreation and pleasure-seeking** linked to social relationships rather than entrapped by dependence or need. There are two potential consequences of this: first, young people may be less likely to envision themselves in need of helping services; and second, young people may perceive available services to target those they seek to distance themselves from. This implies the need for services to better **communicate their relevance to young people** specifically, including nesting harm reduction messages and services inside **approaches which recognize drug use not only as a potential harm but also as a form of pleasure**. If young people do not perceive services to 'speak to' them or the meanings they associate with their drug use, they are less likely to engage. If notions of pleasure and recreation frame how young people interpret their drug use, these notions can also have relevance for how harm reduction advice is delivered. Studies among longer-term drug injectors, for example, have emphasized that interventions focused on the pragmatics of preserving veins and vein care to enable less painful injection do better in indirectly preventing hepatitis C than risk awareness campaigns built directly around hepatitis C prevention messaging (Harris and Rhodes, 2012).

5.5 Preventing risk at initiation to injecting

The contexts of initiation to injecting have relevance to our review regarding the increased risks of sharing injecting equipment which may occur at initiation or early in an injection career. Though there were exceptions, our findings tended to emphasise young people's **initiation as active**, linked to a pattern of **experimentation and pleasure-seeking** and

nested within peer and social relationships. Findings also indicated that peers or others often had an involvement in assisting initiation as well as ongoing injecting. This points to **the initiation situation, and especially the role of peers and others, as potential agents of change in harm reduction interventions**, including the use or distribution of clean injecting equipment. We emphasise building upon the growing evidence-base in relation to **peer interventions to prevent initiations to injecting, as well as maximize the role of peers in enabling a safer initiation** environment (Des Jarlais et al., 1992, Hunt et al., 1998, Stillwell et al., 1999).

5.6 Fostering peer involvement and intervention

Cross-cutting our findings is a strong theme of peer engagement as an important factor mediating initiation, patterns of use, the effects and functions of use, the help given and received, and access to services. The help given and received between peers, the presence and influence of peers in day-to-day drug use, and the relatively more secure trusting relationships between peers, all provide potential foundations for intervention. Peer relationships are obviously not without their dangers in relation to increasing proximity to risk as well as syringe sharing, and are also subject to change over time including as patterns of drug use develop, but **services which meaningfully involve peers and offer peer-based interventions tend to be well received by young people seeking help**. Models of **peer and secondary distribution of injecting equipment should be cautiously encouraged**. We recommend that **future qualitative studies investigate models of peer engagement in NSP provision in the UK, including models of secondary distribution, as well as the effects of informal peer support which operates outside formal services**.

5.7 Methodological considerations and limitations

This analysis sought to identify convergence and divergence across themes represented in multiple qualitative studies. Our approach has been to cluster themes in the primary studies into overarching ‘second order’ categories, which is a common approach when synthesizing previously published qualitative data.

There are two limitations here. First, qualitative studies tend to produce data which is ‘context-based’. This makes generalizing from one context to another problematic, especially where there is evidence of social or cultural contextual difference. The qualitative studies we reviewed are distributed across multiple national and social contexts, as well as across different samples of young people. While we can capture thematic similarity and difference across the studies, clustering findings thematically, we do this with caution, notwithstanding the potential contextual differences which might be blurred through the process of synthesis. However, while potentially mediated slightly differently locally, we nonetheless believe that the core cross-cutting themes we have identified – such as trust/mistrust, social stigma, the role of the police, the role of peer relationships, drug use as a pleasure, and so – hold relevance across the multiple contexts represented by the studies. When planning intervention developments, it will be important to ensure that these are specifically locally tailored.

Second, any qualitative synthesis is only going to be as rich and as 'inductive' as the published data it is based upon. There is considerable variation in the extent and quality of raw data extract provided in published qualitative analyses, and this is also a function of the heavy restrictions academic journals place on the publication of qualitative material. Our approach has been to include data extract where this is particular illustrative or typical of a theme identified. However, the extent to which we have been able to explore for local or contextual nuance, or for negative cases to the norm, is inevitably limited by the data available. Future secondary analyses projects might seek to re-analyse existing qualitative datasets from selected key studies in the field

Due to the overall paucity of data specifically investigating needle and syringe service access for young people, we have drawn inferences from the studies across themes and data of indirect or theoretical relevance. This secondary interpretation of data runs the risk of 'over-interpretation' of results due to the non-specific relationship of the primary data to our research aims. Given these limitations, the generalizability of the conceptual insights produced from this synthesis requires corroboration locally. Furthermore, we did not review studies from low-income settings and the majority of studies were concentrated on urban populations of young PWID and 'street-involved' youth.

In order to review sufficient numbers of studies we included those focusing on young people aged 25 or less. However, this included some data from people aged over 25, and in some circumstances the precise age of the source could not be determined from the published document. These conditions limit the specificity of this analysis to address the original research aim concerning those aged less than 18 years. Finally, some studies contained data from street-involved young people who had not tried injecting. Where possible, only data concerning young PWID has been included in this synthesis, however in some circumstances the drug using status of the study participants could not be determined.

Concluding comments

The quantitative evidence revealed some differences between older and young populations: young girls/women were more represented in younger populations; as was experience of homelessness; and the need for help with injections. There was little difference in injecting or sexual risk behaviours by age although fewer young PWID were in drug treatment. We identified some evidence from Eastern Europe to suggest that young people more frequently used pharmacies rather than NSPs to obtain clean needles/syringes and some evidence from the US to show that young PWID had inadequate access to clean needle/syringes.

Findings from the qualitative synthesis reflect some of these findings and provide some understanding to why there may be lower uptake of service among young PWID. The qualitative data revealed how young PWID considered themselves to be different to older populations of PWID and specifically in relation to how they used drugs, with young people viewing drugs as more experimental and a temporary habit. Young PWID described how services were for older populations with drug problems.

Both findings reveal an urgent need for services to be accessible to young PWID. Evidence from the four evaluations of NSPs included show how NSPs are associated with reduced injecting risk behaviours among young people. **While it may not be feasible to set up services specifically for young people, the findings from both reviews clearly suggest the need to make services more appealing to young people, emphasising anonymity and a non-judgemental attitude.**

The qualitative review presented evidence that young people mistrust services and avoided services for fear of the police and because of concerns about confidentiality. The quantitative synthesis revealed young PWID to be highly marginalised, with frequent experience of arrest, prison and often homeless. Findings from the qualitative review demonstrate how the need to address other social factors issues such as housing, problems with the police, buying drugs can distract individuals from the need to obtain clean injecting equipment and practice safe injecting behaviours. **Services need to work in cooperation with criminal justice services to facilitate access to services for young PWID and address the multiple vulnerabilities including homelessness, sex work that young PWID present with.**

Findings from both reviews demonstrate the importance of peers in influencing injecting risk behaviours. The qualitative review demonstrated both a positive and negative effect of peers. On the one hand peers contributed to the pleasure of using drugs, acting as a useful resource of information and facilitating access to services On the other hand some evidence suggested that the importance of the peer group reduced over time and the role of peers evolved as drug use became more established and less of a social event. Quantitative evidence shows how young people often require help with injection and evidence suggests that young PWID are highly vulnerable during initiation into injection particularly through their sex partners. Evidence shows higher odds of HCV among young PWID if they were initiated into injecting by a sex partner and other evidence shows that young PWID had higher odds

of sharing injecting equipment when injecting with a sex partner compared to those who do not. **Services need to ensure that they consider the role of young PWID's friends in their drug use and that PWID are provided information to protect themselves and their peers.** We only identified two evaluations of peer interventions, but both showed some effect in engaging young people in services and reducing injecting risk behaviours. Two evaluations of outreach interventions also showed moderate effect at reducing injecting risk behaviours and increasing access to medical services. **More robust evaluations or peer interventions and outreach programmes among young PWID is needed.**

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APPENDIX A Search Strategies

Medline Search Strategy
Database: Ovid MEDLINE(R)
Search Strategy:

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1 exp Needle-Exchange Programs/ (1253)
2 ((needle* or syringe* or inject*) adj3 exchange).mp. [mp=title, abstract, original title, name of substance word,
subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique
identifier] (1788)
3 shooting galler*.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword
heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (142)
4 1 or 2 or 3 (1906)
5 Harm Reduction/ (1337)
6 (harm adj reduc*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword
heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (2342)
7 ((needle* or syringe* or inject* or citric acid* or foil or steril* or bleach* or disinfect*) adj3 (suppl* or
access* or provision or provid* or distribut* or dispens* or pack*)).mp. [mp=title, abstract, original title, name of
substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary
concept, unique identifier] (6363)
8 ((needle* or syringe* or inject*) adj3 (program* or service* or center* or centre* or scheme* or facility or
facilities or area* or prison* or pharmacy or pharmacies or unit or units or room*)).mp. [mp=title, abstract, original
title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease
supplementary concept, unique identifier] (6019)
9 ((needle* or syringe* or inject*) and (steril* or bleach* or disinfect* or clean* or safe*)).mp. [mp=title,
abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary
concept, rare disease supplementary concept, unique identifier] (46143)
10 (nsp or nep or nsep or nsps or neps or nseps or sep or seps).mp. [mp=title, abstract, original title, name of
substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary
concept, unique identifier] (10118)
11 5 or 6 or 7 or 8 or 9 or 10 (68057)
12 ((needle* or syringe* or inject* or slot or dispensing or vending) adj3 (machine* or (peer adj distrib*))).mp.
[mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol
supplementary concept, rare disease supplementary concept, unique identifier] (588)
13 (electronic adj dispens*).mp. [mp=title, abstract, original title, name of substance word, subject heading word,
keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (4)

14 ((needle* or syringe* or inject* or sharps or cin or "drug-related litter") adj3 (dispos* or bin* or container*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (1831)
15 (disposal adj3 (bin* or container* or safe*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (492)
16 (fitpack* or distribox* or steribox* or fitbin* or (drop adj box*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (12)
17 12 or 13 or 14 or 15 or 16 (2792)
18 11 or 17 (70262)
19 Substance Abuse, Intravenous/ (11470)
20 ((substance* or drug* or stimulant* or opioid* or morphine or heroin or methadone or opiate or cocaine) adj3 (abus* or misus* or dependen* or use* or addict* or inject* or intravenous)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (202215)
21 substance-related disorders/ or cocaine-related disorders/ or exp opioid-related disorders/ (92019)
22 Street Drugs/ (7214)
23 ((needle* or syringe* or inject*) adj3 (share or sharing or sharer*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (2262)
24 19 or 20 or 21 or 22 or 23 (235617)
25 18 and 24 (5675)
26 4 or 25 (6179)
27 animals/ not humans/ (3653831)
28 26 not 27 (5685)
29 28 (5685)
30 Performance-Enhancing Substances/ (165)
31 (PIED or PIEDs).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (1387)
32 ((performance or image) adj5 drug*).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (2954)
33 Steroids/ (27467)
34 Anabolic Agents/ (5526)
35 ((anabolic or androgenic) adj4 (steroid* or agent*)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (8316)
36 ergogenic.mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (745)
37 Doping in Sports/ (2965)
38 Human Growth Hormone/ (10204)

39 Growth Hormone-Releasing Hormone/ (4666)
40 (growth hormone or HGH).mp. [mp=title, abstract, original title, name of substance word, subject heading word,
keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (61881)
41 alpha-MSH/ (2449)
42 (melanotan or bremelanotide).mp. [mp=title, abstract, original title, name of substance word, subject heading
word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (170)
43 (dermal filler* or cosmetic filler*).mp. [mp=title, abstract, original title, name of substance word, subject
heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique
identifier] (275)
44 or/30-43 (105326)
45 exp Botulinum Toxins/ (10919)
46 (botulinum or botox).mp. [mp=title, abstract, original title, name of substance word, subject heading word,
keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique identifier] (14282)
47 Beauty/ or Beauty Culture/ or Cosmetics/ or Cosmetic Techniques/ or Skin Aging/ or Rejuvenation/ or Facial
Expression/ (21870)
48 (cosmetic* or beaut* or wrinkle* or aesthetic* or esthetic* or face* or facial* or image*).mp. [mp=title,
abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary
concept, rare disease supplementary concept, unique identifier] (637212)
49 (45 or 46) and (47 or 48) (1828)
50 44 or 49 (107118)
51 24 or 50 (339512)
52 18 and 51 (6612)
53 (youth or young people or young or child*).mp. [mp=title, abstract, original title, name of substance word,
subject heading word, keyword heading word, protocol supplementary concept, rare disease supplementary concept, unique
identifier] (2112685)
54 Child/ or adolescent/ or minors/ or adult children/ or young adult/ (2203810)
55 53 or 54 (2741770)
56 4 or 52 (7112)
57 55 and 56 (1655)
58 limit 57 to humans (1616)
59 limit 58 to (english language and yr="1990 -Current") (1385)

Database: Embase
Search Strategy:
---
1 ((needle* or syringe* or inject*) adj3 exchange).mp. [mp=title, abstract, subject headings, heading word, drug
trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (1529)
2 shooting galler*.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device
manufacturer, drug manufacturer, device trade name, keyword] (158)
3 1 or 2 (1666)
4 harm reduction/ (2126)
5 (harm adj reduc*).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device

manufacturer, drug manufacturer, device trade name, keyword] (3625)
6 ((needle* or syringe* or inject* or citric acid* or foil or steril* or bleach* or disinfect*) adj3 (suppl* or
access* or provision or provid* or distribut* or dispens* or pack*)).mp. [mp=title, abstract, subject headings, heading
word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (9015)
7 ((needle* or syringe* or inject*) adj3 (program* or service* or center* or centre* or scheme* or facility or
facilities or area* or prison* or pharmacy or pharmacies or unit or units or room*)).mp. [mp=title, abstract, subject
headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name,
keyword] (9050)
8 ((needle* or syringe* or inject*) and (steril* or bleach* or disinfect* or clean* or safe*)).mp. [mp=title,
abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer,
device trade name, keyword] (68908)
9 (nsp or nep or nsep or nsps or neps or nseps or sep or seps).mp. [mp=title, abstract, subject headings, heading
word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (13982)
10 4 or 5 or 6 or 7 or 8 or 9 (99663)
11 ((needle* or syringe* or inject* or slot or dispensing or vending) adj3 (machine* or (peer adj distrib*))).mp.
[mp=title, abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug
manufacturer, device trade name, keyword] (1040)
12 (electronic adj dispens*).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original
title, device manufacturer, drug manufacturer, device trade name, keyword] (10)
13 ((needle* or syringe* or inject* or sharps or cin or "drug-related litter") adj3 (dispos* or bin* or
container*)).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device
manufacturer, drug manufacturer, device trade name, keyword] (3504)
14 (disposal adj3 (bin* or container* or safe*)).mp. [mp=title, abstract, subject headings, heading word, drug trade
name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (742)
15 (fitpack* or distribox* or steribox* or fitbin* or (drop adj box*)).mp. [mp=title, abstract, subject headings,
heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (34)
16 sharps disposal/ (121)
17 11 or 12 or 13 or 14 or 15 or 16 (5152)
18 10 or 17 (103598)
19 intravenous drug abuse/ (7251)
20 ((substance* or drug* or stimulant* or opioid* or morphine or heroin or methadone or opiate or cocaine) adj3
(abus* or misus* or dependen* or use* or addict* or inject* or intravenous)).mp. [mp=title, abstract, subject headings,
heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]
(685509)
21 substance-related disorders/ or cocaine-related disorders/ or exp opioid-related disorders/ (59224)
22 street drug/ (2739)
23 ((needle* or syringe* or inject*) adj3 (share or sharing or sharer*)).mp. [mp=title, abstract, subject headings,

heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]
(1914)
24 19 or 20 or 21 or 22 or 23 (702832)
25 18 and 24 (23435)
26 3 or 25 (23961)
27 nonhuman/ not human/ (3208770)
28 26 not 27 (22516)
29 28 (22516)
30 performance enhancing substance/ (112)
31 (PIED or PIEDs).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device
manufacturer, drug manufacturer, device trade name, keyword] (1794)
32 ((performance or image) adj5 drug*).mp. [mp=title, abstract, subject headings, heading word, drug trade name,
original title, device manufacturer, drug manufacturer, device trade name, keyword] (5977)
33 steroid/ (101730)
34 anabolic agent/ (7979)
35 ((anabolic or androgenic) adj4 (steroid* or agent*)).mp. [mp=title, abstract, subject headings, heading word,
drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (11129)
36 ergogenic.mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title, device
manufacturer, drug manufacturer, device trade name, keyword] (1162)
37 doping/ (3914)
38 human growth hormone/ (9338)
39 growth hormone releasing factor/ (6488)
40 (growth hormone or HGH).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title,
device manufacturer, drug manufacturer, device trade name, keyword] (78429)
41 alpha intermedin/ (3851)
42 (melanotan or bremelanotide).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original
title, device manufacturer, drug manufacturer, device trade name, keyword] (322)
43 (dermal filler* or cosmetic filler*).mp. [mp=title, abstract, subject headings, heading word, drug trade name,
original title, device manufacturer, drug manufacturer, device trade name, keyword] (465)
44 30 or 31 or 32 or 33 or 34 or 35 or 36 or 37 or 38 or 39 or 40 or 41 or 42 or 43 (203621)
45 exp botulinum toxin/ (10215)
46 (botulinum or botox).mp. [mp=title, abstract, subject headings, heading word, drug trade name, original title,
device manufacturer, drug manufacturer, device trade name, keyword] (24403)
47 cosmetic industry/ or cosmetic/ or esthetic surgery/ or rejuvenation/ or facial expression/ (37964)
48 (cosmetic* or beaut* or wrinkle* or aesthetic* or esthetic* or face* or facial* or image*).mp. [mp=title,
abstract, subject headings, heading word, drug trade name, original title, device manufacturer, drug manufacturer,
device trade name, keyword] (850916)
49 (45 or 46) and (47 or 48) (3325)
50 44 or 49 (206812)
51 24 or 50 (894550)
52 18 and 51 (25199)
53 (youth or young people or young or child*).mp. [mp=title, abstract, subject headings, heading word, drug trade
name, original title, device manufacturer, drug manufacturer, device trade name, keyword] (2163485)
54 Child/ or adolescent/ or juvenile/ or adult child/ (1867453)
55 53 or 54 (2692846)
56 3 or 52 (25722)
57 55 and 56 (3921)

58 limit 57 to (human and english language and yr="1990 -Current") (3309)

CINAL Plus

S64	**S62 AND S63 Limiters - Published Date from: 19900101-20130131; Language: English**	**616**
S63	S4 OR S56	2,931
S62	S57 OR S58 OR S59 OR S60 OR S61	577,939
S61	(MH "Adult Children") OR (MH "Young Adult")	57,508
S60	(MH "Minors (Legal)")	430
S59	(MH "Adolescence")	255,854
S58	(MH "Child")	242,068
S57	(youth OR young people OR young OR child*)	475,921
S56	S18 AND S55	2,655
S55	S26 OR S54	88,122
S54	S42 OR S53	11,586
S53	S51 AND S52	497
S52	S45 OR S46 OR S47 OR S48 OR S49 OR S50	107,557
S51	S43 OR S44	3,182
S50	(cosmetic* OR beaut* OR wrinkle* OR aesthetic* OR esthetic* OR face* OR facial* OR image*)	106,886
S49	(MH "Facial Expression")	1,963
S48	(MH "Rejuvenation")	335
S47	(MH "Skin Aging")	1,013
S46	(MH "Cosmetics") OR (MH "Cosmetic Techniques")	2,598
S45	(MH "Beauty")	818
S44	(botulinum OR botox)	3,182
S43	(MH "Botulinum Toxins")	2,865
S42	S29 OR S30 OR S31 OR S32 OR S33 OR S34 OR S35 OR S36 OR S37 OR S38 OR S39 OR S40 OR S41	11,104
S41	(dermal filler* OR cosmetic filler*)	62
S40	(melanotan OR bremelanotide)	5
S39	alpha-MSH OR alpha-intermedin OR melanocyte stimulating hormone	56
S38	(growth hormone or HGH)	2,338
S37	Growth Hormone-Releasing Hormone	26
S36	(MH "Human Growth Hormone")	1,646
S35	(MH "Doping in Sports")	760
S34	ergogenic	1,137
S33	((anabolic OR androgenic) N4 (steroid* OR agent*))	864
S32	(MH "Steroids") OR (MH "Anabolic Steroids")	6,352
S31	((performance OR image) N5 drug*)	790
S30	(PIED OR PIEDs)	10
S29	(MH "Ergogenic Products")	871
S28	S4 OR S27	2,780
S27	S18 AND S26	2,504
S26	S19 OR S20 OR S21 OR S22 OR S23 OR S24 OR S25	77,589
S25	((needle* OR syringe* OR inject*) N3 (share OR sharing OR sharer*))	810
S24	(MH "Street Drugs")	2,482
S23	(MH "Heroin")	1,563
S22	(MH "Crack Cocaine") OR (MH "Cocaine")	2,950
S21	(MH "Substance Use Disorders")	14,591

S20	((substance* OR drug* OR stimulant* OR opioid* OR morphine OR heroin OR methadone OR opiate OR cocaine) N3 (abus* OR misus* OR dependen* OR use* OR addict* OR inject* OR intravenous))	76,345
S19	(MH "Intravenous Drug Users") OR (MH "Substance Abuse, Intravenous")	3,765
S18	S11 OR S17	16,028
S17	S12 OR S13 OR S14 OR S15 OR S16	965
S16	(fitpack* OR distribox* OR steribox* OR fitbin* OR (drop N3 box*))	21
S15	(disposal N3 (bin* OR container* OR safe*))	127
S14	((needle* OR syringe* OR inject* OR sharps OR cin OR "drug-related litter") N3 (dispos* OR bin* OR container*))	666
S13	(electronic N3 dispens*)	13
S12	((needle* OR syringe* OR inject* OR slot OR dispensing OR vending) N3 (machine* OR (peer N3 distrib*)))	211
S11	S5 OR S6 OR S7 OR S8 OR S9 OR S10	15,395
S10	(nsp OR nep OR nsep OR nsps OR neps OR nseps OR sep OR seps)	3,698
S9	((needle* OR syringe* OR inject*) AND (steril* OR bleach* OR disinfect* OR clean* OR safe*))	6,694
S8	((needle* OR syringe* OR inject*) N3 (program* OR service* Or center* OR centre* OR scheme* OR facility OR facilities OR area* OR prison* OR pharmacy OR pharmacies OR unit OR units OR room*))	1,575
S7	((needle* OR syringe* OR inject* OR citric acid* OR foil OR steril* OR bleach* OR disinfect*) N3 (suppl* OR access* OR provision OR provid* OR distribut* OR dispens* OR pack*))	2,433
S6	(harm N3 reduc*)	2,295
S5	(MH "Harm Reduction")	1,391
S4	S1 OR S2 OR S3	959
S3	shooting AND galler*	35
S2	((needle* or syringe* or inject*) N3 exchange)	932
S1	(MH "Needle Exchange Programs")	804

Web Of Science

 # 59 2,101

(#56 NOT #57) AND Language=(English)

Refined by: [excluding] Web of Science Categories=(CHEMISTRY MULTIDISCIPLINARY OR MEDICAL LABORATORY TECHNOLOGY OR ORTHOPEDICS OR MEDICINE GENERAL INTERNAL OR BIOCHEMICAL RESEARCH METHODS OR ENVIRONMENTAL SCIENCES OR ENDOCRINOLOGY METABOLISM OR RHEUMATOLOGY OR BIOPHYSICS OR FORESTRY OR BIOTECHNOLOGY APPLIED MICROBIOLOGY OR CHEMISTRY MEDICINAL OR ANESTHESIOLOGY OR ALLERGY OR PATHOLOGY OR NEUROSCIENCES OR EMERGENCY MEDICINE OR ECOLOGY OR CELL BIOLOGY OR ENGINEERING ENVIRONMENTAL OR SURGERY OR GENETICS HEREDITY OR CLINICAL NEUROLOGY OR MATERIALS SCIENCE MULTIDISCIPLINARY OR NUTRITION DIETETICS OR PLANT SCIENCES OR ENGINEERING BIOMEDICAL OR GEOCHEMISTRY GEOPHYSICS OR ONCOLOGY OR CRITICAL CARE MEDICINE OR METEOROLOGY ATMOSPHERIC SCIENCES OR UROLOGY NEPHROLOGY OR SPECTROSCOPY OR OBSTETRICS GYNECOLOGY OR OTORHINOLARYNGOLOGY OR TRANSPLANTATION OR GASTROENTEROLOGY HEPATOLOGY OR VETERINARY SCIENCES OR BIOLOGY OR ENTOMOLOGY OR AGRICULTURE DAIRY ANIMAL SCIENCE OR MEDICINE RESEARCH EXPERIMENTAL OR DENTISTRY ORAL SURGERY MEDICINE OR CHEMISTRY PHYSICAL OR CHEMISTRY ANALYTICAL OR FISHERIES OR BIOCHEMISTRY MOLECULAR BIOLOGY OR PHYSICS

APPLIED OR MICROBIOLOGY OR DEVELOPMENTAL BIOLOGY OR WATER RESOURCES OR RESPIRATORY SYSTEM OR GERIATRICS GERONTOLOGY OR GEOSCIENCES MULTIDISCIPLINARY OR ZOOLOGY OR GERONTOLOGY OR OCEANOGRAPHY OR RADIOLOGY NUCLEAR MEDICINE MEDICAL IMAGING OR PARASITOLOGY OR OPHTHALMOLOGY OR PHYSICS CONDENSED MATTER OR REPRODUCTIVE BIOLOGY)

58 4,438 (#56 NOT #57) AND Language=(English)

57 711,030 Topic=(animals)

56 5,098 #55 AND #54

55 62,924 #51 OR #4

54 1,715,242 #53 OR #52

53 1,273,840 Topic=((Child OR adolescent OR minors OR adult children OR young adult))

52 1,456,166 Topic=(((youth OR young people OR young OR child*)))

51 54,087 #50 AND #18

50 1,194,059 #49 OR #24

49 620,657 #48 OR #41

48 1,456 #47 AND #46

47 1,271,176 #45 OR #44

46 16,995 #43 OR #42

45 1,236,408 Topic=(((cosmetic* OR beaut* OR wrinkle* OR aesthetic* OR esthetic* OR face* OR facial* OR image*)))

44 89,443 Topic=((Beauty OR Beauty Culture OR Cosmetics OR Cosmetic Techniques OR Skin Aging OR Rejuvenation OR Facial Expression))

43 16,995 Topic=(((botulinum OR botox)))

42 13,998 Topic=((Botulinum Toxin*))

41 619,301 #40 OR #39 OR #38 OR #37 OR #36 OR #35 OR #34 OR #33 OR #32 OR #31 OR #30 OR #29 OR #28 OR #27

40 715 Topic=((dermal filler* OR cosmetic filler*))

39 183 Topic=((melanotan OR bremelanotide))

38 5,934 Topic=(alpha-MSH OR alpha-Intermedin OR Melanocyte Stimulating Hormone)

37 117,807 Topic=((growth hormone OR HGH))

36 7,263 Topic=(Growth Hormone-Releasing Hormone)

35 33,734 Topic=(Human Growth Hormone)

34 261,895 Topic=(Doping in Sports OR Doping)

33 1,207 Topic=(ergogenic)

32 7,180 Topic=(((anabolic OR androgenic) SAME (steroid* OR agent*)))

31 1,746 Topic=(Anabolic Agent*)

30 174,836 Topic=(Steroid*)

29 67,811 Topic=(((performance OR image) SAME drug*))

28 2,600 Topic=((PIED OR PIEDs))

27 1,184 Topic=(Performance Enhancing Substance*)

26 52,710 #25 OR #4

25 43,785 #24 AND #18

24 636,300 #23 OR #22 OR #21 OR #20 OR #19

23 5,147 Topic=(((needle* OR syringe* OR inject*) SAME (share OR sharing OR sharer*)))

22 2,222 Topic=(Street Drugs)

21 1,177 Topic=(substance-related disorders or cocaine-related disorders OR opioid-related disorders)

20 632,787 Topic=(((substance* OR drug* OR stimulant* OR opioid* OR morphine OR heroin OR methadone OR opiate OR cocaine) SAME (abus* OR misus* OR dependen* OR use* OR addict* OR inject* OR intravenous)))

19 17,996 Topic=(Intravenous Substance Abuse OR Intravenous Drug Use*)
18 334,769 #17 OR #11
17 59,187 #16 OR #15 OR #14 OR #13 OR #12
16 861 Topic=((fitpack* OR distribox* OR steribox* OR fitbin* OR (drop SAME box*)))
15 5,290 Topic=((disposal SAME (bin* OR container* OR safe*)))
14 44,437 Topic=(((needle* OR syringe* OR inject* OR sharps OR cin OR "drug-related litter") SAME (dispos* OR bin* OR container*)))
13 478 Topic=((electronic SAME dispens*))
12 8,827 Topic=(((needle* OR syringe* OR inject* OR slot OR dispensing OR vending) SAME (machine* OR (peer SAME distrib*))))
11 293,552 #10 OR #9 OR #8 OR #7 OR #6 OR #5
10 16,364 Topic=((nsp OR nep OR nsep OR nsps OR neps OR nseps OR sep OR seps))
9 41,075 Topic=(((needle* OR syringe* OR inject*) AND (steril* OR bleach* OR disinfect* OR clean* OR safe*)))
8 115,923 Topic=(((needle* OR syringe* OR inject*) SAME (program* OR service* OR center* OR centre* OR scheme* OR facility OR facilities OR area* OR prison* OR pharmacy OR pharmacies OR unit OR units OR room*)))
7 163,925 Topic=(((needle* OR syringe* OR inject* OR citric acid* OR foil OR steril* OR bleach* OR disinfect*) SAME (suppl* OR access* OR provision OR provid* OR distribut* OR dispens* OR pack*)))
6 8,530 Topic=((harm SAME reduc*))
5 4,471 Topic=(Harm Reduction)
4 10,634 #3 OR #2 OR #1
3 271 Topic=(shooting galler*)
2 10,420 Topic=(((needle* OR syringe* OR inject*) SAME exchange))
1 870 Topic=(Needle Exchange Programs)

Database: Global Health
Search Strategy:

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1 needle exchange schemes/ (422)
2 ((needle* or syringe* or inject*) adj3 exchange).mp. [mp=abstract, title, original title, broad terms, heading words] (706)
3 shooting galler*.mp. [mp=abstract, title, original title, broad terms, heading words] (64)
4 1 or 2 or 3 (756)
5 risk reduction/ (4916)
6 (harm adj reduc*).mp. [mp=abstract, title, original title, broad terms, heading words] (766)
7 ((needle* or syringe* or inject* or citric acid* or foil or steril* or bleach* or disinfect*) adj3 (suppl* or access* or provision or provid* or distribut* or dispens* or pack*)).mp. [mp=abstract, title, original title, broad terms, heading words] (1820)
8 ((needle* or syringe* or inject*) adj3 (program* or service* or center* or centre* or scheme* or facility or facilities or area* or prison* or pharmacy or pharmacies or unit or units or room*)).mp. [mp=abstract, title, original title, broad terms, heading words] (1778)
9 ((needle* or syringe* or inject*) and (steril* or bleach* or disinfect* or clean* or safe*)).mp. [mp=abstract, title, original title, broad terms, heading words] (10183)
10 (nsp or nep or nsep or nsps or neps or nseps or sep or seps).mp. [mp=abstract, title, original title, broad

terms, heading words] (8421)
11 5 or 6 or 7 or 8 or 9 or 10 (26365)
12 ((needle* or syringe* or inject* or slot or dispensing or vending) adj3 (machine* or (peer adj distrib*))).mp.
[mp=abstract, title, original title, broad terms, heading words] (277)
13 (electronic adj dispens*).mp. [mp=abstract, title, original title, broad terms, heading words] (2)
14 ((needle* or syringe* or inject* or sharps or cin or "drug-related litter") adj3 (dispos* or bin* or container*)).mp. [mp=abstract, title, original title, broad terms, heading words] (394)
15 (disposal adj3 (bin* or container* or safe*)).mp. [mp=abstract, title, original title, broad terms, heading
words] (301)
16 (fitpack* or distribox* or steribox* or fitbin* or (drop adj box*)).mp. [mp=abstract, title, original title,
broad terms, heading words] (5)
17 12 or 13 or 14 or 15 or 16 (922)
18 11 or 17 (27056)
19 injecting drug abuse/ or injecting drug users/ or substance abuse/ or drug abuse/ (15758)
20 ((substance* or drug* or stimulant* or opioid* or morphine or heroin or methadone or opiate or cocaine) adj3
(abus* or misus* or dependen* or use* or addict* or inject* or intravenous)).mp. [mp=abstract, title, original title,
broad terms, heading words] (41061)
21 cocaine/ or opioids/ or heroin/ (3196)
22 drug addiction/ or controlled substances/ (3407)
23 ((needle* or syringe* or inject*) adj3 (share or sharing or sharer*)).mp. [mp=abstract, title, original title,
broad terms, heading words] (1154)
24 19 or 20 or 21 or 22 or 23 (42196)
25 18 and 24 (2502)
26 4 or 25 (2645)
27 animals/ not humans/ (718919)
28 26 not 27 (2517)
29 Performance enhancing substance*.mp. [mp=abstract, title, original title, broad terms, heading words] (21)
30 (PIED or PIEDs).mp. [mp=abstract, title, original title, broad terms, heading words] (772)
31 ((performance or image) adj5 drug*).mp. [mp=abstract, title, original title, broad terms, heading words] (325)
32 steroids/ (6690)
33 anabolic steroids/ (412)
34 ((anabolic or androgenic) adj4 (steroid* or agent*)).mp. [mp=abstract, title, original title, broad terms,
heading words] (773)
35 ergogenic.mp. [mp=abstract, title, original title, broad terms, heading words] (438)
36 doping/ (276)
37 Human Growth Hormone.mp. [mp=abstract, title, original title, broad terms, heading words] (506)
38 (Growth Hormone Releasing Hormone or Growth Hormone releasing factor).mp. [mp=abstract, title, original title,
broad terms, heading words] (134)
39 (growth hormone or HGH).mp. [mp=abstract, title, original title, broad terms, heading words] (4810)
40 (alpha-MSH or alpha intermedin or melanocyte stimulating hormone).mp. [mp=abstract, title, original title, broad
terms, heading words] (324)
41 (melanotan or bremelanotide).mp. [mp=abstract, title, original title, broad terms, heading words] (37)
42 (dermal filler* or cosmetic filler*).mp. [mp=abstract, title, original title, broad terms, heading words] (4)
43 or/29-42 (14061)
44 Clostridium Botulinum/ (2277)

45 (botulinum or botox).mp. [mp=abstract, title, original title, broad terms, heading words] (2695)
46 Body image/ or Cosmetics/ (2657)
47 (Beauty or Beauty Culture or Cosmetic Techniques or Skin Aging or Rejuvenation or Facial Expression).mp.
[mp=abstract, title, original title, broad terms, heading words] (771)
48 (cosmetic* or beaut* or wrinkle* or aesthetic* or esthetic* or face* or facial* or image*).mp. [mp=abstract,
title, original title, broad terms, heading words] (43949)
49 (44 or 45) and (46 or 47 or 48) (46)
50 43 or 49 (14107)
51 24 or 50 (55787)
52 18 and 51 (2605)
53 (youth or young people or young or child*).mp. [mp=abstract, title, original title, broad terms, heading words]
(335003)
54 Children/ or Adolescents/ or Young Adults/ (216158)
55 (minors or juvenile or adult children).mp. [mp=abstract, title, original title, broad terms, heading words]
(5758)
56 53 or 54 or 55 (339049)
57 4 or 52 (2747)
58 56 and 57 (353)
59 limit 58 to (english language and yr="1990 -Current") (262)
60 animals/ not humans/ (718919)
61 59 not 60 (261)

Database: Social Policy and Practice
Search Strategy:

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1 (Needle exchange program* or needle exchange scheme*).mp. [mp=abstract, title, publication type, heading word,
accession number] (17)
2 ((needle* or syringe* or inject*) adj3 exchange).mp. [mp=abstract, title, publication type, heading word,
accession number] (53)
3 shooting galler*.mp. [mp=abstract, title, publication type, heading word, accession number] (2)
4 1 or 2 or 3 (54)
5 Harm reduction.mp. [mp=abstract, title, publication type, heading word, accession number] (296)
6 (harm adj reduc*).mp. [mp=abstract, title, publication type, heading word, accession number] (303)
7 ((needle* or syringe* or inject* or citric acid* or foil or steril* or bleach* or disinfect*) adj3 (suppl* or
access* or provision or provid* or distribut* or dispens* or pack*)).mp. [mp=abstract, title, publication type, heading
word, accession number] (19)
8 ((needle* or syringe* or inject*) adj3 (program* or service* or center* or centre* or scheme* or facility or
facilities or area* or prison* or pharmacy or pharmacies or unit or units or room*)).mp. [mp=abstract, title,
publication type, heading word, accession number] (59)
9 ((needle* or syringe* or inject*) and (steril* or bleach* or disinfect* or clean* or safe*)).mp. [mp=abstract,
title, publication type, heading word, accession number] (46)
10 (nsp or nep or nsep or nsps or neps or nseps or sep or seps).mp. [mp=abstract, title, publication type, heading
word, accession number] (70)
11 5 or 6 or 7 or 8 or 9 or 10 (445)
12 ((needle* or syringe* or inject* or slot or dispensing or vending) adj3 (machine* or (peer adj distrib*))).mp.

[mp=abstract, title, publication type, heading word, accession number] (26)
13 (electronic adj dispens*).mp. [mp=abstract, title, publication type, heading word, accession number] (0)
14 ((needle* or syringe* or inject* or sharps or cin or "drug-related litter") adj3 (dispos* or bin* or container*)).mp. [mp=abstract, title, publication type, heading word, accession number] (2)
15 (disposal adj3 (bin* or container* or safe*)).mp. [mp=abstract, title, publication type, heading word, accession
number] (13)
16 (fitpack* or distribox* or steribox* or fitbin* or (drop adj box*)).mp. [mp=abstract, title, publication type,
heading word, accession number] (1)
17 12 or 13 or 14 or 15 or 16 (41)
18 11 or 17 (484)
19 (substance abuse, intravenous or intravenous drug us* or injecting drug abuse).mp. [mp=abstract, title,
publication type, heading word, accession number] (30)
20 ((substance* or drug* or stimulant* or opioid* or morphine or heroin or methadone or opiate or cocaine) adj3
(abus* or misus* or dependen* or use* or addict* or inject* or intravenous)).mp. [mp=abstract, title, publication type,
heading word, accession number] (11695)
21 (substance related disorders or cocaine related disorders or opioid related disorders).mp. [mp=abstract, title,
publication type, heading word, accession number] (11)
22 (street drug* or heroin or cocaine or crack cocaine).mp. [mp=abstract, title, publication type, heading word,
accession number] (677)
23 ((needle* or syringe* or inject*) adj3 (share or sharing or sharer*)).mp. [mp=abstract, title, publication type,
heading word, accession number] (34)
24 19 or 20 or 21 or 22 or 23 (11716)
25 18 and 24 (269)
26 4 or 25 (277)
27 animals.mp. [mp=abstract, title, publication type, heading word, accession number] (407)
28 26 not 27 (277)
29 28 (277)
30 (Performance enhancing substance* or ergogenic products or performance enhancing drug*).mp. [mp=abstract, title,
publication type, heading word, accession number] (3)
31 (PIED or PIEDs).mp. [mp=abstract, title, publication type, heading word, accession number] (3)
32 ((performance or image) adj5 drug*).mp. [mp=abstract, title, publication type, heading word, accession number]
(26)
33 Steroid*.mp. [mp=abstract, title, publication type, heading word, accession number] (69)
34 (Anabolic agent* or anabolic steroid*).mp. [mp=abstract, title, publication type, heading word, accession number]
(10)
35 ((anabolic or androgenic) adj4 (steroid* or agent*)).mp. [mp=abstract, title, publication type, heading word,
accession number] (11)
36 ergogenic.mp. [mp=abstract, title, publication type, heading word, accession number] (0)
37 (Doping in Sport* or Doping).mp. [mp=abstract, title, publication type, heading word, accession number] (4)
38 Human Growth Hormone.mp. [mp=abstract, title, publication type, heading word, accession number] (0)
39 (Growth Hormone Releasing Hormone or Growth Hormone Releasing Factor).mp. [mp=abstract, title, publication type,
heading word, accession number] (2)
40 (growth hormone or HGH).mp. [mp=abstract, title, publication type, heading word, accession number] (27)

41 (alpha-MSH or alpha intermedin or melanocyte stimulating hormone).mp. [mp=abstract, title, publication type,
heading word, accession number] (0)
42 (melanotan or bremelanotide).mp. [mp=abstract, title, publication type, heading word, accession number] (0)
43 (dermal filler* or cosmetic filler*).mp. [mp=abstract, title, publication type, heading word, accession number]
(0)
44 or/30-43 (128)
45 Botulinum Toxin*.mp. [mp=abstract, title, publication type, heading word, accession number] (1)
46 (botulinum or botox).mp. [mp=abstract, title, publication type, heading word, accession number] (2)
47 (Beauty or Beauty Culture or Cosmetic* or Cosmetic Techniques or Skin Aging or Rejuvenation or Facial
Expression).mp. [mp=abstract, title, publication type, heading word, accession number] (211)
48 (cosmetic* or beaut* or wrinkle* or aesthetic* or esthetic* or face* or facial* or image*).mp. [mp=abstract,
title, publication type, heading word, accession number] (14557)
49 (45 or 46) and (47 or 48) (1)
50 44 or 49 (129)
51 24 or 50 (11801)
52 18 and 51 (270)
53 (youth or young people or young or child*).mp. [mp=abstract, title, publication type, heading word, accession
number] (147575)
54 (Child or Adolescent or minors or juvenile or adult children or young adult).mp. [mp=abstract, title, publication
type, heading word, accession number] (68161)
55 53 or 54 (148931)
56 4 or 52 (278)
57 55 and 56 (65)
58 limit 57 to yr="1990 -Current" (63)

IBSS Final Search Strategy

----------((all(needle-exchange programs) OR all((needle* NEAR/3 exchange) OR (syringe* NEAR/3 exchange) OR (inject* NEAR/3 exchange)) OR all(shooting galler*)) OR (((all((fitpack* OR distribox* OR steribox* OR fitbin* OR (drop NEAR/4 box*))) OR all((disposal NEAR/3 bin*) OR (disposal NEAR/3 container*) OR (disposal NEAR/3 safe*)) OR all((needle* NEAR/3 dispos*) OR (syringe* NEAR/3 dispos*) OR (inject* NEAR/3 dispos*) OR (sharps NEAR/3 dispos*) OR (cin NEAR/3 dispos*) OR ("drug-related litter" NEAR/3 dispos*) OR (needle* NEAR/3 bin*) OR (syringe* NEAR/3 bin*) OR (inject* NEAR/3 bin*) OR (sharps NEAR/3 bin*) OR (cin NEAR/3 bin*) OR ("drug-related litter" NEAR/3 bin*) OR (needle* NEAR/3 container*) OR (syringe* NEAR/3 container*) OR (inject* NEAR/3 container*) OR (sharps NEAR/3 container*) OR (cin NEAR/3 container*) OR ("drug-related litter" NEAR/3 container*)) OR all((disposal NEAR/3 bin*) OR (disposal NEAR/3 container*) OR (disposal NEAR/3 safe*)) OR all((needle* NEAR/3 machine*) OR (syringe* NEAR/3 machine*) OR (inject* NEAR/3 machine*) OR (slot NEAR/3 machine*) OR (dispensing NEAR/3 machine*) OR (vending NEAR/3 machine*) OR (needle* NEAR/3 (peer NEAR/4 distrib*)) OR (syringe* NEAR/3 (peer NEAR/4 distrib*)) OR (inject* NEAR/3 (peer NEAR/4 distrib*)) OR (slot NEAR/3 (peer NEAR/4 distrib*)) OR (dispensing NEAR/3 (peer NEAR/4 distrib*)) OR (vending NEAR/3 (peer NEAR/4 distrib*)))) OR (all(Harm Reduction) OR all((harm NEAR/4 reduct*)) OR all((needle* NEAR/3 suppl*) OR (syringe* NEAR/3 suppl*) OR (inject* NEAR/3 suppl*) OR (citric acid* NEAR/3 suppl*) OR (foil NEAR/3 suppl*) OR (steril* NEAR/3 suppl*) OR (bleach* NEAR/3 suppl*) OR (disinfect* NEAR/3 suppl*) OR (needle* NEAR/3 access*) OR (syringe* NEAR/3 access*) OR (inject* NEAR/3 access*) OR (citric acid* NEAR/3 access*) OR (foil NEAR/3 access*) OR (steril* NEAR/3 access*) OR (bleach* NEAR/3 access*) OR (disinfect* NEAR/3 access*) OR (needle* NEAR/3 provision*) OR (syringe* NEAR/3 provision*) OR (inject* NEAR/3 provision*) OR (citric acid* NEAR/3 provision*) OR (foil NEAR/3

provision*) OR (steril* NEAR/3 provision*) OR (bleach* NEAR/3 provision*) OR (disinfect* NEAR/3 provision*) OR (needle* NEAR/3 provid*) OR (syringe* NEAR/3 provid*) OR (inject* NEAR/3 provid*) OR (citric acid* NEAR/3 provid*) OR (foil NEAR/3 provid*) OR (steril* NEAR/3 provid*) OR (bleach* NEAR/3 provid*) OR (disinfect* NEAR/3 provid*) OR (needle* NEAR/3 distribut*) OR (syringe* NEAR/3 distribut*) OR (inject* NEAR/3 distribut*) OR (citric acid* NEAR/3 distribut*) OR (foil NEAR/3 distribut*) OR (steril* NEAR/3 distribut*) OR (bleach* NEAR/3 distribut*) OR (disinfect* NEAR/3 distribut*) OR (needle* NEAR/3 dispends*) OR (dispends* NEAR/3 dispends*) OR (inject* NEAR/3 dispends*) OR (citric acid* NEAR/3 dispends*) OR (foil NEAR/3 dispends*) OR (steril* NEAR/3 dispends*) OR (bleach* NEAR/3 dispends*) OR (disinfect* NEAR/3 dispends*) OR (needle* NEAR/3 pack*) OR (syringe* NEAR/3 pack*) OR (inject* NEAR/3 pack*) OR (citric acid* NEAR/3 pack*) OR (foil NEAR/3 pack*) OR (steril* NEAR/3 pack*) OR (bleach* NEAR/3 pack*) OR (disinfect* NEAR/3 pack*)) OR all((needle* NEAR/3 program*) OR (syringe* NEAR/3 program*) OR (inject* NEAR/3 program*) OR (needle* NEAR/3 service*) OR (syringe* NEAR/3 service*) OR (inject* NEAR/3 service*) OR (needle* NEAR/3 center*) OR (syringe* NEAR/3 center*) OR (inject* NEAR/3 center*) OR (needle* NEAR/3 centre*) OR (syringe* NEAR/3 centre*) OR (inject* NEAR/3 centre*) OR (needle* NEAR/3 scheme*) OR (syringe* NEAR/3 scheme*) OR (inject* NEAR/3 scheme*) OR (needle* NEAR/3 facility*) OR (syringe* NEAR/3 facility*) OR (inject* NEAR/3 facility*) OR (needle* NEAR/3 facilities*) OR (syringe* NEAR/3 facilities*) OR (inject* NEAR/3 facilities*) OR (needle* NEAR/3 area*) OR (syringe* NEAR/3 area*) OR (inject* NEAR/3 area*) OR (needle* NEAR/3 prison*) OR (syringe* NEAR/3 prison*) OR (inject* NEAR/3 prison*) OR (needle* NEAR/3 pharmacy*) OR (syringe* NEAR/3 pharmacy*) OR (inject* NEAR/3 pharmacy*) OR (needle* NEAR/3 pharmacies*) OR (syringe* NEAR/3 pharmacies*) OR (inject* NEAR/3 pharmacies*) OR (needle* NEAR/3 unit*) OR (syringe* NEAR/3 unit*) OR (inject* NEAR/3 unit*) OR (needle* NEAR/3 units*) OR (syringe* NEAR/3 units*) OR (inject* NEAR/3 units*) OR (needle* NEAR/3 room*) OR (syringe* NEAR/3 room*) OR (inject* NEAR/3 room*)) OR all((needle* AND steril*) OR (syringe* AND steril*) OR (inject* AND steril*) OR (needle* AND bleach*) OR (syringe* AND bleach*) OR (inject* AND bleach*) OR (needle* AND disinfect*) OR (syringe* AND disinfect*) OR (inject* AND disinfect*) OR (needle* AND clean*) OR (syringe* AND clean*) OR (inject* AND clean*) OR (needle* AND safe*) OR (syringe* AND safe*) OR (inject* AND safe*)) OR all((nsp OR nep OR nsep OR nsps OR neps OR nseps OR sep OR seps)))) AND (((all(Performance-enhancing substances) OR all(PIED OR PIEDs) OR all((performance NEAR/5 drug*) OR (image NEAR/5 drug*)) OR all(steroids) OR all(anabolic agents) OR all((anabolic NEAR/4 steroid*) OR (anabolic NEAR/4 agent*) OR (androgenic NEAR/4 steroid*) OR (androgenic NEAR/4 agent*)) OR all(ergogenic) OR all(Doping in Sports) OR all(Human Growth Hormone) OR all(Growth Hormone-releasing Hormone) OR all(growth hormone OR HGH) OR all(alpha-MSH OR melanin-stimulating hormone) OR all(melanotan OR bremelanotide) OR all(dermal filler* OR cosmetic filler*)) OR ((all(Botulinum toxin) OR all(botulinum OR botox)) AND ((all(beauty OR beauty culture OR cosmetic techniques OR skin aging) OR SU.EXACT("Cosmetics") OR SU.EXACT("Rejuvenation") OR SU.EXACT("Facial expressions")) OR all(cosmetic* OR beaut* OR wrinkle* OR aesthetic* OR esthetic* OR face* OR facial* OR image*)))) OR ((all(substance-related disorders OR cocaine-related disorders OR opioid-related disorders) OR SU.EXACT("Substance use") OR SU.EXACT("Cocaine") OR SU.EXACT("Heroin")) OR all(street drugs) OR all((needle* NEAR/3 share) OR (syringe* NEAR/3 share) OR (inject* NEAR/3 share) OR (needle* NEAR/3 sharing) OR (syringe* NEAR/3 sharing) OR (inject* NEAR/3 sharing) OR (needle* NEAR/3 sharer*) OR (syringe* NEAR/3 sharer*) OR (inject* NEAR/3 sharer*)) OR (all(Substance abuse, Intravenous) OR SU.EXACT("Substance abuse")) OR all((substance* NEAR/3 abus*) OR (drug* NEAR/3 abus*) OR (stimulant* NEAR/3 abus*) OR (opioid* NEAR/3 abus*) OR (morphine NEAR/3 abus*) OR (heroin NEAR/3 abus*) OR (methadone NEAR/3 abus*) OR (opiate NEAR/3 abus*) OR (cocaine NEAR/3 abus*) OR (substance* NEAR/3 misus*) OR (drug* NEAR/3 misus*) OR (stimulant* NEAR/3 misus*) OR (opioid* NEAR/3 misus*) OR (morphine NEAR/3 misus*) OR (heroin NEAR/3 misus*) OR (methadone NEAR/3 misus*) OR (opiate NEAR/3 misus*) OR (cocaine NEAR/3 misus*) OR (substance* NEAR/3 dependen*) OR (drug* NEAR/3 dependen*) OR (stimulant* NEAR/3 dependen*) OR (opioid* NEAR/3 dependen*) OR (morphine NEAR/3 dependen*) OR (heroin NEAR/3 dependen*) OR (methadone NEAR/3 dependen*) OR

(opiate NEAR/3 dependen*) OR (cocaine NEAR/3 dependen*) OR (substance* NEAR/3 use*) OR (drug* NEAR/3 use*) OR (stimulant* NEAR/3 use*) OR (opioid* NEAR/3 use*) OR (morphine NEAR/3 use*) OR (heroin NEAR/3 use*) OR (methadone NEAR/3 use*) OR (opiate NEAR/3 use*) OR (cocaine NEAR/3 use*) OR (substance* NEAR/3 addict*) OR (drug* NEAR/3 addict*) OR (stimulant* NEAR/3 addict*) OR (opioid* NEAR/3 addict*) OR (morphine NEAR/3 addict*) OR (heroin NEAR/3 addict*) OR (methadone NEAR/3 addict*) OR (opiate NEAR/3 addict*) OR (cocaine NEAR/3 addict*) OR (substance* NEAR/3 inject*) OR (drug* NEAR/3 inject*) OR (stimulant* NEAR/3 inject*) OR (opioid* NEAR/3 inject*) OR (morphine NEAR/3 inject*) OR (heroin NEAR/3 inject*) OR (methadone NEAR/3 inject*) OR (opiate NEAR/3 inject*) OR (cocaine NEAR/3 inject*) OR (substance* NEAR/3 intravenous) OR (drug* NEAR/3 intravenous) OR (stimulant* NEAR/3 intravenous) OR (opioid* NEAR/3 intravenous) OR (morphine NEAR/3 intravenous) OR (heroin NEAR/3 intravenous) OR (methadone NEAR/3 intravenous) OR (opiate NEAR/3 intravenous) OR (cocaine NEAR/3 intravenous)))))) AND (all(youth OR young people OR young OR child*) OR (all(young adult OR minors OR adult children OR young adult) OR SU.EXACT("Youth") OR (SU.EXACT("Adolescence") OR SU.EXACT("Adolescents")))) NOT all(animal*)Limits applied 290

Database: PsycINFO

Search Strategy:

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1 exp Needle Exchange Programs/ (323)

2 ((needle* or syringe* or inject*) adj3 exchange).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (672)

3 shooting galler*.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (85)

4 1 or 2 or 3 (746)

5 Harm Reduction/ (1490)

6 (harm adj reduc*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (2384)

7 ((needle* or syringe* or inject* or citric acid* or foil or steril* or bleach* or disinfect*) adj3 (suppl* or access* or provision or provid* or distribut* or dispens* or pack*)).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (598)

8 ((needle* or syringe* or inject*) adj3 (program* or service* or center* or centre* or scheme* or facility or facilities or area* or prison* or pharmacy or pharmacies or unit or units or room*)).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (1224)

9 ((needle* or syringe* or inject*) and (steril* or bleach* or disinfect* or clean* or safe*)).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (1878)

10 (nsp or nep or nsep or nsps or neps or nseps or sep or seps).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (2092)

11 5 or 6 or 7 or 8 or 9 or 10 (6996)

12 ((needle* or syringe* or inject* or slot or dispensing or vending) adj3 (machine* or (peer adj distrib*))).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (405)

13 (electronic adj dispens*).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures] (1)

14 ((needle* or syringe* or inject* or sharps or cin or "drug-related litter") adj3 (dispos* or bin* or container*)).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]

(107)
15 (disposal adj3 (bin* or container* or safe*)).mp. [mp=title, abstract, heading word, table of contents, key
concepts, original title, tests & measures] (36)
16 (fitpack* or distribox* or steribox* or fitbin* or (drop adj box*)).mp. [mp=title, abstract, heading word, table
of contents, key concepts, original title, tests & measures] (13)
17 12 or 13 or 14 or 15 or 16 (539)
18 11 or 17 (7474)
19 Intravenous Drug Usage/ (2855)
20 ((substance* or drug* or stimulant* or opioid* or morphine or heroin or methadone or opiate or cocaine) adj3
(abus* or misus* or dependen* or use* or addict* or inject* or intravenous)).mp. [mp=title, abstract, heading word,
table of contents, key concepts, original title, tests & measures] (112341)
21 Heroin Addiction/ (2157)
22 Heroin/ (1929)
23 cocaine/ or crack cocaine/ (10409)
24 ((needle* or syringe* or inject*) adj3 (share or sharing or sharer*)).mp. [mp=title, abstract, heading word,
table of contents, key concepts, original title, tests & measures] (1120)
25 Needle Sharing/ (379)
26 19 or 20 or 21 or 22 or 23 or 24 or 25 (115548)
27 18 and 26 (2895)
28 4 or 27 (3022)
29 28 (3022)
30 Performance Enhancing Drugs/ (168)
31 (PIED or PIEDs).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests &
measures] (270)
32 Steroids/ (2564)
33 ((anabolic or androgenic) adj4 (steroid* or agent*)).mp. [mp=title, abstract, heading word, table of contents,
key concepts, original title, tests & measures] (613)
34 ergogenic.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests &
measures] (75)
35 (doping in sports or doping).mp. [mp=title, abstract, heading word, table of contents, key concepts, original
title, tests & measures] (274)
36 Human Growth Hormone.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title,
tests & measures] (136)
37 (Growth hormone releasing hormone or Growth hormone relasing factor).mp. [mp=title, abstract, heading word, table
of contents, key concepts, original title, tests & measures] (112)
38 (growth hormone or HGH).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title,
tests & measures] (1971)
39 Melanocyte Stimulating Hormone/ (167)
40 alpha-MSH.mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests &
measures] (33)
41 (melanotan or bremelanotide).mp. [mp=title, abstract, heading word, table of contents, key concepts, original
title, tests & measures] (22)
42 (dermal filler* or cosmetic filler*).mp. [mp=title, abstract, heading word, table of contents, key concepts,
original title, tests & measures] (4)
43 or/30-42 (5468)

44 exp Botulinum Toxin/ (511)
45 (botulinum or botox).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title,
tests & measures] (893)
46 Body Image/ or Cosmetic Techniques/ or Facial Expressions/ (14247)
47 (beauty culture or skin aging or rejuvenation).mp. [mp=title, abstract, heading word, table of contents, key
concepts, original title, tests & measures] (198)
48 (cosmetic* or beaut* or wrinkle* or aesthetic* or esthetic* or face* or facial* or image*).mp. [mp=title,
abstract, heading word, table of contents, key concepts, original title, tests & measures] (200210)
49 (44 or 45) and (46 or 47 or 48) (94)
50 43 or 49 (5559)
51 26 or 50 (120498)
52 18 and 51 (2931)
53 (youth or young people or young or child*).mp. [mp=title, abstract, heading word, table of contents, key
concepts, original title, tests & measures] (629838)
54 Adult Offspring/ (3672)
55 (adolescent or minors or juvenile or adult children or young adult).mp. [mp=title, abstract, heading word, table
of contents, key concepts, original title, tests & measures] (132501)
56 53 or 54 or 55 (683781)
57 4 or 52 (3058)
58 56 and 57 (392)
59 limit 58 to (human and english language and yr="1990 -Current") (360)

Database: PsycEXTRA
Search Strategy:
---
1 exp Needle Exchange Programs/ (36)
2 ((needle* or syringe* or inject*) adj3 exchange).mp. [mp=title, abstract, heading word, keywords] (53)
3 shooting galler*.mp. [mp=title, abstract, heading word, keywords] (3)
4 1 or 2 or 3 (55)
5 Harm Reduction/ (168)
6 (harm adj reduc*).mp. [mp=title, abstract, heading word, keywords] (202)
7 ((needle* or syringe* or inject* or citric acid* or foil or steril* or bleach* or disinfect*) adj3 (suppl* or
access* or provision or provid* or distribut* or dispens* or pack*)).mp. [mp=title, abstract, heading word, keywords]
(31)
8 ((needle* or syringe* or inject*) adj3 (program* or service* or center* or centre* or scheme* or facility or
facilities or area* or prison* or pharmacy or pharmacies or unit or units or room*)).mp. [mp=title, abstract, heading
word, keywords] (60)
9 ((needle* or syringe* or inject*) and (steril* or bleach* or disinfect* or clean* or safe*)).mp. [mp=title,
abstract, heading word, keywords] (100)
10 (nsp or nep or nsep or nsps or neps or nseps or sep or seps).mp. [mp=title, abstract, heading word, keywords]
(62)
11 5 or 6 or 7 or 8 or 9 or 10 (402)
12 ((needle* or syringe* or inject* or slot or dispensing or vending) adj3 (machine* or (peer adj distrib*))).mp.
[mp=title, abstract, heading word, keywords] (39)
13 (electronic adj dispens*).mp. [mp=title, abstract, heading word, keywords] (0)
14 ((needle* or syringe* or inject* or sharps or cin or "drug-related litter") adj3 (dispos* or bin* or

container*)).mp. [mp=title, abstract, heading word, keywords] (1)
15 (disposal adj3 (bin* or container* or safe*)).mp. [mp=title, abstract, heading word, keywords] (2)
16 (fitpack* or distribox* or steribox* or fitbin* or (drop adj box*)).mp. [mp=title, abstract, heading word,
keywords] (0)
17 12 or 13 or 14 or 15 or 16 (42)
18 11 or 17 (443)
19 Intravenous Drug Usage/ (181)
20 ((substance* or drug* or stimulant* or opioid* or morphine or heroin or methadone or opiate or cocaine) adj3
(abus* or misus* or dependen* or use* or addict* or inject* or intravenous)).mp. [mp=title, abstract, heading word,
keywords] (17429)
21 Heroin Addiction/ (184)
22 Heroin/ (295)
23 cocaine/ or crack cocaine/ (1037)
24 ((needle* or syringe* or inject*) adj3 (share or sharing or sharer*)).mp. [mp=title, abstract, heading word,
keywords] (78)
25 Needle Sharing/ (36)
26 19 or 20 or 21 or 22 or 23 or 24 or 25 (17680)
27 18 and 26 (156)
28 4 or 27 (170)
29 28 (170)
30 Performance Enhancing Drugs/ (14)
31 (PIED or PIEDs).mp. [mp=title, abstract, heading word, keywords] (4)
32 Steroids/ (150)
33 ((anabolic or androgenic) adj4 (steroid* or agent*)).mp. [mp=title, abstract, heading word, keywords] (73)
34 ergogenic.mp. [mp=title, abstract, heading word, keywords] (2)
35 (doping in sports or doping).mp. [mp=title, abstract, heading word, keywords] (22)
36 Human Growth Hormone.mp. [mp=title, abstract, heading word, keywords] (14)
37 (Growth hormone releasing hormone or Growth hormone relasing factor).mp. [mp=title, abstract, heading word,
keywords] (1)
38 (growth hormone or HGH).mp. [mp=title, abstract, heading word, keywords] (32)
39 Melanocyte Stimulating Hormone/ (1)
40 alpha-MSH.mp. [mp=title, abstract, heading word, keywords] (1)
41 (melanotan or bremelanotide).mp. [mp=title, abstract, heading word, keywords] (0)
42 (dermal filler* or cosmetic filler*).mp. [mp=title, abstract, heading word, keywords] (1)
43 or/30-42 (211)
44 exp Botulinum Toxin/ (9)
45 (botulinum or botox).mp. [mp=title, abstract, heading word, keywords] (25)
46 Body Image/ or Cosmetic Techniques/ or Facial Expressions/ (861)
47 (beauty culture or skin aging or rejuvenation).mp. [mp=title, abstract, heading word, keywords] (11)
48 (cosmetic* or beaut* or wrinkle* or aesthetic* or esthetic* or face* or facial* or image*).mp. [mp=title,
abstract, heading word, keywords] (10984)
49 (44 or 45) and (46 or 47 or 48) (13)
50 43 or 49 (223)
51 26 or 50 (17816)
52 18 and 51 (157)
53 (youth or young people or young or child*).mp. [mp=title, abstract, heading word, keywords] (48796)
54 Adult Offspring/ (132)
55 (adolescent or minors or juvenile or adult children or young adult).mp. [mp=title, abstract, heading word,
keywords] (12020)
56 53 or 54 or 55 (53697)

57 4 or 52 (171)
58 56 and 57 (23)
59 limit 58 to (human and english language and yr="1990 -Current") (18)

APPENDIX B Quality Assessment Tables

Quantitative Review

AUTHOR	Did the study address a clearly focussed issue?	Was the method appropriate to answer the question?	Was recruitment appropriate?	Sample size	Was the exposure appropriately measured	
Score			Was the sample representative of a defined population? Did the sample include treatment and non-treatment samples?	Was the study sufficiently powered? Is a power calculation presented? If not, what is the expected effect size? Is the sample size adequate	Definition of injecting	Definition of young person
	Mark: 1) Clear 2) Unclear 3) Mixed	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) sufficient 2) insufficient 3) Not clear	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) appropriate 2) Inappropriate 3) Not sure

Was the outcome accurately measured to minimise bias?	Was behaviour data collected accurately to minimise bias?	Were confounders adjusted for?	How precise are the results?	Can the results be applied to the local population?
Did they use self reports or biological measures in measuring a BBV?	Were questionnaires self completed/interviewer administered or CASI?		I.e what is the effect size? Do confidence intervals cross 0? What is the p value?	Does the local setting differ to England? Are the samples comparable to local population?
Mark: 1) Accurate 2) Inaccurate 3) Not sure	Mark: 1) Accurate 2) Inaccurate 3) Not sure	Mark: 1) Yes 2) No 3) Not sure	Mark: 1) Strong 2) Weak 3) Not sure	Mark: 1) Yes 2) No 3) Not sure

Qualitative Review

Author	Year	Is a qualitative approach appropriate?	Was there a clear statement of the aims of the research?	Was the research design appropriate to address the aims of the research?	Was the recruitment strategy appropriate to the aims of the research?	Were the data collected in a way that addressed the research issue?	Has the relationship between the researcher and participants been adequately considered?	Was the data analysis sufficiently rigorous?	Is there a clear statement of findings?	Have ethical issues been taken into consideration?	How valuable is the research?	Overall assessment
		Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) Clear 2) Unclear 3) Mixed	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) appropriate 2) Inappropriate, 3) Not sure	Mark: 1) Clear 2) Unclear 3) Mixed	Mark: 1) Rigorous 2)Unrigorous 3) Not sure	Mark: 1) Clear 2) Unclear 3) Mixed	Mark: 1) appropriate 2) Inappropriate, 3) Not sure	Mark: 1) Valuable 2) Not valuable 3) Not sure	Mark: 1) Good 2) Average 3) Poor
		Does the research seek to understand processes or structure of illuminate subjective experience or meaning. Would a quantitative approach have been better?	Consider: a) What the goal of the research was b) Why is it important c) Its relevance	Consider if the researcher has justified the research design (e.g. Have they discussed how they decided which method to use?)	Have they explained how participants were selected? If so was it the most appropriate method to provide access to the type of knowledge sought by the study? Is there any discussion around recruitment (e.g. why some people chose not to take part)	Is it clear what data collection methods were used (focus groups, interviews etc) Has the researcher justified why these particular methods were used? Were the data collection and record keeping systematic? Were the data transcribed?	Did the researcher critically examine their own role, potential bias and influence during: Formulation of research questions; data collection including sample recruitment and choice of location?	Is there an in-depth description of the analysis process? If thematic analysis is used, is it clear how themes were derived from the data? Is sufficient data presented to support the findings? To what extent are contradictory data taken into account? Does the research critically examine their own role, potential bias and influence during analysis and selection of data to present?	Are findings explicit? Is there adequate discussion of the evidence (both for and against). Has the researcher discussed the credibility of their findings? Are the findings discussed in relation to the original research questions.	Were there sufficient details of how the research was explained to participants for the reader to assess whether ethical standards were maintained? Was ethical approval obtained from an appropriate body?	Does the researcher discuss the contribution the study make to existing knowledge or understanding? Do they identify new areas where research is necessary? Have they discussed whether or how the findings can be transferred to other populations or considered other ways the research may be used?	

Appendix C: Summary of Quality Assessment

Quantitative Review

AUTHOR	Did the study address a clearly focussed issue?	Was the method appropriate to answer the question?	Was recruitment appropriate?	Sample size	Was the exposure appropriately measured		Was the outcome accurately measured to minimise bias?	Was behaviour data collected accurately to minimise bias?	Were confounders adjusted for?	How precise are the results?	Can the results be applied to the local population?
					injecting	young person					
	Mark: 1) Clear 2) Unclear 3) Mixed	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) sufficient 2) insufficient 3) Not clear	Mark: 1) appropriate 2) Inappropriate 3) Not sure		Mark: 1) Accurate 2) Inaccurate 3) Not sure	Mark: 1) Accurate 2) Inaccurate 3) Not sure	Mark: 1) Yes 2) No 3) Not sure	Mark: 1) Strong 2) Weak 3) Not sure	Mark: 1) Yes 2) No 3) Not sure
Bailey, 2003	1	1	1	1	1	2	1	1	1	1	3
Busza et al, 2013	1	1	1	3	1	1	1	1	3	3	3
Cassin (no date)		1	1	1	1	3	1	1	2	3	3
Chan et al, 2011	1	1	1	1	1	1	1	1	3	2	1
Cronquist, 2001	1	1	1	1	1	3	1	1	1	1	2
Dean et al,	1	1	1	1	3	1	1	1	1	1	1
Diaz et al, 2001	1	1	1	1	1	3	1	1		2	3
Gleghorn et al, 1997	1	1	1	1	1	1	1	1	1	1	3
Guydish, 2000	1	2	2	2	1	1	3	3	1	2	1
Hahn et al, 2001	1	1	1	1	1	3	1	1	1	1	1
Heller et al, 2009	1	1	1	1	1	2	1	1	1	1	2
Kipke et al, 1997	1	1	1	3	1	1	1	1	1	1	1
Kral et al, 2000	1	1	1	1	1	3	1	1	1		3
Loxley, 1997	1	1	1	1	1	3	1	3	2	3	3
Miller, 2002		1	1	1	1	1	1	1	1	1	1
Mullen,2003	1	1	1	1	1	1	3	3	3	3	1
Sears et al,	1	1	1	1	1	3	1	1	1	3	1
Sherman et al, 2004	1	1	1	1	1	3	1	1	1	1	3
Smyrnov et al, 2012	1	1	1	1	3	3	3	3	2	3	3
Smyth et al, 2004	1	1	1	1	3	1	3	3	2	1	1
Wong et al, 2008	1	1	1	1	3	1	1	1	1	1	1
Woods, 2000	1	3	2	1	2	1	3	3	1	1	3

AUTHOR	Did the study address a clearly focussed issue?	Population	Was the method appropriate to answer the question?	Was recruitment appropriate?	Sample size	Was follow up time meaningful?	Was the exposure appropriately measured?		Was the outcome accurately measured to minimise bias?	Was behaviour data collected accurately to minimise bias?	Were confounders adjusted for?	How precise are the results?	Can the results be applied to the local population?
	Mark: 1) Clear 2) Unclear 3) Mixed		Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) sufficient 2) insufficient 3) Not clear	Mark: 1) sufficient 2) insufficient 3) Not clear	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) Accurate 2) Inaccurate 3) Not sure	Mark: 1) Accurate 2) Inaccurate 3) Not sure	Mark: 1) Yes 2) No 3) Not sure	Mark: 1) Strong 2) Weak 3) Not sure	Mark: 1) Yes 2) No 3) Not sure
Booth, 2006	1		1	1	1	1	1	2	1	1	1	1	2
Hadland, 2008	1		1	1	1		1	1	1	1	1		1
Miller, 2011,	1		1	1	1	1	1	3	1	1	1	1	1
Miller, 2007	1		1	1	1	1	1	1	1	3	1	1	3

Qualitative Review

Author	Year	Is a qualitative approach appropriate?	Was there a clear statement of the aims of the research?	Was the research design appropriate to address the aims of the research?	Was the recruitment strategy appropriate to the aims of the research?	Were the data collected in a way that addressed the research issue?	Has the relationship between the researcher and participants been adequately considered?	Was the data analysis sufficiently rigorous?	Is there a clear statement of findings?	Have ethical issues been taken into consideration?	How valuable is the research?	Overall assessment
		Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) Clear 2) Unclear 3) Mixed	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) appropriate 2) Inappropriate, 3) Not sure	Mark: 1) Clear 2) Unclear 3) Mixed	Mark: 1) Rigorous 2)Unrigorous 3) Not sure	Mark: 1) Clear 2) Unclear 3) Mixed	Mark: 1) appropriate 2) Inappropriate 3) Not sure	Mark: 1) Valuable 2) Not valuable 3) Not sure	Mark: 1) Good 2) Average 3) Poor
Barnaby, L	**2010**	1	1	1	3	1	2	3	3	1	1	2
Buccieri, K	**2010**	1	1	1	3	1	2	2	1	3	3	3
Buzducea, D	**2011**	1	1	1	3	3	2	2	3	3	3	2
Davis, M	**2004**	1	1	1	1	1	2	1	3	1	3	1
Fast, D	**2009**	1	1	1	1	1	3	1	1	1	1	1
Fast, D	**2010**	1	1	1	1	1	3	1	1	1	1	1
Fast, D	**2010**	1	1	1	1	1	3	1	1	1	1	1
Harocopos, A	**2009**	1	1	1	1	1	3	1	1	3	1	1
Hughes, R	**2000**	1	1	3	1	1	2	3	1	3	3	2
Krusi, A	**2010**	1	1	1	1	1	3	1	1	1	1	1
Lankenau, S	**2005**	1	1	1	3	3	2	3	1	1	1	2
Loxley, W	**1995**	1	1	1	1	1	2	3	1	1	1	2
Mayock, P	**2005**	1	1	1	1	3	2	3	1	3	1	2
McCalman, J	**2001**	3	1	3	1	3	2	2	3	3	3	3
Pierce, T	**1999**	1	1	1	1	3	3	3	1	3	1	2
Preda, M	**2009**	1	1	1	3	3	2	3	3	3	1	3
Racz, J	**2005**	1	1	1	1	1	2	1	1	3	1	1
Rhodes, T	**2011**	1	1	1	1	1	2	1	1	3	1	1
Roy, E	**2008**	1	1	1	1	1	1	1	1	3	1	1
Roy, E	**2007**	1	1	1	1	1	1	1	1	3	1	1
Sherman, S	**2002**	1	1	1	3	1	2	1	1	1	1	1
Small, W	**2009**	1	1	1	1	1	1	1	1	1	1	1
Treloar, C	**2005**	1	1	1	1	1	2	3	1	3	1	2
Trudgeon, H	**2010**	1	1	1	3	1	2	1	1	1	1	1
UNICEF		1	1	1	3	3	2	3	1	3	1	3

Appendix D: Evidence Tables

Quantitative Synthesis (Comparison by age)

Reference	Study design	Aim	Population	Analysis	Findings
Busza et al, 2013 Romania	Cross-sectional surveys (++) n=300 Recruited via respondent driven sampling	To describe the characteristics and behaviours of PWID in Albania, Moldova, Romania and Serbia, to compare characteristics between youth (18-24) and adolescents (<18)	PWID age 15-24 years Definition of injection not specified	Descriptive comparison by age (15-17 vs. 18-24). Factors associated with sharing needles/syringes Univariate analysis used Fishers Exact Test Logistic regression analysis	**Young** / **Old** Total: 19 / 281 Female: 26% / 19% Shared injecting equipment: 26.30% / 18.50% Obtained n/s from NSP: 57.90% / 71.90% Steady partner is PWID: 47.40% / 74.40% Risk factors associated with sharing included: experiencing police harassment in the last 12 months (3.17, 1.22-8.19); experience of prison (2.81, 1.42-5.55). Reduced odds of sharing were associated with obtaining needles/syringes from a formal source only (0.18, 0.68-0.49) compared to informal only. Model adjusted for age, sex, education and ethnicity
Moldova	350				**Young** / **Old** Total: 105 / 245 sex work: 33% / 42.10% Use of pharmacies for n/s: 86.70% / 76.70% Stopped by the police: 37.10% / 53.50% Been in prison: 1.90% / 12.20%

Reference	Study design	Aim	Population	Analysis	Findings
					Risk factors associated with sharing included: being female (4.04, 1.71-9.50); being from an ethnic minority (Bulgarian, Gaguzian, Roma or mixed) (4.98, 1.93-12.87); experience of prison (4.58; 1.69-12.42). Reduced odds were associated with obtaining needles/syringes from a formal source only (NSP, outreach, pharmacies) (0.33, 0.12-0.93) or a combination of formal and informal (0.33, 0.12-0.93) compared to informal only. Model adjusted for age, sex, education and ethnicity
Serbia	248				**Young** / **Old** Total: 21 / 227 Female: 4.80% / 25.60% Shared injecting equipment in the last month: 35.10% / 35.10% P value not specified. Risk factors associated with sharing included reduced odds associated with obtaining needles/syringes from a formal source only (0.28, 0.10-0.81) compared to informal only. Model adjusted for age, sex, education and ethnicity
Albania	250				**Young** / **Old** Total: 7 / 114 Stopped by the police: 66% / 67%% Shared injecting equipment in the last month: 0% / 22% Use of pharmacies: 100% / 91% Use of NSPs: 50% / 47%

Reference	Study design	Aim	Population	Analysis	Findings
					P value not specified
Cassin (no year), Ireland, Dublin	Cross-sectional survey (+) n=770 Recruited from NSP	To provide empirical data about younger injectors (under 25 years) levels of injecting risk behaviour by comparing with older injectors	PWID attending a NSP, 63% aged under 25 years	Descriptive comparison by age (<25 vs. >25 years) Chi squared tests and t tests for continuous variable.	**Young** / **Old** / **P value** Total: 485 / 285 Female: 30.50% / 15.40% / <0.001 Smoked prior to injecting: 93.10% / 75.80% / <0.001 Age first drug use: Mean=16.9 / Mean=22.6 / <0.001 Age first injection: Mean=18.9 / 24.8 / <0.001 Ever shared n/s: 56.40% / 53% / NS Lent n/s: 18.10% / 12.20% / <0.05 Shared injecting paraphernalia: 64% / 44% / <0.001 inject self: 73% / 85.90% / <0.001 Multiple sexual partners: 28.50% / 21.30% / <0.05 Had IDU sex partner: 41.90% / 33.60% / <0.05 % had HIV test: 38.40% / 60.80% / <0.001 % use condoms: 69.10% / 58.20% / <0.001 % vaccinated for HBV: 10.90% / 30.20% / <0.001
Chan, 2011 USA	Cross-sectional survey (+) n=153 Recruited from drug treatment	To examine estimates of HIV risk behaviour and association with mental health	PWID who have ever injected aged 12 to 18 years	Descriptive comparison by age (12-15 vs 16-18 years) Analysis not specified	**Young** / **Old** / **P value** Total: 4147 / 5372 Injected drugs: 1.1% (46) / 2% (107) / 0.05 Total injected: 46 / 107 Allowed someone to inject you: 63% / 65% / 0.05 Injected with used needle: 37% / 45% / 0.05

Reference	Study design	Aim	Population	Analysis	Findings
	centre				Reused a needle used before 26% 45% 0.001
Diaz, 2001 USA, New York	Cross-sectional survey (+) n=537 recruited from community settings	Examine rates and correlates of HCV infection among young adult PWID in two sites	PWID who had injected in the last 6 months aged 18-29 years	Descriptive comparison by age (mean 23 vs 26 years) Chi squared tests and t tests for continuous variable	**Young** **Old** **P value** Total 357 200 N/S sharing 31% 26% 0.208 Used NSP in past 6 months 31% 26% 0.259 Ever been in prison 15% 49% <0.001 Homeless 77% 41% 0.001 Never used condom with steady partner 38% 59% 0.001 Never use condom with non-steady partner 15% 29% 0.001 Sex work 11% 14% 0.367 HIV 3% 10% 0.001 HCV 42% 52% 0.031 Female 27% 29% 0.692
Hadland, 2008 Canada, Vancouver	Cohort (At risk youth study) (++) n=529 Recruited from community settings	To identify barriers encountered as street youth attempt to access addiction services	Young people (aged 14-26 years) who had used an illicit drug other than marijuana in the last 30 days	Descriptive comparison by age (<18 vs. >=18 years) Factors associated with accessing of attempting to access on at least 1 occasion drug or alcohol addiction services in the last 6 months prior to	**Young** **Old** **P value** Total 49 480 Attempting to access drug or alcohol addiction service in last 6 months at least once 26% 32% 0.426 Factors associated with attempted service use included: aboriginal ethnicity (1.66, 1.05-2.62); high school education (1.66, 1.09-2.55); history of mental illness (2.25, 1.50-3.38); history of sex work in last 6 months (1.59, 0.88-2.88); non-injection crack use in last 6 months

<table>
<tr><th>Reference</th><th>Study design</th><th>Aim</th><th>Population</th><th>Analysis</th><th>Findings</th></tr>
<tr><td></td><td></td><td></td><td></td><td>interview

Chi squared tests for univariate analysis and logistic regression model</td><td>(2.93, 1.76-4.89); drug bingeing behaviour in last months (1.03, 0.64-1.66); Money spent/day on drugs >=$50 (2.13, 1.41-3.22).

Model adjusted for all variables listed above and gender and ethnicity.</td></tr>
<tr><td>Kral, 2000 USA, San Francisco</td><td>Cross-sectional survey (++)

n=172

Targetted sampling informed by ethnographic research</td><td>To compare drug injection and sex related risk behaviours of younger and older injectors</td><td>PWID who had injected in the last 30 days (age range not specified)</td><td>Factors associated with younger Age (<30 years)

Chi squared tests or Fishers exact tests and logistic regression models.</td><td><table><tr><th></th><th>Young</th><th>Old</th><th>P value</th></tr><tr><td>Total</td><td>56</td><td>116</td><td></td></tr><tr><td>Female</td><td>38%</td><td>35%</td><td>NS</td></tr><tr><td>Arrested past year</td><td>86%</td><td>87%</td><td>NS</td></tr><tr><td>Currently in drug treatment</td><td>0%</td><td>17%</td><td><0.05</td></tr><tr><td>HIV+</td><td>5%</td><td>10%</td><td>NS</td></tr><tr><td>Sharing syringes</td><td>52%</td><td>10%</td><td><0.05</td></tr><tr><td>Receiving injections</td><td>53%</td><td>24%</td><td><0.05</td></tr><tr><td>Unprotected vaginal sex</td><td>77%</td><td>53%</td><td><0.05</td></tr><tr><td>Sex work</td><td>18%</td><td>11%</td><td>NS</td></tr><tr><td>Recent overdose</td><td>39%</td><td>7%</td><td><0.05</td></tr></table>
Risk factors associated with younger age included: sharing needles/syringes (5.3, 2.1-13.1); unprotected sex (3.0, 1.3-7.0); and sex work (4.5, 1.6-12.7). Model adjusted for all significant variables</td></tr>
</table>

Reference	Study design	Aim	Population	Analysis	Findings
Loxley, 1997 Australia	Cross-sectional survey (+) Sample=872 Recruited via advertisements, snowball sampling and networking	To investigate whether age differences found in 1989 persisted in 1994 and whether young PWID were at particular risk of BBVs	PWID who had engaged in injecting and sexual activity at least once in the last month (30% under 23 years) recruited via advertisements, snowball sampling and networking	Descriptive comparison by age (<=23 vs. 23+) Test of significance not specified	**Young** / **Old** / **P value** Total: 160 / 368 HIV: 1.30% / 3.40% / NS HBV: 5.70% / 21.20% / <0.001 HCV: 22.80% / 63.80% / <0.001 Receiving drug treatment: 23.80% / 50.80% / <0.01 Use protection during last sexual encounter: 38.10% / 28.10% / <0.05 Injecting group size in the last month: mean=1.9 (0-9) / mean=1.3 (0-7) / <0.01 Number of addresses: mean=4.7 (1-40) / mean=3.5 (1-40) / <0.05
Miller, 2002 Canada, Vancouver	Cross-sectional survey taken from baseline on established cohort (VIDUS) (++) n =1437	To determine socio-demographic, drug and sexual differences between younger and older PWID and to investigate risk factors for HIV infection among young PWID	PWID who had injected in the last month, recruited in community settings (Younger PWID 13-24 years and median older	Descriptive comparison by age ((<=24 vs. 24+) and factors associated with HIV+ among female PWID Chi squared tests and t tests for univariate analysis	**Young** / **Old** / **P value** Total: 232 / 1205 Female: 50% / 32% / 0.001 Sex worker: 41% / 24% / 0.001 Condom use with last casual partner: 26% / 15% / 0.001 Help injecting: 53% / 39% / 0.001 Needle borrowing: 42% / 38% / 0.971 HIV positive: 10% / 24% / ?

Reference	Study design	Aim	Population	Analysis	Findings
			PWID =36 years)	and logistic regression model	Risk factors associated with being HIV positive among female youth included: Increased age per year (1.7, 1.3-2.3); Speedball >=1/day (7.5,1.9-30.0) having a regular sex partner yes vs no (0.2, 0.-0.6); Education yes vs no (0.3, 0.1-0.9) Model adjusted for all significant variables
Miller, 2007 Canada, Vancouver	Cohort (++) n=1598 Community recruited	To examine longitudinal drug use and sexual risk associated with younger age	PWID who had injected at least once in the previous month Age >=14 years, recruited in community settings	Factors associated with younger age (<=29 vs. >=30 years) Chi squared tests and Fishers exact tests for univariate analysis. Multivariate logistic GEE model	**Young** / **Old** / **P value** Total 582 1016 Female 47% 30% <0.001 Homeless 26% 6% <0.001 Jail/Youth detention 37% 31% 0.016 Unprotected sex 8% 70% <0.001 Borrowed needles/syringes 36% 37% 0.552 Received help injecting 46% 39% 0.005 Drug treatment 68% 78% 0.048 Denied treatment 23% 18% <0.001 Sex work 44% 20% <0.001 HIV HCV Age at first fix <16 38% 33% 0.039 Methadone Maintenance Therapy 6% 14% <0.01 Daily injection of heroin 46% 28% <0.01 Daily cocaine injection 33% 35% 0.347

Reference	Study design	Aim	Population	Analysis	Findings
					Increased risk associated with younger age included the following factors: being female (2.04, 1.66-2.51); homeless (1.11, 1.02-1.20); borrowing needles/syringes for injection (1.08, 1.01-1.16); history of prison (1.16, 1.08-1.24); daily injection of heroin (1.11, 1.03-1.19); and daily injection of cocaine (1.07, 1.0-1.15). Reduced risk associated with younger age included testing positive for antibodies to HIV (0.75, 0.63-0.90); testing positive for antibodies to HCV (0.37, 0.29-0.47); receiving OST (0.77, 0.68-0.87); or drug treatment (0.93, 0.86-0.87). Adjusted for HIV, HCV, sex, homeless, prison, sex worker, borrowing syringes, not fatal overdose, drug use, drug treatment, receiving OST.
Miller, 2011 Canada Vancouver	Cohort (++) n=255 Community recruited	To determine individual, social and structural risk factors associated with younger age (<=24)	Female sex workers using illicit drugs Age = 36 years(median, IQR=25-41)	Factors associated with younger age (<=24 vs. >=25 years) Chi squared tests and Fishers exact tests for univariate analysis. Multivariate logistic GEE model	**Young** / **Old** / **P value** Total: 56 / 199 Homeless last 6 months: 68% / 36% / <0.001 HIV+: 18% / 24% / 0.361 Ever inject drugs: 70% / 80% / 0.104 Increased risk associated with younger age among FSWs included the following factors: injecting heroin frequently (1.35, 1.06-1.74); being homeless (1.26, 1.07-1.48) servicing clients in cars and public spaces (1.28, 1.04-1.57). Reduced odds were associated with receiving OST (0.72, 0.62-0.93). Not clear what adjusted for.
Mullen,	Cross-	To establish	PWID	Descriptive	**Young** **Old** **P value**

Reference	Study design	Aim	Population	Analysis	Findings
2003 Ireland, Dublin	sectional survey (++) Sample=1224 Recruited from a NSP	demographic characteristics, drug taking characteristics and risk behaviours of first time attendees at NSPs	attending a NSP	comparison by age (median 18 vs. 23 years) Factors associated with sharing a needle/syringe in previous year and non-condom use at registration Chi squared tests and Fishers exact tests for univariate analysis. Multivariate analysis using logistic regression model	Total 1219 5791 Needle sharing 39% 39% 0.83 Using condoms 61% 55% <0.001 Multivariate analysis of risk factors associated with needle/syringe sharing include lower odds among those injecting for less than a year (0.70 0.51-0.95), among those using condoms (0.48, 0.35-0.65). Increased odds of sharing reported among those with more than one sexual partner in the previous year (1.47, 1.08-1.99) and among those reporting hepatitis or jaundice (1.75, 1.12-2.72). Risk factors associated with lack of condom use include sharing a needle in the last year (2.13, 1.70-3.16), lower odds associated with having more than one sex partner in the previous year and taking condoms during attendance at NSP (0.33, 0.25-0.45). 8% (79/1010) were currently receiving methadone and 23% (282/1223) had ever had an HIV test. Not clear what adjusted for.
Smyth et al, 2004 Ireland, Dublin	Analysis of National Drug Treatment Reporting System (+) n=9874	3 aims: 1) describe characteristics 2) examine the differences between adults and children 3) to examine temporal trends 1990-1999	Attendees at addiction services, 14% of children injected. Age ranged from 14-adults	Descriptive comparison by age Age = 10-17 vs. Adults (not specified(Chi squared tests.	**Young** **Old** **P value** Total 1953 7921 Female 30% 24% <0.001 Homeless 6.50% 1.90% <0.001

Reference	Study design	Aim	Population	Analysis	Findings
			(not defined)		

Quantitative Synthesis (Risk factors and use of services)

Reference	Study design (++)	Aim	Recruitment	Outcome and analysis	Findings
Cronquist et al, 2001 USA	Cross-sectional survey (baseline from longitudinal cohort) (++) n=206 Community recruitment, area mapped by ethnographers first	To explore health care utilisation patterns of young adult PWID: to describe frequency of use, level of insurance coverage and type of health care used and identify whether use of NSPs was associated with increased use of health services	PWID injecting in the last 6 months. Age 18-29 (median 26 years)	Using health services in the last 6 months (any health care excluding drug treatment and NSP) Chi squared tests and Fishers exact tests for univariate analysis. Multivariate analysis using logistic regression model	Associations between using health care included experience of drug treatment (2.57, 1.31-5.04) being gay/bisexual (3.86, 1.40-10.76) injecting cocaine (0.45, 0.22-0.92) Using NEPs among those with insurance (10.66, 1.46-77.6) Using NEPs among those without insurance (2.45, 1.04-5.76). Model adjusted for race and ethnicity.
Dean et al, Australia	Cross-sectional survey (++) n=272 Attenders at the Adolescent Drug and Alcohol Withdrawal Service	To describe a clinical sample of Australian adolescents admitted to a substance withdrawal service and to examine gender differences in substance use characteristics and risk behaviours in this group	Attenders at the Adolescent Drug and Alcohol Withdrawal Service (ADAWS) 13- Age=18 years (mean=16)	Needle/syringe sharing and heroin as primary drug. Chi squared tests and Fishers exact tests for univariate analysis. Multivariate analysis using logistic regression model	Associations between heroin use as primary drug included: female sex (4.70, 1.90-11.60); use for emotional stress (0.42, 0.18-0.99). Factors not associated with heroin use included: age ; number of drugs used; homeless; using with partner; use to self harm. Factors associated with sharing injecting equipment included: using heroin (5.33, 2.12-13.40); using with a partner (2.81, 1.28-6.20). Factors not associated with sharing included: age, number of drugs use, being homeless, currently using cannabis or psychostimulants; injecting drug

Reference	Study design (++)	Aim	Recruitment	Outcome and analysis	Findings
					use; using for emotional stress, using to self harm. Adjusted for all significant factors
Hahn et al, 2001 USA	Cross sectional survey (+) N= 312 Community recruited	To estimate prevalence of HCV in PWID aged 29 or less in San Francisco and to examine risk factors for HCV	PWID injecting in the last month. Age=15-29 (median=22 years)	Risk factors associated with HCV. Multivariate analysis using logistic regression model.	Factors associated with HCV included: age (1.17, 1.05-1.30); duration of injection (1.21, 1.10-1.34); initiation into injecting by a sex partner (4.06, 1.74-9.52); daily injection in the past month (3.85, 2.07-7.17); injected by someone else in the last 30 days (0.50, 0.25-0.99); ever borrowed a needle (2.56, 1.18-5.53); snorted other drugs in last year (0.48, 0.26-0.89); and cleaned needle with bleach last time borrowed (0.50, 0.24-1.02). Adjusted for all significant factors
Heller et al, 2009 USA	Cross-sectional survey (+) n=504 Recruited through an NSP	Two aims: 1) examine extent to which NSP participants receive adequate numbers of sterile N/Ss relative to injection frequency; and 2) Identify reasons why PWID do not receive adequate number of n/s	PWID attending an NSP Age =19-45+ years	Inadequate syringe coverage (defined as receiving fewer syringes in past month than numbers of times injecting Multivariate analysis using logistic regression	In multivariate analysis younger age (19-25) was associated with inadequate syringe coverage compared to those aged >45 years, Other factors included, being homeless (OR=1.6 1.0-2.5), being male (OR=1.6, 1.0-2.6), injecting in a public place (OR=1.9, 1.2-3.0) and ethnicity Black/African American (3.0, 1.5-6.2) or Latino/Hispanic (OR=2.5, 1.3-4.8)

Reference	Study design (++)	Aim	Recruitment	Outcome and analysis	Findings
				model	compared to white/Caucasian. Adjusted for all factors listed
Sherman et al, 2004 USA	Cross-sectional survey (++) n=294 Community recruited, through targeted outreach	To examine syringe acquisition and disposal practices among young PWID and to examine the relationship between syringe acquisition and disposal practices and risky injection behaviours	PWID inititated into injecting in the last 5 years, injecting in the last 6 months Age= 15-30 years	Safe acquisition of needle/syringes defined as from an NSP or pharmacy Chi squared tests and Fishers exact tests for univariate analysis. Multivariate analysis using logistic regression model	Factors associated with safe acquisition of n/s included: injecting for longer than two years (2.43, 1.23-4.81), five or more injections per syringe (2.57,1.17-5.64), obtaining more than two syringes per pickup (16.7, 5.97-46.8); safely disposing of syringes (2.28, 1.20-4.37); attended education beyond high school (2.17, 1.10-4.28); White ethnicity vs. Africa American (3.20, 1.36-7.51). Model adjusted for ethnicity, sex, education, age.
Wong et al, 2009 USA	Baseline data from prospective study (++) n=478 Recruited via snowball sampling and street-based outreach	To assess access to addiction treatment among a cohort of street-involved youths and young adults	Street Youth using illicit drugs in the last 30 days Age=14-26 years	Had ever accessed some form of alcohol or drug (AOD) treatment (including methadone maintenance) Chi squared tests for univariate analysis. Multivariate analysis using logistic regression model	Factors associated with accessing AOD services included: a history of prison (2.04, 1.33-3.14), overdose (2.84, 1.82-4.42), crack use (2.06, 1.35-3.13), experience of injecting (1.58, 1.00-2.51). Factors not associated with AOD included: age or heroin use. Model adjusted for age, education, prison.

Evidence Tables: Quantitative Synthesis (Evaluation)

Reference Location	Study design	Aim	Population	Intervention and analysis	Effect
Bailey, 2003 USA	Cross-sectional (+) n=700 Community recruited, large sample, included RDS	To examine the prevalence and correlates of NSP use among young PWID	PWID injecting in the last 6 months; Age =18-30 years (64% <26 years)	NSP (the number of time participants had used the intervention in the last 6 months) Chi squared tests for univariate analysis. Multivariate analysis using ordinal logistic regression model	PWID who injected daily had increased odds of attending the NSP 1-6 times (1.64, 1.10-2.42) or >=7 time (2.88, 1.6904.91) compared to non-daily injectors. For all other factors there was no effect on attending the NSP between 1-6 times on injecting risk behaviours. PWID who attended the NSP >=7 time had reduced odds of ever sharing syringes (0.32, 0.19-0.54); sharing cookers, cotton, water (0.51, 0.30-0.85); backloading (0.39, 0.19-0.81); reuse a needle for injection (0.25, 0.13-0.45) and increased odds of always using a condom with a steady sex partner (2.95, 1.56-5.56). Adjusted for Age, Sex, ethnicity, frequency and duration of injection

Reference Location	Study design	Aim	Population	Intervention and analysis	Effect
Booth et al, 2006 Ukraine	Cohort (96% retention from n=300) (++) n=269 Recruited through Respondent Driven Sampling	To assess factors associated with change in needle-related risk behaviours as well as predictors of continued high-risk behaviour following intervention efforts	PWID injecting in the last 30 days; Mean age= 28 (SD=7.2)	Indigenous Leader Outreach Model - Former PWID act as outreach workers to access target population and conduct a baseline interview. During next 5 months participants receive HIV interventions Chi squared tests and Fishers exact tests and t tests for univariate analysis. Multivariate analysis using logistic regression model	Reduction in injecting risk behaviours pre and post intervention: Used preloaded syringe in past 30 days. Front/back loaded 30.6% to 20.9% (0.002); Used common container 19.7% to 11.2% (0.002); Used dirty n/s 19% to 6% (<0.001); Composite risk 45.7% to 25.3% (<0.001). Multivariate logistic regression model was developed for each outcome using significant predictors from univariate analysis. Young age was associated with front or back loading (0.88, 0.81-0.94); use a common container (0.91, 0.84-0.99); use dirty n/s (0.88, 0.78-0.98); as well as give their n/s to another PWID (0.92, 0.85-0.99) Models controlled for site as well as baseline risk behavior.

Reference Location	Study design	Aim	Population	Intervention and analysis	Effect
Gleghorn, 1997 USA	Serial cross-sectional (2.2% included in both studies) quasi experimental (++) n=1210 Street based sample, systematically recruited using ethnographic research to determine sampling sites.	1) To determine whether the intervention was successful in increasing youth contact and frequency of contact with outreach workers, 2) To assess the impact of the intervention on youth HIV risk behaviours and access to prevention services; and 3) to explore the relationship between the amount of outreach contact and youth participation in HIV prevention activities	Street youth homeless currently, or have been in past 12 months, engaged in street economy including prostitution, drug sales, theft; Age=~38% less than 18 years	Geographical location where street youth congregate. Basic street outreach by outreach workers and peer health educators, presented information on services at youth centre, distribution of condoms, bleach and flyers. Subculture specific intervention tools including posters, t-shirts, condom packets, stickers, harm reduction cards and a video also produced in collaboration with youth. Underground youth NSP advertised through word of mouth to youth only. Chi squared tests and Fishers exact tests and t tests for univariate analysis. Multivariate analysis using logistic regression model to examine the effect of using the intervention on: 1) talking to an outreach worker (OW); know one OW bests; follow through on an HIV-related referral; (ie. testing and counseling; drug treatment; diagnosis or care); used a condom at last vaginal intercourse; used a new syringe for injecting in past 6 months.	Attending the intervention (OR 4.0, 1.7-9.3) and recent injecting drug use (1.7, 1.1-2.7) were significant predictors of talking to an outreach worker in the past 6 months. Youths attending the intervention had increased odds of receiving referrals (4.6, 1.4-15.0). Number of outreach contacts was associated with numbers of HIV-related referral (effect increases with 4 levels of contacts). The intervention was no longer significant predictor. Youth with 30 or more outreach worker contacts in last 6 months, had increased odds of using clean n/s at last injection (4.9, 1.2-20.6). PWID with youth NSP available had increased odds of using a new syringe at last injection (3.1, 1.5-6.6). Not clear what adjusted for.

Reference Location	Study design	Aim	Population	Intervention and analysis	Effect
Guydish, 2000 USA	Cross-sectional (+) n=161 Convenience sample	To describe the characteristics and behaviours of young injectors and compare how use of NSPs impact this group.	PWID injecting at least 3 times in last 30 days; Age 13-23 (mean=20 years)	Youth-specific NSP offering street based outreach, secondary distribution and 'home delivery' services Chi squared tests and Fishers exact tests and t tests for univariate analysis. Multivariate analysis using logistic regression model	Respondents attending NSP at least 3 times in the past 6 months defined as NSP users, those visiting less frequently or never as non-NSP users. Multivariate logistic model showed that NSP attendees had fewer partners with whom they shared n/s in the last week (>1 vs. <=1) (0.33, 0.14-0.78); lower odds of using a single syringe more than once (0.42, 0.18-0.98); and lower odds of owning fewer than 5 syringes (0.20, 0.09-0.43). Use of NSP was not associated with sharing n/s in the past 30 days (0.61, 0.29-1.26); sharing rinse water (0.59, 0.27-1.30); inconsistent skin cleaning prior to injection (1.41, 0.54-3.69); and injection by another person (0.62, 0.30-1.28). Model adjusted for age, sex, education, duration of injection, frequency of injecting in the last month, ethnicity, type of drug injected, recruitment site.

Reference Location	Study design	Aim	Population	Intervention and analysis	Effect
Kipke, 1997 USA	Cross-sectional (+) n=195 NSP attenders, snowball sample, community recruitment and street outreach workers	To determine whether street youth using NSP differed demographically or injecting risk behaviours to non-NSP users 2) to determine whether use of NSP was associated with lower HIV-risk behaviours	PWID injecting in the last 30 days; Age=16-24 years	NSP Chi squared tests for univariate analysis. Multivariate analysis using logistic regression model	Factors associated with NSP use included: reduced odds of sharing needles (0.48, 0.24, 0.98); sharing paraphernalia (0.53, 0.28-0.99); use another drug to come down (0.31, 1.09, 3.63); using a dirty needle when high (0.27, 0.13-0.56); using a dirty needle when craving drugs (0.41, 0.22-0.77). Model adjusted for age, sex and ethnicity
Sears, 2001 USA	Cross-sectional (+) n=122 Mapping of homeless encampments, then recruitment via interviewers on site.	To assess the proportion of homeless young PWID reached by the intervention and to describe the association between the intervention and HIV risk behaviour	PWID injecting in the last 30 days; 15-25 Mean =20.9 years	Intervention targeting a population living in homeless encampments. Three components of intervention: 1) population-subculture specific media; 2) community development activities; and 3) enhanced model of secondary NSP distributed by young PWID who had gained respect from their peers, including daily contact with supporting community based project that provided n/s supplies and other services as necessary. Chi squared tests and Fishers exact tests and t tests for univariate analysis. Multivariate analysis using logistic regression model	Multivariate analysis of risk factors associated with those recruited from the non-intervention site suggested higher odds of sharing needle/syringe (3.78, 1.41-10.0); reusing the same syringe (1.77,1.12-6.85); and inconsistent condom use with casual partner (4.8, 1.39-16.7) Model adjusted for age, ethnicity, income source, use of drop-in centre, number of time consumed alcohol in the past 30 days.

Reference Location	Study design	Aim	Population	Intervention and analysis	Effect
Smyrnov et al, 2012 Ukraine	Cross-sectional (+) 2273 Recruitment via RDS	To determine whether a peer driven intervention could recruit 500 'new' PWID to each of five selected Harm Reduction sites within 6 months of implementation	PWID (detail not specified) Mean age =33.4 years pre PDI; 27.9 post PDI)	Projects that had been unsuccessful in recruiting new participants were selected (n=5 sites), 3 health educators were trained in each site to test a peer driven intervention (PDI). HEs recruited 'seeds' among PWID, seeds recruits other PWID and those PWID recruit others in a chain referral sampling strategy (respondent driven sampling). Each recruit is provided HIV intervention information and actively referred to services. Each recruit is provided an opportunity to become a recruiter. Those who agree are given a baseline survey to assess what they have learnt on HIV prevention. They are provided with more enhanced training, then continue further recruiting via Respondent Driven Sampling technique Z tests and T tests for differences in averages. .	On average, each PDI recruited 6.3 times more respondents that prior to the intervention. Overall the proportion of female PWID recruited was 6% points greater than the 26% recruited by traditional outreach; this difference was statistically significant in 3 sites. Overall, and in each site separately, the average age of recruits was significantly lower for those recruited via PDI, dropping from 34 years to 27.4 years (P<0.01). Some evidence to suggest that PDI was successful at recruiting more varied type of drug user. Pre PDI 99% were opiate users, post PDI only 65.9%.

Reference Location	Study design	Aim	Population	Intervention and analysis	Effect
Woods et al, 2000 USA	Cross-sectional (+) n=1044 Convenience sample	To assess utilisation of health services by clients of the Boston HAPPENS programme	HIV+ and at risk youth Only minority PWID (<2%) Aged 12-24 years	Boston HAPPENS (HIV Adolescent Provider and Peer Education Network for Services) Programme. Includes: outreach and risk reduction counselling; access to develpmentally and culturally appropriate HIV testing and counselling ; life management counselling; health status screening and needs assessment; client-focussed comprehensive, multi-disciplinary care and support; follow-up and outreach to ensue continuing care; and integrated care and communication between providers in the area Chi squared tests and Fishers exact tests and t tests for univariate analysis. Multivariate analysis using logistic regression model	Analysis to assess access of medical care through the programme. Younger age predicted use of medical care (0.89,0.84-0.94), being HIV positive (8.26, 2.25-30.29), homeless(3.64,2.06-6.43), Hispanic (6.08,3.75-9.88) or Black ethnicity (2.93,1.96-4.39) , sex with IDU (5.14,1.06-24.88), previous pregnancy (3.74,1.54-9.12), care at an outreach site (10.04, 6.88-14.65). There were differences by sex: among women having sex with an HIV+ person (9.88, 1.01-97.06) and previous pregnancy (2.97,1.19-7.39) was a significant predictor but not for men. Adjusted for factors listed.

Qualitative synthesis

Author Date of Pub. (Date of Field work)	Study aim	Setting	Population	Study design	Recruitment Strategy
Barnaby, L 2010	The Shout Clinic Harm Reduction Report 2010 - Needs assessment and barriers to harm reduction services for young 'street involved' people who use substances	Toronto / Canada	16-24yrs homeless street involved young people. 27 young people took part in focus group discussions. Participants had used crack, speed, opiates (not prescribed) and/or injected any drug in past 6 months. 75% male, 21% female, 4% transgender. 63% white.	3 focus group discussions. Also a quantitative survey, with some open-ended questions.	Recruited from youth-serving agencies (drop-in centres/shelters/health centres)
Buccieri, K 2010 (2006)	A comparative analysis of street youth and service provider opinions on harm reduction	Ontario/Canada	16-24yrs. 6 male, 4 female homeless/ in secure housing. 3 male, 6 female service providers.	19 semi-structured interviews	Service providers and users of a 'street-youth' drop-in centre
Buzducea, D 2011 (2010)	An evaluation of programmes targeting adolescents 'at risk' of HIV infection. Evaluating the efficiency and effectiveness of harm reduction services addressing MARA (most-at risk adolescents), as part of UNICEF's MARA programme - Services provided by 8 NGOs: ACCEPT, ALIAT, ARAS, INTEGRATION, PARADA, SAMUSOCIAL, SASTIPEN, Romanian Harm Reduction Network (RHRN))	Four cities: Bucharest, Timisoara, Iasi and Constanta / Romania	15 FSW, 20 PWID, 10MSM aged <25yrs and 11 programme managers from NGOs providing outreach services for marginalised groups. The PWID population were 13-21yrs, with injecting histories of 1-12 years.	45 semi-structured interviews with service users and 11 with service providers	Recruited through their use of services of the following NGOs : ACCEPT, ALIAT, ARAS, INTEGRATION, PARADA, SAMUSOCIAL, SASTIPEN, Romanian Harm Reduction Network (RHRN)

Author **Date of Pub.** (Date of Field work)	**Analysis**	**Key emergent themes**	**Limitations / Value**	**Quality**
Barnaby, L 2010	Focus group data was analysed by identifying recurring themes from the discussions	1) using drugs to suppress other problems, losing children, homelessness, depression, hunger 2) places to inject, 3) sharing with trusted relationships, 4) NSP not open/available when needed, 5) preference for interacting with peer HR services, 6) withdrawal, 7) police - trust/mistrust, abuse, 8) stigma, 9) Mistrust, 10) services not available when needed/not in good location, 11) not wanting to use adult services	The analysis could have been explained in more detail. Recurring themes were identified in the data, but no further details are given. There is sufficient data to support the findings, and limitations are discussed. The findings are reported with recommendations for policy guidelines.	+
Buccieri, K 2010 (2006)	Interviews were recorded, transcribed and analysed thematically. A discourse analysis was used.	1) stigma associated with accessing services, effectiveness of programming, 2) waiting times, engagement *'maybe because they're scared or they might be made fun of..',* 3) NSE won't increase use	The analysis could have been explained in more detail. There is limited data presented, and limitations and bias are not discussed. Further work is identified, the contribution is discussed. Limited data and age and drug use of participants is unclear.	-
Buzducea, D 2011 (2010)	Participants were asked questions around the relevance, effectiveness, efficiency, impact, sustainability and replicability of services. The results were presented in reference to each of these categories, service users and providers statements are presented separately. No method of analysis is described in the paper.	Outreach services - relevant, useful, helpful and supportive. Young PWID found out about the services through word of mouth, outreach workers, Internet, TV, leaflets. No fear was expressed regarding accessing services, people accessed NSE because: 1) they were aware of BBV risk. 2) Other health advice/information/counselling/emotional support was sought, 3) provision of free N&S, condoms, hygiene/ sanitary items, vaccinations, medical treatment and tests, which are expensive elsewhere. 4) confidentiality was assured, Trust, 5) non-judgemental/lack of discrimination by service providers. Challenges - long term sustainability; government doesn't want to take on these services, different service providers; NGOs, public, private, don't work well together	Analysis was not described. This is an evaluation of UNICEF funded programs targeting MARA. Could have generalisable findings to similar service provision NGOs.	+

Author **Date of Pub.** (Date of Field work)	**Study aim**	**Setting**	**Population**	**Study design**	**Recruitment Strategy**
Davis, M **2004** (2000-2001)	An exploration of the narratives of people at risk of HCV infection. Perceptions of risk of HCV and HIV and risk management of people who began injecting drugs in the 1990's (post-harm reduction period).	London / UK	17-50yrs (mean 29.8) current drug injectors (within past 4 weeks). 32% women. 32% reported that they were HCV positive. 68% reported initiating injecting in 1995 or later (mean 1993, median 1996) .	59 in-depth qualitative interviews	Recruited from the networks of the researchers, community-based D&A services, snowballing, or connections of 'indigenous fieldworkers'.
Fast, D **2009** (2008)	To explore how youth who were currently entrenched in a local drug scene in downtown Vancouver, characterised and understood their initiation into this setting.	Vancouver/ Canada	16-26yrs (median 22) street youth with self-reported use of illicit drugs other than marijuana in the past 30 days. 18 women, 18 men, 2 transgender individuals. Sampling aimed to attain variation in gender, ethnicity, age and experience of the drug scene.	38 in-depth semi-structured qualitative interviews	Recruited from the At-risk Youth Study (ARYS) cohort (initiated in 2005). Young people attending research office (youth drop-in centre).
Fast, D **2010a** (2008)	To examine young people's understanding of the physical and social landscape of the downtown drug scene in Vancouver. The roles of social networks, violence and risk are discussed.	Vancouver/ Canada	16-26yrs (median 22) street youth with self-reported use of illicit drugs other than marijuana in the past 30 days. 18 women, 18 men, 2 transgender individuals. Sampling aimed to attain variation in gender, ethnicity, age and experience of the drug scene.	semi-structured qualitative interviews and ethnographic fieldwork	Recruited from the At-risk Youth Study (ARYS) cohort (initiated in 2005). Young people attending research office (youth drop-in centre).

Author **Date of Pub.** (Date of Field work)	**Analysis**	**Key emergent themes**	**Limitations / Value**	**Quality**
Davis, M **2004** (2000-2001)	Interviews were facilitated using a topic guide, focusing on: first and last injection experience, risk management; skills acquisition, blood safety, awareness, needle sharing, access to needles/syringes, service use, HCV testing, symptoms and self care. The analysis was interpretive and the fieldwork progressed in an inductive manner. Content and themes were identified, catalogued and a simple framework of themes generated from the interviews.	1) Knowledge deficits regarding HCV transmission, symptoms, treatment, 2) People had partial or confused knowledge, 3) HCV not as bad as HIV, 4) HCV infection is inevitable - ubiquitous risk - In comparison to HIV - HCV is everywhere and is acquired if you inject drugs, HIV is embodied in people who are HIV positive and is caught from these people. 5) Harm reduction messages about HIV were understood, this is the reason given for avoiding sharing injecting equipment.	The analysis is well explained, there is sufficient data to support the findings, and paradoxical aspects of the data is analysed. However, bias and interviewer influence is not discussed. The contribution is discussed and wider implications are implied. However, other populations are not discussed, neither is further work.	++
Fast, D **2009** (2008)	Interviews facilitated using a topic guide encouraging broad discussion relating to how participants came to be involved in the local drug scene, drug-use practices, income generation activities, social relationships. Data coded on key themes. Substantive codes then applied to categories/themes based on initial codes. Interview content was analysed and discussed throughout data collection to inform the focus and direction of subsequent interviews.	Positive reasons for entrenchment into the local drug scene: 1) excitement, independence, belonging, proximity, affordable housing. Negative aspects: 2) problematic drug use, need for income; sex work, dealing, homelessness, 3) unstable social relationships, 4) lack of agency. 5) Other priorities; housing, avoiding police, harmful drug use/income generation, chronic poverty. 6) Poor experience of 'carers', 7) regulation-heavy social services, 8) fear of older PWID, 9) social-networks	The analysis is well explained, there is sufficient data to support the findings, and limitations are discussed. The contribution is discussed and wider implications are discussed.	++
Fast, D **2010a** (2008)	Interviews facilitated using a topic guide encouraging broad discussion of experiences and understandings of their neighbourhoods, 'safe' and 'unsafe' places in the city, and how these experiences were shaped by gender and social position more generally. Data coded on key themes. Substantive codes then applied to categories/themes based on initial codes. Interview content was analysed and discussed throughout data collection to inform the focus and direction of subsequent interviews.	Main themes:1) marginalisation, social hierarchies, risk, geographical&conceptual boundaries, violence, social suffering. 2) Other priorities; housing, avoiding police, harmful drug use/income generation, sex work, chronic poverty. 3) They were aware of BBV risk. 4) '*They stop carin about themselves'* -personal health not a priority? 5) Avoidance of service due to location - '*I've got a hole in my tooth that's like this big.... probably end up relapsing'.* Also due to social networks and being 'tracked down'...*'I'm not in one place*'.. 6) youth services were used for daily needs-food/washing/internet/phone/avoid police&violence. 7) Fear of older PWID, 8) lack of agency	The analysis is well explained, there is sufficient data to support the findings, and limitations are discussed. The contribution is discussed and wider implications are discussed.	++

Author Date of Pub. (Date of Field work)	Study aim	Setting	Population	Study design	Recruitment Strategy
Fast, D 2010b (2008)	To examine young peoples perspectives regarding the evolution of their drug use, to look at transitions in drug use (initiation, changes in substances, mode of use, intensity of use).	Vancouver/ Canada	16-26yrs (median 22) street youth with self-reported use of illicit drugs other than marijuana in the past 30 days. 18 women, 18 men, 2 transgender individuals. Sampling aimed to attain variation in gender, ethnicity, age and experience of the drug scene.	semi-structured qualitative interviews and ethnographic fieldwork	Recruited from the At-risk Youth Study (ARYS) cohort (initiated in 2005). Young people attending research office (youth drop-in centre).
Harocopos, A 2009	To explore the circumstances of injection initiation for a cohort of new injectors whose first injection had taken place within the previous 18 months	New York City / USA	54 participants aged 16-42 (median 22yrs). 59% male, mostly non-Hispanic white or Hispanic. Age at first injection 15-41 (median 21 yrs). Median time from first use (not intravenous), to injecting was 8 months. All but two quotes from people <24, mostly teenagers.	In-depth bi-monthly interviews for 2 years. Semi-structured interviews	Street-based contact with researchers, internet chat rooms, chain referrals, mobile NSPs
Hughes, R 2000 (1997)	To study social distance - how close or distant individuals consider others and the influence of this on HIV risk behaviour among PWID.	Two cities in North-East England / UK	7 participants aged 16-24yrs, 7 participants aged 25-36yrs. 9 men and 5 female PWID. Mainly unemployed people, living in hostel accommodation with experience of imprisonment.	in-depth interviews using a vignette (developed through discussions with PWID and service providers), focus group discussions and observational field notes	Recruited through services in touch with PWID and snowballing.

Author **Date of Pub.** (Date of Field work)	**Analysis**	**Key emergent themes**	**Limitations / Value**	**Quality**
Fast, D **2010b** (2008)	Interviews facilitated using a topic guide encouraging broad discussion of transitions in drug use, specifically first experiences of problematic drug use, evolution of practices over time, how these were shaped by social, structural and physical contexts. Data coded on key themes. Substantive codes then applied to categories/themes based on initial codes. Interview content was analysed and discussed throughout data collection to inform the focus and direction of subsequent interviews.	looking at transition events - choice, having agency, curiosity. Social networks influenced transitions. But context of 'choice' is discussed. Aspects of marginalisation and socio-economic circumstances are discussed in the discussion.	The analysis is well explained, there is sufficient data to support the findings, and limitations are discussed. The contribution is discussed and wider implications are discussed.	++
Harocopos, A **2009**	Topic guide: economic resources, drug use, initial injection, current injection practices, syringe sources, sexual history, social resources, service utilisation, HIV knowledge. Interviews were transcribed, catalogued using a coding framework derived from the interview guide.	1) initiation into injection through friends / lovers, 2) injecting use less, cost effective, more potent effect, '*final frontier of the drug world*'3) needing help injecting, 4) attractiveness of taboo/dangerous practices, 5) curiosity, 6) injecting - '*the real way to do it*' 7) glamorous, 8) clean needle aware, 9) pleasure, 10) reluctant initiators	The analysis is well explained, there is sufficient data to support the findings, and limitations are discussed. The contribution is discussed and wider implications are discussed.	++
Hughes, R **2000** (1997)	Interviews were facilitated using a piloted topic guide and vignette, investigating social distance and perceptions of sexual and drug injecting behaviour inside and outside of prison. Data was coded following established procedures and designed to be flexible to combine prior knowledge with inductive generation of original concepts and theories.	Sexual risk (not using condoms) and injection risk (sharing needles) was higher in trusted more long-term partners/close friends. Use of condoms indicated mistrust. Conversely, unsafe sex in casual partnerships because of the immediacy of it. PWID share needles with people they know (close friends), but also lend needles to people who they don't want to see suffering (withdrawal). Sharing with people when their background was unknown was considered dangerous by some. And the risk that needles would not be returned was a consideration. However, decisions over sharing also depended on need to inject.	The analysis is described, although more detail could have been provided. sufficient data is presented, including contradictory data. Bias and influence are not discussed. The value is discussed and further research suggested, transfer of findings is not well discussed	+

Author **Date of Pub.** (Date of Field work)	**Study aim**	**Setting**	**Population**	**Study design**	**Recruitment Strategy**
Krusi, A **2010** (2008)	An investigation into the barriers to housing faced by street-involved young people who use illicit drugs	Vancouver/ Canada	16-26yrs (median 22) street youth with self-reported use of illicit drugs other than marijuana in the past 30 days. 18 women, 18 men, 2 transgender individuals. Sampling aimed to attain variation in gender, ethnicity, age and experience of the drug scene.	38 in-depth semi-structured qualitative interviews	Recruited from the At-risk Youth Study (ARYS) cohort (initiated in 2005). Young people attending research office (youth drop-in centre).
Lankenau, S **2005** (2000-2002)	An investigation into the timing of polydrug use, drug forms consumed, and mode of administration in young people who inject ketamine	New York City / USA	40 participants aged 18-25 (median 21), 73% male, 65% white, 73% had been homeless in the past, 38% homeless at time of interview. 68% high school education. All had injected ketamine.	semi-structured survey consisting of both open and closed-ended questions	Recruited over a period of months from street involved youth 'hanging out' in Manhattan's East Village - a park and two streets.
Loxley, W **1995**	To explore needle sharing risks in young PWID, and to investigate individual, interpersonal, social and cultural processes that underlie risky injecting by young people	Perth / Australia	105 YPWID, 55 young men, 50 young women aged 14-20 (median 18), mostly unemployed and living in a house/flat. 79 injectors and 26 non-injectors	quantitative and qualitative methods. In-depth qualitative interviews	Advertising, snowballing, direct referral

Author **Date of Pub.** (Date of Field work)	**Analysis**	**Key emergent themes**	**Limitations / Value**	**Quality**
Krusi, A **2010** (2008)	Interviews facilitated using a topic guide encouraging broad discussion relating to how participants came to be involved in the local drug scene, drug-use practices, income generation activities, social relationships. Data coded on key themes. Substantive codes then applied to categories/themes based on initial codes. Interview content was analysed and discussed throughout data collection to inform the focus and direction of subsequent interviews.	1) lack of formal support, lack of confidence that services will be helpful (experience of bureaucratic welfare and housing system), 2) shelters have too many regulations, experience of restricted access and rejection from facilities, 3) mistrust of service providers, mistrust of adults, 4) viewed themselves as distinct from older service users, not identifying with adult services, 5) experience of discrimination, 6) other priorities: financial problems, violence, fear	The analysis is well explained, there is sufficient data to support the findings, and limitations are discussed. The contribution is discussed and wider implications are discussed.	++
Lankenau, S **2005** (2000-2002)	Interview focused on ketamine injection initiation, most recent ketamine injection, most recent ketamine sniffing. Also regarding polydrug use: which drugs, how did they feel. Analysis method not described.	Some quantitative analysis, essentially polydrug use at initiation of ketamine injection was common; marijuana, alcohol most common, but also LSD, PCP, speed, ecstasy and heroin. Most K injection initiations were unplanned. Pleasure and un-pleasant experiences described. Risk of OD mitigated by multiple smaller shots could lead to BBV risk due to sharing a vial of Ketamine even though needles were not shared. novice injector - help needed. 90% of ketamine initiations and recent K injections occurred among groups - socially injected. Different 'jobs': K, other drugs, syringes, money, knowledge, space	Analysis was not described. The value is discussed and further research suggested, transfer of findings could have been discussed further.	+
Loxley, W **1995**	Qualitative analysis techniques, although this was not described	1) BBV aware, 2) unrealistic optimism - sharing with friends / trusted partners '*...oh the people that I shared with I've know known since in primary school and I think they're pretty safe'* 3) sharing with sexual partners because already engage in unsafe sex. *'Oh I'd share with a sexual partner. Because you are already transmitting bodily fluids, so if you're going to catch it, you're going to catch it...'*	Other than analysis using NUDIST, no details on analysis are given. The findings are discussed in the context of previous work and implications for future harm reduction policy is discussed. Wider generalisability could have been discussed further.	+

Author **Date of Pub.** (Date of Field work)	**Study aim**	**Setting**	**Population**	**Study design**	**Recruitment Strategy**
Mayock, P **2005** (1998 & 2001)	To examine young people's drug use and their drug transitions within a framework of risk. *'This study aimed to tap into a diverse range of drug-related experiences, thereby creating the space to examine how marginal contexts impact differentially on young people's drug biographies'*	Dublin / Ireland	1998: 57 participants aged 15-19; 24 young men and 33 young women. 18 non-illicit drug users, 21 people who used illicit drugs, 18 people who self identified has having 'problem drug use', primarily smokers/intravenous heroin use. 2001: 42 of these participants, 16 young men and 26 young women. 33% of 'abstainers' 1998 now used drugs. 3 'drug-takers' were now 'problem drug-takers', almost all heroin smokers transitioned to injecting.	longitudinal ethnographic study. Individual in-depth interviews and six focus group discussions. Also photography project designed to capture the social landscape.	Snowball sampling and targeted sampling used to recruit people from youth venues and street-based settings.
McCalman, J **2001**	To investigate the injecting practices and knowledge of HCV prevention among young people	Cairns / Australia	Qualitative sample is unclear. PWID aged 12-22yrs, past experience of homelessness.	Mixed methods: focus groups, questionnaire and interviews	Outreach in street hangouts, services, subculture press, personal contacts and snowballing.
Pierce, T **1999**	To examine the network dynamics of young White heroin users. To look at who the drug users are, how their networks form and how they change over time. Comparison with older Black PWID networks in the same area is also made.	Washington, DC / USA	12 well-off White young PWID. 6 male, 6 female. Aged 19-31yrs. 12 networks studied : networks contained 2 or 3 core members, periphery and outer periphery members. Bridging members connected one network to another. All had high school education, and some higher. 8 other and 25 peripheral network members were also studied.	ethnographic research and network analysis. 50 hours of observation/ week for 104 weeks.	Snowballing through the researcher's networking through the social networks of PWID.
Preda, M **2009**	To identify behaviours adopted by most-at-risk-adolescents and to evaluate services addressing these adolescents in Romania (part of the UNICEF MARA initiative)	Bucharest / Romania	7 PWID aged 17-24yrs (focus group), and 10 interviews with people who have taken part in commercial sex within the past month, aged 16-22yrs.	focus group and qualitative interviews	Respondent-driving sampling (snowballing)

Author **Date of Pub.** (Date of Field work)	**Analysis**	**Key emergent themes**	**Limitations / Value**	**Quality**
Mayock, P **2005** (1998 & 2001)	Analysis is not described	1) Pleasure, excitement, reduced anxiety, psychological relief, 2) displays of experience, status achievement, 3) transitions - unexceptional, ordinary, spontaneous, 4) normalised risk with more experienced peers, 5) risky transition: ' *there were people there that didn't smoke gear and offered me 2ml in a barrel, so I took it... I just wanted the drug anyway I could',*6) acquired knowledge from peers, 7) found themselves in drugs lifestyle without access to means to minimise risk, 8) diversity of drug users	Analysis was not described. The findings are discussed at length in the context of previous work and implications for future harm reduction policy is discussed.	+
McCalman, J **2001**	Analysis is not described	1) unprepared 1st injection, 2) lack of BBV knowledge, 3) not concerned about BBV, 3) sources of information, peer education	Analysis was not described, only a few quotes are provided. Little evidence of any analysis. The contribution is discussed and wider implications are implied. However, other populations are not discussed, neither is further work.	-
Pierce, T **1999**	Primary analysis for each network was based on dyadic and triadic core relationships within each network. Life histories were taken of each of the 12 core participants.	Positive reasons for entrenchment into the local drug scene: 1) excitement, fun, 2) lack of knowledge regarding injecting and withdrawal, 3) division of tasks - one person in network responsible for scoring drugs, 4) white PWID: well off, inexperienced, small networks, focused on scoring drugs, vs. black PWID: low-income, large networks, experienced, focused on financing drugs. 5) possible fear of older PWID. 6) unstable social networks, 7) the participants were financially secure - lowing their risk of sharing and enabling them to leave the drug scene. 8) aware of BBV risk. 9) could always buy clean needles, 10) sharing needles only in trusted more long-term partners	Reliability and validity of data is discussed, bias and influence could have been discussed. The findings provide useful insights into this demographic, but could have been discussed in the context of existing work to a greater extent. New areas of work are identified, work may have limited generalisability	+
Preda, M **2009**	Topic guide: history of drug use, present experience, patterns of drug use, injecting behaviour, sex partners, access to services.	1) Story of initiation 2) financing drugs 3) BBV awareness, sharing needles, withdrawal 4) barriers to using pharmacies 5) fear of police 6) inevitability of infection 7) discrimination and stigma	The analysis was not described. Limitations are not discussed. This is a study of UNICEF funded programs targeting MARA. Could have generalisable findings to similar service provision NGOs	-

Author **Date of Pub.** (Date of Field work)	**Study aim**	**Setting**	**Population**	**Study design**	**Recruitment Strategy**
Racz, J **2005** 2002	To investigate and describe the risk behaviour in reference to BBV infection of young PWID in Hungary. Looking at various levels of the 'risk environment' - physical, social, economic, policy, legal, gender, ethnic inequalities, and how life circumstances shape risk perceptions in the context of different social and policy contexts	Budapest & Pecs / Hungary	22 males, 11 females aged 17-30yrs (majority aged 22-25) PWID. Inclusion criteria: injected drugs in the past 30 days.	semi-structured qualitative interviews, face -to-face interviews.	Recruited from outpatient treatment centres and hospitals, NSPs and PWID social networks. People in the assessment phase of drug treatment, regular and casual NSP attendees and their friends who had no contact with services.
Rhodes, T **2011** (2009)	To investigate accounts of the micro social relations of initiation.	Balti / Moldova	31 currently injecting, 11 recently stopped.Aged 16-37yrs (average 25yrs). 76% male, 88% urban.	semi-structured in-depth qualitative interviews	Purposive sample. Interviews took place at the local 'youth friendly' clinic
Roy, E **2008** (2000-2002)	To examine the social contexts and processes that influence transition to drug injection among 'street' youth.	Montreal / Canada	42 'street youth' aged 15-25yrs. 16 female, 26 male. At the time of interview, 17 had never injected drugs, 8 had tried injecting but not pursed it, 8 had stopped following regular injecting use, 9 were currently injecting (1 of whom for less than 1 year).	semi-structured in-depth qualitative interviews	Recruited from street youth agencies and snowballing

Author **Date of Pub.** (Date of Field work)	**Analysis**	**Key emergent themes**	**Limitations / Value**	**Quality**
Racz, J **2005** 2002	Interviews focused on the first occasion drugs were used, first injection, purchase, preparation and sharing of drugs, overdose, needle use, HCV infection and participation in NSP. Analysis was done using Grounded theory and using inductive and deductive approaches to obtain the final code structure. Coding and analysis continued as long as the formulated codes still had explanatory power. When no substantial new information emerged, the point of theoretical saturation was deemed to have been reached, and analysis was completed.	1) Generally aware of BBV, but not aware of BBV of filters: false sense of security, 2) Positive aspects; pleasure, loyalty, friendship, comradeship, 3) Opposite view: each to their own, no loyalty, 4) withdrawal particularly risky, 5) sharing jobs: one person sources drugs, 6) novice injectors - needing help from others, being less prepared 7) policing means can carry clean needles, 8) fatalism towards BBV, 9) sharing needles higher in trusted relationships (sexual partners, close friends, relatives)	The analysis is well explained, there is sufficient data to support the findings, and limitations are discussed. The findings are discussed at length in the context of previous work and implications for future harm reduction policy is discussed. The setting may not be generalisable.	++
Rhodes, T **2011** (2009)	Topic guide: initiation, help reveived and given, perception of risk, dissuading others. Interviews were transcribed, coded and refined using iterative process. Thematic categories within and across codes were generated.	accounting for self-initiation, initiation of others, boundaries, dissuasion of others	The analysis is well explained, there is sufficient data to support the findings. Contradictory data is presented, but bias and limitations are not. The findings are discussed at length in the context of previous work and implications for future harm reduction policy is mentioned.	++
Roy, E **2008** (2000-2002)	Interviews focused on childhood, adolescence, onset of drug use, introduction/arrival to street life, and time since. Topics examined in relation to these periods were: family and school, drug use, goals and expectations, social networks, living conditions and resources. Analysis used an inductive process on an iterative basis. Preliminary coding was followed by theoretical codification. A typology was developed to describe the data.	Five different 'types' of young people were identified, each with different experiences, different levels of 'entrenchment' and potential risks. Over-arching themes: 1) avoiding police/authorities, 2) lack of identification, 3) Pleasure, belonging, 4) other priorities; overdose, withdrawal, 5) some were BBV risk aware, 6) Mistrust. 7) people had different views on injecting, but several of the 'types' of youth identified could be at risk of occasional injecting, and therefore not accessing services.	The analysis is fairly well explained, there is sufficient data to support the findings, but contradictory data is not presented. Bias and interviewer influence is discussed. Further research, generalisability and contribution is discussed	++

Author **Date of Pub.** (Date of Field work)	**Study aim**	**Setting**	**Population**	**Study design**	**Recruitment Strategy**
Roy, E **2007** (2004-2005)	To examine what HCV means to young PWID and how this impacts on their health behaviours, based on the social contexts in which they live and consume drugs.	Montreal / Canada	23 males and 16 females, 18-27yrs. 'Street-involved' youth who were HCV antibody positive, HIV negative, and currently injecting drugs or in the process of quitting.	In-depth interviews	Recruited from an on-going cohort on HIV and HCV incidence among street youth, from methadone programmes and medical clinics.
Sherman, S **2002**	To investigate the role of the social environment on transition behaviours - through the framework if social influence theory, to explore the spheres that influence young drug users transition from heroin sniffing to injecting.	Baltimore / USA	19 PWID who had initiated injecting within the past 3 years. 55% male, 95% Caucasian, 61% not completed high school, aged 19-29yrs (mean 24yrs). 90% reported injecting heroin daily.	Open-ended interviews	Participants in a larger study : Risk Evaluation and Assessment of Community Health III (REACH III). Interviews conducted in a mobile van.
Small, W **2009** (2007-2009)	To explore initiation of injecting among street youth - social influences which shape the adoption of injection drug use. Looking at first injection experiences, uptake of injecting.	Vancouver/ Canada	26 people from the ARYS cohort - aged 16-26yrs (median 23). 8 people who initiated injecting in past 24 months, 18 others - selected for representation of gender, aboriginal people and socio-demographic profile of larger cohort. 12 female, 13 male, 1 transgender.	in-depth qualitative interviews	Recruited from the At-risk Youth Study (ARYS) cohort (initiated in 2005). Young people attending research office (youth drop-in centre).
Treloar, C **2005** (2000-2002)	To examine knowledge levels and information exchange among young PWID in relation to location, drug of choice, age, HCV status, risk practice.	Brisbane and Sydney / Australia		Qualitative semi-structured interviews	Snowballing and youth shelters, treatment centres, emergency rooms, public health clinics, NSPs, sub cultural press.

Author **Date of Pub.** (Date of Field work)	**Analysis**	**Key emergent themes**	**Limitations / Value**	**Quality**
Roy, E **2007** (2004-2005)	Interviews covered time from first injecting to HCV diagnosis, HCV testing and living with HCV - three themes: drug consumption, street-life and HCV. Constant comparative analysis used to build a typology founded on the participants experiences.	1) Other priorities: avoiding overdose, police, withdrawal, '*..I've had 7 overdoses, and I told myself I would die of that much sooner than I would die of hepatitis C*' 2) impossible to avoid HCV, fatalistic outlook '*It's almost normal to have hepatitis C for us. It's almost sure that if you're gonna inject, you'll get it one day.*', 3) not as bad as HIV - normalised, 3) street-cred : '*Once you have hepatitis C ..you'll be one of the gang.*4) people with less street involvement are more concerned about their HCV diagnosis and getting well. 5) living on the street makes safe injecting very difficult.	The analysis is fairly well explained, there is sufficient data to support the findings, and limitations are discussed. The findings are discussed at length in the context of previous work and implications for future harm reduction policy is discussed.	++
Sherman, S **2002**	Topic guide: daily routine, family history, first drug use, first heroin use, first injection. Transcripts coded for common themes. Coded themes determined by two researchers separately. Themes across interviews coded.	1) Young people's initiation into drugs is via relations (parents), friends who inject, 2) each to their own, no friendship/helping out people by sharing drugs, 3) All women initiated injecting with male sexual partners, 4) novice injectors - needing help from others, 5) pleasure, 6) injecting because sniffing is too expensive and not effective enough.	The analysis is well explained, there is sufficient data to support the findings, and limitations are discussed. The findings are discussed at length in the context of previous work and implications for future harm reduction policy is discussed.	++
Small, W **2009** (2007-2009)	Topic guide: transition, first injection, ongoing injection drug use, perceptions of injecting. Coding, categorising, thematic analysis.	1) initiation into injection through friends / lovers, active in brining about initiation, 2) changing perceptions of risk/IDU, 3) reduction in dose, 4) distinct from older/experienced PWID, 5) reluctance of initiators - moral 'code' not to initiate, 6) providing drugs in return for assistance	The analysis is well explained, there is sufficient data to support the findings, and limitations are discussed. The findings are discussed at length in the context of previous work and implications for future harm reduction policy is discussed.	++
Treloar, C **2005** (2000-2002)	Topic guide: transition and initiation, drug use career, contexts of use, PWID networks, current patterns of drug use, knowledge of risk and HCV, sources of knowledge, information exchange. Thematic coding used to analyse the data.	1) less knowledge when first injecting '*..comes later on as you find out'* especially if someone else did the injecting	The analysis is well explained, but there is limited qualitative data and bias is not discussed. The findings are discussed at length in the context of previous work and implications for future harm reduction policy is discussed.	+

Author Date of Pub. (Date of Field work)	Study aim	Setting	Population	Study design	Recruitment Strategy
Trudgeon, H 2010	To determine how much young PWID knew about the potential harms associated with injecting and to ascertain what they perceived to be the most important source of such knowledge.	Plymouth / UK	5 PWID, 16-19yrs, currently in drug treatment, who initiated injection <18 yrs. 3 female, 2 male. 2 living in flats, 3 living with relations.	in-depth semi-structured interviews	Drug treatment programme
UNICEF 2013 (2008)	Experiences from the Field - HIV prevention among Most At Risk Adolescents	Central and Eastern Europe and the Commonwealth of Independent States	Service users of UNICEF funded MARA programmes	Qualitative Interviews	Unclear. Service users of MARA programmes

Author Date of Pub. (Date of Field work)	Analysis	Key emergent themes	Limitations / Value	Quality
Trudgeon, H 2010	Topic guide: circumstances around initiation, drug using behaviours, obtaining injecting equipment, perceptions of injecting, experiences, knowledge and feelings of perceived harms. Grounded theory analysis was used. Both authors read and agreed on thematic codes.	1) Little knowledge about harms when first injecting, 2) main source of knowledge is from peer PWID, 3) Peer advice held in higher regard than professional?, 4) Other priorities: withdrawal, 5) aware of BBV risk.	The analysis is fairly well explained, there is sufficient data to support the findings, and limitations due to sample size is discussed. The findings are discussed at length in the context of previous work and implications for future harm reduction policy is discussed.	++
UNICEF 2013 (2008)	Not detailed in the document	Mistrust of police, initiation by older PWID, confidentiality	Data analysis is unclear. This is a study of UNICEF funded programs targeting MARA. Could have generalisable findings to similar service provision NGOs.	-