



## UWS Academic Portal

### **An uncontrolled feasibility study of a group intervention to reduce hepatitis C transmission risk behaviours and increase transmission knowledge among women who inject drugs**

Gilchrist, Gail; Tirado-Munoz, Judit; Taylor, Avril; Fischer, Gabrielle; Moskalewicz, Jacek; Kochl, Birgit; Giammarchi, Cinzia; Dabrowska, K.; Shaw, April; Munro, Alison; Di Furia, Lucia; Torrens, Marta

*Published in:*

Drugs: Education, Prevention and Policy

*DOI:*

[10.1080/09687637.2016.1197885](https://doi.org/10.1080/09687637.2016.1197885)

E-pub ahead of print: 07/07/2016

*Document Version*

Peer reviewed version

[Link to publication on the UWS Academic Portal](#)

*Citation for published version (APA):*

Gilchrist, G., Tirado-Munoz, J., Taylor, A., Fischer, G., Moskalewicz, J., Kochl, B., Giammarchi, C., Dabrowska, K., Shaw, A., Munro, A., Di Furia, L., & Torrens, M. (2016). An uncontrolled feasibility study of a group intervention to reduce hepatitis C transmission risk behaviours and increase transmission knowledge among women who inject drugs. *Drugs: Education, Prevention and Policy*, 1-10. <https://doi.org/10.1080/09687637.2016.1197885>

#### **General rights**

Copyright and moral rights for the publications made accessible in the UWS Academic Portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

#### **Take down policy**

If you believe that this document breaches copyright please contact [pure@uws.ac.uk](mailto:pure@uws.ac.uk) providing details, and we will remove access to the work immediately and investigate your claim.

1  
2  
3 **An uncontrolled, feasibility study of a group intervention to reduce hepatitis C**  
4 **transmission risk behaviors and increase transmission knowledge among**  
5 **women who inject drugs**  
6  
7  
8  
9

10  
11 **Abstract**  
12

13  
14 **Aims.** This study aimed to develop and test the feasibility, acceptability, and initial  
15 effectiveness of a 3-session psychosocial group intervention to reduce hepatitis C  
16 risk behaviours and increase hepatitis C transmission knowledge among women who  
17 inject drugs in five European cities/towns.  
18  
19

20  
21 **Methods.** An uncontrolled, field effectiveness study of a psychosocial group  
22 intervention. Hepatitis C virus transmission knowledge, sexual and drug risk  
23 behaviours and depressive symptoms were assessed at baseline and one-month  
24 post-intervention. Intention-to-treat analyses were conducted. **Findings.** One-month  
25 post-intervention, a significant increase was reported in hepatitis C virus transmission  
26 knowledge and in the number of new and unused needles/syringes used to inject.  
27  
28 There were significant reductions in the sharing of spoons/containers for mixing that  
29 had been used by someone else, sharing of filters, cookers, spoons or water with  
30 someone who was hepatitis C positive and the use of alcohol swabs following  
31 injection.  
32  
33

34  
35 **Conclusions.** The intervention showed promising results in reducing some hepatitis  
36 C injecting risk behaviors and increasing hepatitis C transmission knowledge among  
37 women who inject drugs. These preliminary findings suggest that it is feasible to  
38 deliver the intervention in drug treatment settings, and that the intervention was  
39 acceptable to both participants and staff.  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 **An uncontrolled, feasibility study of a group intervention to reduce hepatitis C**  
4 **transmission risk behaviors and increase transmission knowledge among**  
5 **women who inject drugs**  
6  
7  
8  
9

10  
11 **INTRODUCTION**  
12

13  
14 In Europe the prevalence of Hepatitis C virus (HCV) is estimated at around 2-3% of  
15 the general population (Mohd Hanafiah et al., 2013), rising to 5-90% among people  
16 who inject drugs (Hahne et al., 2013). Sharing needles/syringes and other injecting  
17 equipment/ paraphernalia pose the greatest risk of HCV transmission among people  
18 who inject drugs (Corson et al., 2013). Many people who inject drugs have poor  
19 knowledge of HCV transmission (Norton et al., 2014; O'Brien et al., 2008),  
20 contributing to the high prevalence in this group. While there is no increased risk of  
21 HCV transmission in a long term, heterosexual relationship, the risk of transmission  
22 increases with multiple sexual partners (although this may be confounded by  
23 increased likelihood of injecting drug use with increased number of partners), among  
24 women who are infected with HIV and among men who have sex with men who are  
25 infected with HIV (Tohme & Holmberg, 2010). Being female is a predictor of HCV  
26 seropositivity (Vescio et al., 2008). One longitudinal study of young injectors found  
27 that females who injected drugs were more likely than males who injected to become  
28 infected with HCV (Tracy et al., 2014), suggesting that females may engage in  
29 behaviours that put them at increased risk of infection. Therefore, preventing the  
30 transmission of HCV among people who inject drugs, especially females, is a major  
31 public health challenge.  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

### Increased risk of HCV among females who inject drugs

A number of studies that have explored injecting risk behaviours in relation to blood borne virus transmission have highlighted the social, interpersonal and functional contexts in which injecting occurs (Bourgois et al., 2004; MacRae & Aalto, 2000; Sheard & Tompkins, 2008; Tompkins et al., 2006). Studies that have examined the injecting behaviours of women found that they report risk behaviours that include sharing needles, syringes and other injecting paraphernalia, having sex with people who inject drugs, trading sex for money or drugs and not using condoms (Booth et al., 1995; Brook et al., 2000; Gilchrist et al., 2011; MacRae & Aalto, 2000). A recent study in England, reported that 15% of women had traded sex for money, drugs or other goods in the year before entering treatment for drug use (Gilchrist et al., 2015). Women who engage in sex trading may not use condoms with their intimate partners to distinguish these private relationships from sex trading (Bernstein, 2007). Women who inject drugs are more likely than their male counterparts to have sexual partners who also inject drugs and with whom they share injecting equipment (Bennett et al., 2000; Evans et al., 2003; Gilchrist et al., 2007; Hahn et al., 2002; Stein et al., 2005; Wood, 2007). Moreover, many women rely on others to inject them, often male sexual partners (Bryant & Treloar, 2007; Doherty et al., 2000; Hahn et al., 2002; MacRae & Aalto, 2000; Wood, 2007), which reduces their control over the injecting process (MacRae & Aalto, 2010; Tompkins et al., 2006). Studies suggest that around 40-70% of women receiving treatment for drug misuse have experienced intimate partner violence (Engstrom et al., 2008; Gilchrist et al., 2011; Panchanadeswaran et al., 2010; Wagner et al., 2009), which may impact on their ability to insist on safer injecting and sexual practices (MacRae & Aalto, 2000; Wagner et al., 2009), potentially resulting in increased vulnerability to HCV infection. HCV risk behaviours

1  
2  
3 among women who inject drugs, should therefore be understood in the context of  
4  
5 their relationships with male partners (Hearn et al., 2005). The social proximity of  
6  
7 other injectors has been shown to be influential on perceptions of risk. The closer the  
8  
9 proximity of injecting partners/peers, the less perceived risk with sharing injecting  
10  
11 equipment (MacRae & Aalto, 2000; Smyth & Roche, 2007). Women who inject  
12  
13 drugs are often marginalised and socially isolated, and as a result often engage in  
14  
15 smaller social networks increasing the likelihood of sharing injecting equipment (De  
16  
17 et al., 2007). A high proportion of female drug users meet criteria for a depressive  
18  
19 disorder (Torrens et al., 2011). Apathy and low mood are associated with risk  
20  
21 behaviours among drug users (Gilchrist et al., 2011; Stein et al., 2005).  
22  
23  
24  
25  
26

### 27 **Efficacy of interventions to reduce HCV transmission**

28  
29 Most interventions to reduce injecting and sexual risk behaviours among people who  
30  
31 inject drugs have targeted HIV transmission (Meader et al., 2010). Needle and  
32  
33 syringe programmes and opiate substitution treatment are effective in reducing  
34  
35 injecting risk behaviours (Hagan et al., 2011), and interventions that integrate  
36  
37 treatment for substance misuse with support for safe injection demonstrate the most  
38  
39 efficacy for reducing HCV seroconversion (MacArthur et al., 2014). In a systematic  
40  
41 review of six behavioural interventions to prevent HCV among people who inject  
42  
43 drugs, (Sacks-Davis et al., 2012) only two peer training interventions of HCV and HIV  
44  
45 negative (Garfein et al., 2007) and HCV positive (Latka et al., 2008) young injectors  
46  
47 reported significantly greater reductions in injecting risk behaviours in the intervention  
48  
49 group compared with the control group at 6 month follow-up. Those who tested HCV  
50  
51 and HIV negative were eligible for the Third Collaborative Injection Drug Users/ Drug  
52  
53 Users Intervention Trial (DUIT) (Garfein et al., 2007) and those who tested HCV  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 positive were eligible for The Study to Reduce Intravenous Exposures (STRIVE)  
4 (Latka et al., 2008). Both trials compared similar 6 session x 2 hour small-group,  
5  
6 cognitive behavioural, skills-building interventions that taught peer education skills to  
7  
8 reduce injecting (Garfein et al., 2007; Latka et al., 2008) and sexual risk behaviours  
9  
10 (Garfein et al., 2007) or a video discussion group. Among those who were HCV and  
11  
12 HIV negative, the intervention group reported a 29% greater reduction in injecting risk  
13  
14 behaviours than the control group, but there were no differences between trial arms  
15  
16 for sexual risk behaviours (Garfein et al., 2007). Among those who were HCV  
17  
18 positive, the intervention group reported a 26% greater reduction in distributive risk  
19  
20 behaviours than the control group (Latka et al., 2008). The authors believe that the  
21  
22 absence of gender-specific intervention content could have resulted in the lack of  
23  
24 intervention effect on sexual risk behaviours for women participating in the DUIT trial  
25  
26 (Mackesy-Amiti et al., 2014). They stress the need to address issues of gender  
27  
28 norms, relationship power, sexual coercion, and negotiation of safer sex for reducing  
29  
30 sexual risk behaviours among women who inject drugs. Furthermore, barriers that  
31  
32 can impede females who inject from accessing harm reduction services and  
33  
34 information, such as stigmatisation and fear of child removal (Harris et al., 2015)  
35  
36 should be addressed to ensure women can access the treatment and support they  
37  
38 require.  
39  
40  
41  
42  
43  
44  
45  
46

### 47 **The need for gender sensitive interventions**

48  
49 Despite some injecting and sexual risk practices putting women who inject drugs at  
50  
51 increased risk for acquiring or transmitting HCV, none of the six trials in the Sacks-  
52  
53 Davis et al. (2012) review were targeted at women who inject drugs and just 24%-  
54  
55 46% of the participants in the included trials were female. Gender sensitive  
56  
57  
58  
59  
60

1  
2  
3 interventions should be developed and tested to address the specific risk behaviours  
4  
5 for HCV transmission among women, including those related to co-occurring  
6  
7 psychiatric symptoms and intimate relationships (Greenfield & Pirard, 2009).  
8  
9 Moreover, women report a preference for female-only groups in drug treatment as  
10  
11 they allow discussion of sensitive topics in a safe environment (Grosenick &  
12  
13 Hatmaker, 2000). The risk of sexual acquisition of HCV for HIV negative women is  
14  
15 extremely low. HCV prevention interventions for people who inject drugs may result  
16  
17 in their rationalising sharing injecting equipment with a sexual partner they are having  
18  
19 unprotected sex with, if they perceive an equivalent risk of HCV from both behaviours  
20  
21 (Harris & Rhodes, 2013). Interventions for women should therefore, concentrate on  
22  
23 reducing injecting risk behaviours, highlight situations in which sexual transmission is  
24  
25 possible (e.g. rough and anal sex where blood-to-blood contact may occur, and  
26  
27 among those women who are HIV positive) and provide skills/tools to help women  
28  
29 negotiate safer sexual interactions in situations that may result in increased  
30  
31 transmission risk, such as intimate partner violence and sex trading. While in some  
32  
33 countries (e.g. 1% in the UK) HIV prevalence among people who inject drugs  
34  
35 remains low (Hope et al., 2014), trend data from the European Union highlights that  
36  
37 the rate of HIV among people who inject drugs from Spain, Italy and Poland remains  
38  
39 unchanged (Weissing et al., 2011), with individual studies reporting prevalence rates  
40  
41 ranging from 11% in Italy (Cruciani et al., 2013) to 30% among female injectors in  
42  
43 Spain (Barrio et al., 2007). Moreover, in countries such as Poland, with elevated HIV  
44  
45 prevalence among people who inject drugs (18%), co-infection with HCV is reported  
46  
47 to be 17% (Rosinska et al., 2015). Therefore, the inclusion of information on safer  
48  
49 sex and discussion on the increased risk of sexual transmission of HCV among  
50  
51 women with HIV is warranted.  
52  
53  
54  
55  
56  
57  
58  
59  
60

## **Aims of the study**

This study aimed to 1) adapt the US DUIT intervention (Garfein et al., 2007) for women; 2) test the feasibility and acceptability of delivering the adapted intervention in drug treatment settings in Europe; and 3) determine the initial effectiveness of the adapted intervention to reduce HCV risk behaviours and increase HCV transmission knowledge among women who inject drugs in five European countries.

## **METHODS**

### **Design**

An uncontrolled, field effectiveness study of a manualised 3-session psychosocial group intervention, adapted from the DUIT intervention, with outcomes measured pre and one month post intervention was undertaken in 2013.

### **Adapting the intervention**

Permission was granted by the authors of DUIT to adapt the intervention. The Capacity Opportunity Motivation-Behaviour framework was used to understand behaviour change (Michie et al., 2014) and inform the intervention adaptation. The DUIT intervention was reviewed by the research team and adapted where required to include up-to-date information on sexual risk of HCV transmission (Franciscus, 2015), pregnancy, motherhood and HCV transmission (Porter, 2013), and to include female relevant scenarios in the exercises and examples (Gilbert et al., 2006). The adapted intervention highlighted the link between depression and HCV risk behaviours and provided participants with skills to recognise and address such



1  
2  
3 feelings (Carpenter et al., 2006; Carpenter et al., 2008; Gilbert et al., 2006;  
4  
5 Lewinsohn et al., 1984).  
6  
7  
8

### 9 10 **The intervention**

11 The REDUCE intervention consisted of three two-hour manualised group sessions.  
12  
13 Each session began with a welcome and subsequent sessions had a brief feedback  
14  
15 on what was learned in the previous session before progressing to the goals of that  
16  
17 session. In each session, participants learned about HCV transmission through  
18  
19 discussion and activities. Each session included one didactic presentation from the  
20  
21 group facilitator, and used games, role-play, exercises, information pamphlets, video  
22  
23 and skills building approaches to enhance learning. There are many  
24  
25 misunderstandings or myths surrounding HCV transmission. Session 1  
26  
27  
28 “Understanding Hepatitis C transmission risks” included a myths and facts game to  
29  
30 ensure participants had up-to-date information about HCV and its transmission (e.g.  
31  
32 there is no vaccination to protect against HCV, reinfection with another genotype of  
33  
34 HCV is possible etc.). Thereafter, participants watched and discussed a video that  
35  
36 demonstrated how cross-contamination of injecting paraphernalia could occur and  
37  
38 engaged in an activity that allowed them to rate the HCV transmission risk for specific  
39  
40 injecting behaviours (e.g. injecting with someone else’s used needles (higher risk) to  
41  
42 use a new syringe and equipment for every injection (lower risk)). Having highlighted  
43  
44 the injecting HCV transmission risks, motivation and strategies to reduce risks were  
45  
46 considered (e.g. labelling your syringe to avoid inadvertent sharing). In session 2  
47  
48  
49 “Hepatitis C and sexual wellbeing – negotiating safety”, the low risk of sexual and  
50  
51 mother-to-child transmission and the need to avoid pregnancy during HCV treatment  
52  
53 were explained, using a rate the risk group activity. The next activity focused on why  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 some women do things that may put them at risk of HCV (relationships and power,  
4 withdrawal etc.) and identified strategies/solutions and built skills and motivation to  
5 negotiate safer interactions with intimate partners and others. In the final session,  
6  
7 “Hepatitis C and emotional wellbeing – reducing negative mood”, participants learned  
8  
9 to identify symptoms of depression, understand the association between HCV  
10  
11 treatment and depression, and between risk taking behaviours and depression by  
12  
13 using the Behavioural Model of Depression (i.e. mood can be changed by your  
14  
15 activities and the situations in which you place yourself. We can lift our mood by  
16  
17 doing pleasant activities). Participants considered what they could do to change the  
18  
19 way they feel and facilitators taught safer-coping skills, including the use of positive  
20  
21 self-talk, for participants to use when they were feeling depressed. The manual is  
22  
23 available from the corresponding author or can be downloaded free of charge in  
24  
25 English, Italian, German, Polish and Spanish from the REDUCE project website  
26  
27 [www.thereduceproject.imim.es](http://www.thereduceproject.imim.es) (Figure 1).  
28  
29  
30  
31  
32  
33  
34  
35

36 INSERT FIGURE 1 HERE  
37  
38  
39

#### 40 **Participants, setting and recruitment**

41  
42 Females aged 18 years and older and who had injected heroin or other opiates,  
43  
44 cocaine or amphetamines in the previous month were eligible to participate.  
45

46  
47 Participants were recruited from harm reduction services (including a low  
48  
49 threshold drop-in in Warsaw (Poland) where self-injecting is tolerated; injecting  
50  
51 rooms in Barcelona (Spain)) and waiting rooms of drug treatment centres (health  
52  
53 service and third sector providers that offered opiate substitution therapy, drug  
54  
55 treatment and needle and syringe exchange) in Vienna (Austria), Ascoli Piceno  
56  
57  
58  
59  
60

1  
2  
3 (Italy), Warsaw (Poland), Paisley (Scotland) and Barcelona (Spain). In addition, staff  
4  
5 approached eligible participants and asked them whether they were interested in  
6  
7 being contacted by a researcher to hear more about the study. The study was  
8  
9 explained to potential participants verbally by researchers and all participants were  
10  
11 given an information sheet about the study prior to the researcher gaining informed  
12  
13 consent. With the exception of Warsaw, interviews were conducted by employees of  
14  
15 Universities or Health Authorities. In Warsaw interviews were conducted by harm  
16  
17 reduction workers, including two ex-service users. Participation was voluntary and  
18  
19 participants were made aware that they could drop out of the study at any time  
20  
21 without having to give a reason, and that this would not affect the care they received  
22  
23 at the harm reduction or treatment centre.  
24  
25  
26

27  
28 Researchers reminded participants of the intervention times and dates by  
29  
30 telephone and/or text on the day before and/or on the morning of the intervention  
31  
32 session they were due to attend. Participants received gift vouchers as a thank you  
33  
34 for their time and travel expenses following participation in each intervention session  
35  
36 and research interview.  
37  
38  
39

#### 40 41 **Measures**

42  
43 The following outcomes were assessed at baseline (pre-intervention) and one month  
44  
45 post intervention: HCV transmission knowledge, injecting and drug risk behaviours,  
46  
47 condom use, and depressive symptoms. Instruments were self-administered with  
48  
49 assistance by a trained researcher where required in a private room in all sites  
50  
51 except Scotland, where they were interviewer-administered.  
52  
53

54  
55 The HCV transmission knowledge questionnaire used in this study (REDUCE,  
56  
57 2013) was adapted from Balfour et al. (Balfour et al., 2009) and updated to include  
58  
59  
60

1  
2  
3 gender specific questions, and questions that incorporated recent advances in sexual  
4 and vertical transmission (Tohme & Holmberg, 2010). The questionnaire used in the  
5 current study had 53 risk statements with three response options “true”, “false” and  
6 “don’t know”. Each correct answer scored one. The total score ranged from 0-53. The  
7 higher the total score, the greater the HCV transmission knowledge.  
8  
9  
10  
11  
12

13  
14 Questions were included to determine the frequency of past month injecting  
15 drug use, injecting preparation and administration practices, and sexual practices to  
16 determine the frequency of these HCV transmission risk behaviours (University of the  
17 West of Scotland, 2012; Cox et al., 2008).  
18  
19  
20  
21  
22

23 The Patient Health Questionnaire (PHQ-9) (Kroenke et al., 2001) is a reliable  
24 and valid measure of depression severity across nine depressive symptoms  
25 experienced in the past two weeks as "0" (not at all) to "3" (nearly every day). A  
26 PHQ-9 score of 10 or more had a sensitivity of 88% and a specificity of 88% for  
27 major depression (Kroenke et al., 2001). However, recent research suggests that a  
28 cut-off of 12 should be used for substance misusers (Delgadillo, 2012).  
29  
30  
31  
32  
33  
34  
35  
36  
37

### 38 **Intervention delivery**

39  
40 Following training in its use, the manualised intervention was delivered in outpatient  
41 drug treatment settings by a Clinical Psychologist in Austria, Italy and Spain, by two  
42 Health Educators in Poland, and by a blood borne virus Nurse in Scotland. The  
43 interventionists at each site reflected the usual way that interventions were delivered  
44 at these treatment settings, and therefore, real practice. A researcher attended each  
45 session to check the fidelity of the intervention delivered against the manual. One  
46 group programme of three sessions took place in each city (range 5-10 participants  
47 per group).  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

## Analysis

Paired t-tests were used for continuous data and McNemar tests for matched pairs were used for categorical data to compare pre and post intervention findings.

Intention to treat analysis was conducted to ensure that all participants who began the treatment were included in the analysis, whether they completed all three sessions of the intervention or not. Therefore, if the participant did not complete the assessment one month post intervention, the responses from their baseline assessment were used to assume no change in their behaviour or knowledge. Such imputation of data was conducted for four cases at one month post intervention follow-up. One question asked participants of all the needles and syringes that they used to inject in the last month, how many were new and unused (i.e. from a packet) on a scale of 0 to 10 (where 0 was none and 10 was all). A score of 10 was entered for the four participants that had ceased injecting at one month post intervention to allow for intention to treat analysis to be conducted.

The intervention was targeted at women who had injected drugs in the past month regardless of their self-reported HCV status, as previous research confirms that people who inject drugs are not always aware of their HCV status, and that self-reported and actual HCV status often differ (Kwiatkowski et al., 2002; O'Keefe et al., 2013). The analysis is therefore, not presented by HCV status.

## RESULTS

Thirty six females who injected opiates or stimulant drugs in the previous month completed the baseline assessment with the researcher prior to beginning the intervention: 10 from Austria, 6 from Italy, 5 from Poland, 7 from Scotland and 8 from Spain (Table 1). The mean age of the participants was 32.19 years (SD 8.31; range

1  
2  
3 22-56 years). Most participants lived with their intimate partner (16/36; 44.4%),  
4  
5 19.4% (7/36) lived alone, 19.4% (7/36) lived with friends or flatmates, 11.1% (4/36)  
6  
7 lived with other family members and 8.3% (3/36) lived with their children (answers  
8  
9 not mutually exclusive). The majority of participants had attained secondary school  
10  
11 qualifications (20/36; 55.6%) or a technical certificate or apprentice (10/36; 27.8%).  
12  
13 The majority were heterosexual (29/34; 85.3%). Almost 9% had exchanged sex for  
14  
15 money, drugs or goods in the past month (3/34; 8.8%). Forty two percent (15/36;  
16  
17 41.7%) reported they had ever been afraid of an intimate partner, with three (3/14;  
18  
19 21.4%) participants stating they were afraid of their current intimate partner. At  
20  
21 baseline the drugs that participants had injected most often in the previous month  
22  
23 were heroin/other opiates (23/36; 63.9%); cocaine (9/36; 25.0%); amphetamine  
24  
25 (3/36; 8.3%) and speedball (heroin and cocaine together) (1/36; 2.8%). Thirty two of  
26  
27 the 36 participants reported they had ever been tested for HCV: nine self-reported  
28  
29 they were HCV negative (28.1%), 18 self-reported they were HCV positive (56.3%)  
30  
31 and five reported they did not know or were unwilling to disclose their HCV status  
32  
33 (15.6%). Table 1 describes the attendance at each session and attrition by country.  
34  
35  
36  
37  
38  
39  
40  
41

42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

INSERT TABLE 1 HERE

Mean HCV transmission knowledge scores increased significantly from  
baseline (pre-intervention) to one month post intervention (36.44 (SD 6.81) versus  
44.97 (SD 5.74);  $t(35) = -7.845$ ,  $p < 0.001$ ). All participants had injected drugs in the  
month prior to baseline assessment, mainly heroin (17/36; 47.2%) or other opiates  
(6/36; 16.7%), cocaine (9/36; 25.0%) or amphetamine (3/36; 8.3%). One month post

1  
2  
3 intervention, four participants had not injected in the month prior since the  
4  
5 intervention (4/36; 11.1%).  
6  
7

8  
9  
10 INSERT TABLE 2  
11

12  
13  
14 Participants were asked of all the needles and syringes that they used to inject in the  
15  
16 last month, how many were new and unused (i.e. from a packet) on a scale of 0 to 10  
17  
18 (where 0 was none and 10 was all). There was a significant increase reported in the  
19  
20 number of all new and unused needles/syringes used to inject in the past month  
21  
22 (Table 2). Among the total sample (where 10 was imputed for those who had not  
23  
24 injected in the month post intervention), reductions were reported in the mean  
25  
26 number of times participants had injected with a needle/syringe that had already  
27  
28 been used by someone else, the mean number of different people that they had  
29  
30 received used needles/syringes from and the mean number of different people that  
31  
32 they had passed their used needles/syringes on to from baseline to one month post  
33  
34 intervention, although these reductions were not statistically significant (Table 2).  
35  
36 Compared to baseline, the proportion of participants who had at one month post  
37  
38 intervention used spoons or containers for mixing that had previously been used by  
39  
40 someone else, used an alcohol swab when they injected drugs after the injection and  
41  
42 shared filters, spoons, cookers or water with someone they knew was HCV positive  
43  
44 reduced significantly. There was a marginally significant reduction in the proportion of  
45  
46 participants who reported preparing drugs or rinsing their works with water that had  
47  
48 already been used by someone else at one month post intervention (Table 2). **No**  
49  
50 **reduction in condom use was reported. For participants who reported having**  
51  
52 **intimate relations with men and having vaginal sex in the past month (21/30; 70.0%**  
53  
54  
55  
56  
57  
58  
59  
60

1  
2  
3 at baseline and 19/32; 59.4% at one month post intervention), 47.6% (10/21) at  
4  
5 baseline and 52.6% (10/19) at one month post intervention reported they had never  
6  
7 used condoms for vaginal sex during that time period. Table 3 describes a trend  
8  
9 towards greater ability to make decisions or negotiate safer drug preparation in the  
10  
11 month post intervention among those who reported sharing a drug with another  
12  
13 person before or after preparing it from baseline assessment.  
14  
15

16  
17  
18 INSERT TABLE 3  
19

20  
21  
22  
23 Depressive symptoms did not reduce significantly from baseline to one month  
24  
25 post intervention (14.25 (SD 5.49) vs 14.53 (SD 6.79);  $t(35) = -0.313$ ,  $p = 0.756$ ).  
26  
27

### 28 29 **Acceptability**

30  
31 Feedback from staff who delivered and participants who attended the intervention  
32  
33 determined its acceptability, and identified areas that worked well and those that  
34  
35 could be improved. While the intervention was relatively brief (three sessions),  
36  
37 professionals believed that the duration of each session (two hours) was too long for  
38  
39 participants to concentrate well throughout. However, they also believed that two  
40  
41 hours was too brief to be able to answer all questions raised by participants.  
42  
43 Participants stated that they learned a lot and really enjoyed the interactive parts of  
44  
45 the intervention including the video, games and role play exercises. They found the  
46  
47 didactic sessions delivered by the professionals to be less interesting. The first  
48  
49 session, *Understanding Hepatitis C transmission risks*, was enjoyed the most,  
50  
51 followed by the second session, *Hepatitis C and sexual wellbeing– negotiating*  
52  
53 *safety*. Participants felt that the strategies taught during the third session, *Hepatitis C*  
54  
55  
56  
57  
58  
59  
60



1  
2  
3 *and emotional wellbeing – reducing negative mood*, were not enough to stop them  
4  
5 injecting (and taking risks) when they were feeling down. This view is reflected in the  
6  
7 findings that depressive symptoms did not reduce one month post-intervention.  
8  
9

## 10 11 **DISCUSSION**

12  
13 The findings demonstrate that it was feasible and acceptable to deliver a three  
14  
15 session gender specific group intervention to address HCV transmission risks in  
16  
17 harm reduction and drug treatment centres in five European cities. One month post-  
18  
19 intervention, women's knowledge on HCV transmission had significantly increased  
20  
21 (with an average of nine additional correct answers). However, increased knowledge  
22  
23 alone does not necessarily result in corresponding changes in behaviour, therefore it  
24  
25 is important that the intervention also addresses capability, opportunity and  
26  
27 motivation (Michie et al., 2014).  
28  
29  
30  
31

32 While there were reductions in all drug administration and preparation risk  
33  
34 behaviours, only the following risk behaviours reduced significantly from pre to one  
35  
36 month post-intervention: the use of spoons or containers for mixing that had  
37  
38 previously been used by someone else, sharing of filters, spoons, cookers or water  
39  
40 with someone who was HCV positive and the use of an alcohol swab following  
41  
42 injection. There was a significant increase in the proportion of new and unused  
43  
44 needles and syringes used to inject drug with. Despite the intervention highlighting  
45  
46 the possibility of becoming infected with another genotype of HCV and therefore the  
47  
48 importance of not sharing injecting equipment with others regardless of their HCV  
49  
50 status, the increase in the proportion sharing equipment with only those whose HIV  
51  
52 or HCV status was the same as theirs was a concern and the message about this  
53  
54 risk requires to be strengthened in future interventions. Conflicting results have been  
55  
56  
57  
58  
59  
60

1  
2  
3 found regarding the impact of HCV status on injecting risk behaviours. Some studies  
4  
5 report that those who knew they were HCV positive engaged in fewer HCV risk  
6  
7 behaviours than those who were unaware of their status (Kwiatkowski et al., 2002),  
8  
9 while other studies reported no difference (Norden, et al., 2009) or high needle  
10  
11 sharing among people who were HCV positive (Korthuis et al., 2012). This may be  
12  
13 due to the fact that people engage in risky injection behaviours with those they  
14  
15 believe are also infected with HCV (i.e. “sero-sort) (Burt, Thiede, & Hagan, 2009),  
16  
17 potentially not understanding the risks of becoming infected with another genotype of  
18  
19 the virus. While the results were not significant, greater proportions of women felt  
20  
21 they were better able to control (e.g. refuse to inject because they believed the drugs  
22  
23 were prepared unsafely, take the initiative of preparing the drugs, make sure drug  
24  
25 preparation and injection was done safely) the preparation and administration of the  
26  
27 injecting process (Table 3).  
28  
29  
30  
31

32  
33 No increases in condom use were reported post-intervention, potentially due  
34  
35 to 44% of participants living with an intimate partner, therefore other forms of  
36  
37 contraception may be being used, or that as with many longer-term relationships  
38  
39 contraception is not always used with steady partners (Mercer et al., 2013), once  
40  
41 trust is established in the relationship (Gilchrist et al., 2011).  
42  
43

44  
45 There were no changes in depressive symptoms from pre to one month post-  
46  
47 intervention. The REDUCE intervention included strategies to improve mood, and  
48  
49 did not attempt to treat depression, therefore, it was perhaps unrealistic to expect any  
50  
51 change in depressive symptoms. More intensive treatment should be offered to  
52  
53 women who inject drugs with comorbid depression, given the relationship between  
54  
55 depressive symptoms and injecting and sexual risk behaviours (Gilchrist et al., 2011;  
56  
57 Stein et al., 2005).  
58  
59  
60

### Limitations of the study

Findings from the intervention study are limited as it was not a randomised controlled trial. The small sample size could have resulted in type II errors, with insufficient power to account for the variation in treatment and sampling variations across sites. Participants were engaged with drug treatment or needle exchange services so the findings may not be generalizable to all women who inject drugs particularly those not engaged with treatment services, whose situations and experiences may be different. Eleven participants had also taken part in the mixed methods study so may have been familiar with the HCV transmission knowledge questionnaire, although participants in the mixed methods study were not given the correct answers to the questionnaire in that study. Most sites reported that the follow-up questionnaires were self-completed, however where participants required help due to literacy or concentration issues they were assisted by the researcher. Previous research found similar disclosure rates of sensitive or stigmatising information (including substance use) across face-to-face interview, telephone interview and paper-and-pencil questionnaires (Rosenbaum et al., 2006). While it is possible that participants may have under-reported specific behaviors to be viewed favorably by the researcher (i.e. social desirability), self-reports of drug use and risk behaviours have shown acceptable levels of reliability and validity (Darke, 1998). Despite these limitations, the intervention did successfully reduce some injection risk behaviours and significantly increased HCV transmission knowledge among women in this study. However, it was not successful in reducing depressive symptoms or sexual risk behaviours, potentially due to the fact that the intervention was not targeted at reducing depressive symptoms and the majority of participants may have been in

1  
2  
3 long term established relationships where condoms were not routinely used. As high  
4  
5 proportions of women in this sample reported depressive symptoms, more intensive  
6  
7 intervention should be offered to address depressive symptoms. Moreover, it may be  
8  
9 unrealistic to encourage condom use in established relationships. Promising findings  
10  
11 have been shown from interventions that have targeted couples who use drugs (El-  
12  
13 Bassel et al., 2014). “Symbiotic” goals for people who inject drugs, such as avoiding  
14  
15 injecting related scars or marks and maintaining venous access, may result in the  
16  
17 use of sterile injecting equipment (Harris & Rhodes, 2012). Future harm reduction  
18  
19 interventions, should focus on these symbiotic goals, and include protective practices  
20  
21 and strategies to avoid injecting risk situations such as withdrawal and lack of  
22  
23 preparedness (Harris et al., 2012; Mateu-Gelabert et al., 2014; Treolar et al., 2015).  
24  
25  
26  
27  
28

## 29 **CONCLUSIONS**

30  
31 The REDUCE intervention is an innovative, evidence-informed gender-specific group  
32  
33 intervention to reduce HCV risk behaviours in the particularly vulnerable target group  
34  
35 of women who inject drugs. The study found that the intervention was both feasible  
36  
37 to introduce in real world harm reduction and drug treatment services throughout  
38  
39 Europe and promising findings on reducing injecting risk behaviours were reported at  
40  
41 one month post-intervention. There remains a need to update the intervention to  
42  
43 incorporate recent findings on HCV prevention and determine whether these results  
44  
45 can be improved. The benefits of successful early intervention to reduce risk  
46  
47 behaviours and subsequently HCV transmission, in comparison to the consecutive  
48  
49 costs of treatment (from interferon to liver transplantation) highlight the importance of  
50  
51 psychosocial interventions as part of a wider harm reduction strategy to reduce HCV  
52  
53 among women who inject drugs.  
54  
55  
56  
57  
58  
59  
60

1  
2  
3  
4  
5 **Declaration of interest**  
6

7 All the authors declare that there is no potential conflict of interest.  
8  
9  
10  
11  
12  
13  
14  
15  
16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

For Peer Review Only

## References

- Balfour, L., Kowal, J., Corace, K. M., Tasca, G. a, Krysanski, V., Cooper, C. L., & Garber, G. (2009). Increasing public awareness about hepatitis C: development and validation of the brief hepatitis C knowledge scale. *Scandinavian Journal of Caring Sciences*, 23(4), 801–8.
- Barrio, G., De la Fuente, L., Toro, C., Brugal, T.M., Soriano, V., Gonzalez, F. et al. (2007) Prevalence of HIV infection among young adult injecting and non-injecting heroin users in Spain in the era of harm reduction programmes: gender differences and other related factors. *Epidemiology and Infection*, 135:592–603.
- Bennett, G. A., Velleman, R. D., Barter, G., & Bradbury, C. (2000). Gender differences in sharing injecting equipment by drug users in England. *AIDS Care*, 12:77-87.
- Bernstein, E. (2007) *Temporarily yours: intimacy, authenticity, and the commerce of sex*. Chicago: The University of Chicago Press.
- Booth, R. E., Koester, S. K., & Pinto, F. (1995). Gender differences in sex-risk behaviors, economic livelihood, and self-concept among drug injectors and crack smokers. *American Journal on Addictions*, 4(4), 313–322.
- Bourgois, P., Prince, B., & Moss, A. (2004). The everyday violence of hepatitis C among young women who inject drugs in S an Francisco. *Hum Organ*, 63(3), 253–264.
- Bryant, J., & Treloar, C. (2007). The gendered context of initiation to injecting drug use: Evidence for women as active initiates. *Drug and Alcohol Review*, 26: 287-293.

- 1  
2  
3 Brook, D. W., Brook, J. S., Richter, L., Masci, J. R., & Roberto, J. (2000). Needle  
4  
5 sharing: a longitudinal study of female injection drug users. *The American*  
6  
7 *Journal Of of Drug Andand Alcohol Abuse*, 26(2), 263–281.  
8  
9  
10 Burt RD, Thiede H, Hagan H. (2009) Serosorting for hepatitis C status in the sharing  
11  
12 of injection equipment among Seattle area injection drug users. *Drug and*  
13  
14 *Alcohol Dependence*, 105(3):215–220.  
15  
16  
17 Carpenter, K. M., Aharonovich, E., Smith, J. L., Iguchi, M. Y., & Nunes, E. V. (2006).  
18  
19 Behavior therapy for depression in drug dependence (BTDD): results of a stage  
20  
21 Ia therapy development pilot. *The American Journal of Drug and Alcohol Abuse*,  
22  
23 32(4), 541–548.  
24  
25  
26 Carpenter, K. M., Smith, J. L., Aharonovich, E., & Nunes, E. V. (2008). Developing  
27  
28 therapies for depression in drug dependence: results of a stage 1 therapy study.  
29  
30 *The American Journal of Drug and Alcohol Abuse*, 34(5), 642–652.  
31  
32  
33 Corson, S., Greenhalgh, D., Taylor, A., Palmateer, N., Goldberg, D., & Hutchinson,  
34  
35 S. (2013). Modelling the prevalence of HCV amongst people who inject drugs:  
36  
37 An investigation into the risks associated with injecting paraphernalia sharing.  
38  
39 *Drug and Alcohol Dependence*, 133(1), 172–179.  
40  
41  
42 Cox, J., De, P., Morissette, C., Tremblay, C., Stephenson, R., Allard, R., Graves, L.,  
43  
44 et al. (2008). Low perceived benefits and self-efficacy are associated with  
45  
46 hepatitis C virus (HCV) infection-related risk among injection drug users. *Social*  
47  
48 *Science & Medicine*, 66(2), 211–220.  
49  
50  
51 Cruciani, M., Wiessing, L., Serpelloni, G., Genetti, B., Andreotti, A., Carpignano, L.,  
52  
53 Zermiani, M. & Suligoi, B. (2015) Increasing prevalence of HIV infection among  
54  
55 first time clients in Italian drug treatment services – is it sexual transmission?  
56  
57 *BMC Infectious Diseases*, 15:201.  
58  
59  
60

- 1  
2  
3 Darke, S., 1998. Self-report among injecting drug users: a review. *Drug and Alcohol*  
4 *Dependence*, 51(3), pp.253-263.  
5  
6  
7 De, P., Cox, J., Boivin, J.-F., Platt, R. W., & Jolly, A. M. (2007). The importance of  
8 social networks in their association to drug equipment sharing among injection  
9 drug users: a review. *Addiction*, 102(11), 1730–9.  
10  
11  
12 Delgadillo, J. (2012). Depression and anxiety symptoms: measuring reliable change  
13 in alcohol and drug users. *Advances in Dual Diagnosis*, 5:102–114.  
14  
15  
16 Doherty, M. C., Garfein, R. S., Monterroso, E., Latkin, C., & Vlahov, D. (2000).  
17 Gender differences in the initiation of injection drug use among young adults.  
18  
19  
20  
21  
22  
23  
24  
25 El-Bassel, N., Gilbert, L., Terlikbayeva, A., Beyrer, C., Wu, E., Chang, M., Hunt, T.,  
26  
27  
28  
29  
30  
31  
32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47  
48  
49  
50  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60
- Ismaïlova, L., Shaw, S.A., Primbetova, S., Rozental, Y., Zhussupov, B. & Tukeyev, M. (2014). Effects of a couple-based intervention to reduce risks for HIV, HCV, and STIs among drug-involved heterosexual couples in Kazakhstan: a randomized controlled trial. *Journal of Acquired Immune Deficiency Syndrome*, 67:196-203.
- Engstrom, M., El-Bassel, N., Go, H., & Gilbert, L. (2008). Childhood Sexual Abuse and Intimate Partner Violence among Women in Methadone Treatment: A Direct or Mediated Relationship? *Journal of Family Violence*, 23:605-617
- Evans, J. L., Hahn, J. a., Page-Shafer, K., Lum, P. J., Stein, E. S., Davidson, P. J., & Moss, A. R. (2003). Gender Differences in Sexual and Injection Risk Behavior among Active Young Injection Drug Users in San Francisco (the UFO Study). *Journal of Urban Health*, 80(1), 137–146.



- 1  
2  
3 Franciscus, F. (2015). Frequently asked questions about Hepatitis C? sexual  
4 transmission of HCV. Retrieved from  
5 [http://hcvadvocate.org/hepatitis/factsheets\\_pdf/sexFAQ.pdf](http://hcvadvocate.org/hepatitis/factsheets_pdf/sexFAQ.pdf)  
6  
7  
8  
9  
10 Garfein, R. S., Golub, E. T., Greenberg, A. E., Hagan, H., Hanson, D. L., Hudson, S.  
11 M., Kapadia, F., et al. (2007). A peer-education intervention to reduce injection  
12 risk behaviors for HIV and hepatitis C virus infection in young injection drug  
13 users. *AIDS (London, England)*, 21(14), 1923–1932.  
14  
15  
16  
17  
18 Gilbert, L., El-Bassel, N., Manuel, J., Wu, E., Go, H., Golder, S., Seewald, R., et al.  
19 (2006). An integrated relapse prevention and relationship safety intervention for  
20 women on methadone: testing short-term effects on intimate partner violence  
21 and substance use. *Violence and Victims*, 21(5), 657–72.  
22  
23  
24  
25  
26  
27  
28 Gilchrist, G., Singleton, N., Donmall, M., Jones, A. (2015) Prevalence and factors  
29 associated with sex trading in the year prior to entering treatment for drug  
30 misuse in England. *Drug and Alcohol Dependence*, 152:116-22.  
31  
32  
33  
34 Gilchrist, G., Blazquez, A., & Torrens, M. (2011). Psychiatric, behavioural and social  
35 risk factors for HIV infection among female drug users. *AIDS and Behavior*,  
36 15(8), 1834–43.  
37  
38  
39  
40  
41 Gilchrist, G., Gruer, L., & Atkinson, J. (2007). Predictors of neurotic symptom severity  
42 among female drug users in Glasgow, Scotland. *Drugs: Education, Prevention &*  
43 *Policy*. 14(4), pp. 347-365.  
44  
45  
46  
47  
48 Greenfield SF, Pirard S. (2009). *Gender-specific treatment for women with substance*  
49 *abuse disorders*. In: Brady K, Back SE, Greenfield SF, editors. *Women and*  
50 *Addiction*. Guilford; New York, NY. pp. 289–306.  
51  
52  
53  
54  
55  
56  
57  
58  
59  
60

- 1  
2  
3 Grosenick JK, Hatmaker CM. (2000). Perceptions of the importance of physical  
4 setting in substance abuse treatment. *Journal of Substance Abuse*  
5 *Treatment*, 18:29–39.  
6  
7  
8  
9  
10 Hagan, H., Pouget, E. R., & Des Jarlais, D. C. (2011). A systematic review and meta-  
11 analysis of interventions to prevent hepatitis C virus infection in people who  
12 inject drugs. *The Journal of Infectious Diseases*, 204(1), 74–83.  
13  
14  
15  
16 Hahn, J. A., Page-Shafer, K., Lum, P. J., Bourgois, P., Stein, E., Evans, J. L., Busch,  
17 M. P., et al. (2002). Hepatitis C Virus Seroconversion among Young Injection  
18 Drug Users: Relationships and Risks. *The Journal of Infectious Diseases*,  
19 186(11), 1558–1564.  
20  
21  
22  
23  
24  
25 Hahné, S. J. M., Veldhuijzen, I. K., Wiessing, L., Lim, T.-A., Salminen, M., & Laar, M.  
26 van de. (2013). Infection with hepatitis B and C virus in Europe: a systematic  
27 review of prevalence and cost-effectiveness of screening. *BMC Infectious*  
28 *Diseases*, 13(1), 181.  
29  
30  
31  
32  
33  
34 Harris M, Albers E, Swan T. (2015). The promise of treatment as prevention for  
35 hepatitis C: Meeting the needs of people who inject drugs? *International Journal*  
36 *of Drug Policy*, 26(10):963-9.  
37  
38  
39  
40  
41 Harris, M., & Rhodes, T. (2013). Injecting practices in sexual partnerships: Hepatitis  
42 C transmission potentials in a 'risk equivalence' framework. *Drug and Alcohol*  
43 *Dependence*, 132(3), 617–623.  
44  
45  
46  
47 Harris M, Treloar C, & Maher L. (2012). Staying safe from hepatitis C: engaging with  
48 multiple priorities. *Qualitative Health Research*; 22:31–42.  
49  
50  
51  
52 Harris M, & Rhodes T. (2012) Venous access and care: harnessing pragmatics in  
53 harm reduction for people who inject drugs. *Addiction*, 107:1090–6.  
54  
55  
56  
57  
58  
59  
60

- 1  
2  
3 Hearn, K. D., O'Sullivan, L. F., & Gilbert, L. (2005). Intimate Partner Violence and  
4  
5 Monogamy among Women in Methadone Treatment. *AIDS and Behavior*, 9:177-  
6  
7 186.  
8  
9  
10 Hope VD, Harris RJ, De Angelis D, *et al.* (2014) Two decades of successes and  
11  
12 failures in controlling the transmission of HIV through injecting drug use in  
13  
14 England and Wales, 1990 to 2011. *European Surveillance*, 19(14): 20762.  
15  
16 Korthuis PT, Feaster DJ, Gomez ZL, Das M, Tross S, Wiest K, Douaihy A, Mandler  
17  
18 RN, Sorensen JL, Colfax G, McCarty D, Cohen SE, Penn PE, Lape D, Metsch  
19  
20 LR. (2012) Injection behaviors among injection drug users in treatment: the role  
21  
22 of hepatitis C awareness. *Addictive Behaviors*, 37:552-555.  
23  
24  
25 Kwiatkowski, C.F., Corsi, K.F. & Booth, R.E. (2002). The association between  
26  
27 knowledge of hepatitis C virus status and risk behaviours in injection drug  
28  
29 users. *Addiction*, 97:1289–1294  
30  
31  
32 Kroenke, K., Spitzer, R.L., & Williams, J.B.W. (2001). The PHQ-9: Validity of a brief  
33  
34 depression severity measure. *Journal of General Internal Medicine*, 16: 606–  
35  
36 613.  
37  
38 Latka, M.H., Hagan, H., Kapadia, F., Golub, E.T., Bonner, S., Campbell, J.V, Coady,  
39  
40 M.H., et al. (2008). A randomized intervention trial to reduce the lending of used  
41  
42 injection equipment among injection drug users infected with hepatitis C.  
43  
44 *American Journal of Public Health*, 98, 853–861.  
45  
46  
47 Lewinsohn, P.M., Antonuccio, D.O., Breckenridge, J.S., & Teri, L. (1984). *The*  
48  
49 *“Coping with Depression” Course*. Eugene OR, Castalia Publishing Company.  
50  
51  
52 MacArthur, G.J., van Velzen, E., Palmateer, N., Kimber, J., Pharris, A., Hope, V.,  
53  
54 Taylor, A., et al. (2014). Interventions to prevent HIV and Hepatitis C in people  
55  
56  
57  
58  
59  
60

1  
2  
3 who inject drugs: a review of reviews to assess evidence of effectiveness. *The*  
4  
5 *International Journal on Drug Policy*, 25(1), 34–52.

6  
7 Mackesy-Amiti ME, Ouellet LJ, Finnegan L, et al. Transitions in Latent Classes of  
8  
9 Sexual Risk Behavior Among Young Injection Drug Users Following HIV  
10  
11 Prevention Intervention. *AIDS and Behavior*. 2014;18(3):464-472.

12  
13  
14 MacRae, R., & Aalto, E. (2000). Gendered power dynamics and HIV risk in drug-  
15  
16 using sexual relationships. *AIDS care*, 12(4), 505–515.

17  
18 Margolin, A., Avants, S. K., Warburton, L. A., Hawkins, K. A., & Shi, J. (2003). A  
19  
20 randomized clinical trial of a manual-guided risk reduction intervention for HIV-  
21  
22 positive injection drug users. *Health Psychology*, 22:223-228

23  
24  
25 Mateu-Gelabert P, Gwadz M, Guarino H, Sandoval M, Cleland C, Jordan A, et al.  
26  
27 (2014). The staying safe intervention: training people who inject drugs in  
28  
29 strategies to avoid injection-related HCV and HIV infection. *AIDS Education and*  
30  
31 *Prevention*; 26:144–57.

32  
33  
34 Meader, N., Li, R., Des Jarlais, D. C., & Pilling, S. (2010). Psychosocial interventions  
35  
36 for reducing injection and sexual risk behaviour for preventing HIV in drug users.  
37  
38 *Cochrane Database of Systematic Reviews (Online)*, (1), CD007192.

39  
40  
41 Mercer, C. H., Tanton, C., Prah, P., Erens, B., Sonnenberg, P., Clifton, S., et al.  
42  
43 (2013). Changes in sexual attitudes and lifestyles in Britain through the life  
44  
45 course and over time: findings from the National Surveys of Sexual Attitudes and  
46  
47 Lifestyles (Natsal). *Lancet*, 382:1781-1794.

48  
49  
50 Michie, S., Atkins, L., & West, R. (2014). *The Behaviour Change Wheel A Guide to*  
51  
52 *Designing Interventions*. London. Silverback Publishing.

- 1  
2  
3 Mohd Hanafiah, K., Groeger, J., Flaxman, A. D., & Wiersma, S. T. (2013). Global  
4  
5 epidemiology of hepatitis C virus infection: new estimates of age-specific  
6  
7 antibody to HCV seroprevalence. *Hepatology (Baltimore, Md.)*, *57*(4), 1333–42.  
8  
9  
10 Norden L, Saxon L, Kaberg M, Kall K, Franck J, Lidman C. (2009) Knowledge of  
11  
12 status and assessment of personal health consequences with hepatitis C are not  
13  
14 enough to change risk behaviour among injecting drug users in Stockholm  
15  
16 County, Sweden. *Scandinavian Journal of Infectious Diseases*, *41*(10):727–734  
17  
18  
19 Norton, B. L., Voils, C. I., Timberlake, S. H., Hecker, E. J., Goswami, N. D., Huffman,  
20  
21 K. M., Landgraf, A., et al. (2014). Community-based HCV screening: knowledge  
22  
23 and attitudes in a high risk urban population. *BMC Infectious Diseases*, *14*(1),  
24  
25 74.  
26  
27  
28 O'Brien, S., Day, C., Black, E., & Dolan, K. (2008). Injecting drug users'  
29  
30 understanding of hepatitis C. *Addictive Behaviors*, *33*, 1602–1605.  
31  
32  
33 O'Keefe, D., Aitken, C., Higgs, P., & Dietze, P. (2013). Concordance between self-  
34  
35 reported and actual hepatitis C virus infection status in a cohort of people who  
36  
37 inject drugs. *Drug and Alcohol Review*, *32*:208-210.  
38  
39  
40 Panchanadeswaran, S., Frye, V., Nandi, V., Galea, S., Vlahov, D., & Ompad, D.  
41  
42 (2010). Intimate partner violence and consistent condom use among drug-using  
43  
44 heterosexual women in New York City. *Women's Health*, *50*:107–124.  
45  
46  
47 Porter, L. (2013). Pregnancy, Childbirth, and Breastfeeding. Retrieved from  
48  
49 [http://hcvadvocate.org/hepatitis/factsheets\\_pdf/Wm\\_pregnancy.pdf](http://hcvadvocate.org/hepatitis/factsheets_pdf/Wm_pregnancy.pdf)  
50  
51 *Reducing hepatitis C injecting and sexual risk behaviours among females who inject*  
52  
53 *drugs in Europe (REDUCE): translating evidence into practice. Final Report*  
54  
55 (2013). [https://thereduceproject.imim.es/files/final/English\\_REDUCE\\_final\\_report.](https://thereduceproject.imim.es/files/final/English_REDUCE_final_report.pdf)  
56  
57 [pdf](#)  
58  
59  
60

- 1  
2  
3 Rosenbaum A, Rabenhorst M, Reddy M, *et al.* (2006) A comparison of methods for  
4  
5 collecting self-report data on sensitive topics. *Violence and Victims*, 21:461–471.  
6  
7 Rosińska, M, Sierosławski J, & Wiessing L (2015) High regional variability of HIV,  
8  
9 HCV and injecting risks among people who inject drugs in Poland: comparing a  
10  
11 cross-sectional bio-behavioural study with case-based surveillance. *BMC*  
12  
13 *Infectious Diseases*, 15:83.  
14  
15  
16 Sacks-Davis, R., Horyniak, D., Grebely, J., & Hellard, M. (2012). Behavioural  
17  
18 interventions for preventing hepatitis C infection in people who inject drugs: A  
19  
20 global systematic review. *International Journal of Drug Policy*, 23(3), 176–184.  
21  
22  
23 Samet, J. H., Raj, A., Cheng, D. M., Blokhina, E., Bridden, C., Chaisson, C. E., et al.  
24  
25 (2015). HERMITAGE - a randomized controlled trial to reduce sexually  
26  
27 transmitted infections and HIV risk behaviors among HIV-infected Russian  
28  
29 drinkers. *Addiction*, 110:80-90.  
30  
31  
32 Schroeder, J. R., Epstein, D. H., Umbricht, A., & Preston, K. L. (2006). Changes in  
33  
34 HIV risk behaviors among patients receiving combined pharmacological and  
35  
36 behavioral interventions for heroin and cocaine dependence. *Addictive*  
37  
38 *Behaviors*, 31:868-879.  
39  
40  
41 Sheard, L., & Tompkins, C. (2008). Contradictions and misperceptions: an  
42  
43 exploration of injecting practice, cleanliness, risk, and partnership in the lives of  
44  
45 women drug users. *Qualitative Health Research*, 18:1536-1547.  
46  
47  
48 Smyth, B. P., & Roche, A. (2007). Recipient syringe sharing and its relationship to  
49  
50 social proximity, perception of risk and preparedness to share. *Addictive*  
51  
52 *Behaviors*, 32:1943-1948.  
53  
54  
55  
56  
57  
58  
59  
60

- 1  
2  
3 Stein, M. D., Anderson, B. J., Solomon, D. A., Herman, D. S., Ramsey, S. E., Brown,  
4  
5 R. A., & Miller, I. W. (2005). Reductions in HIV risk behaviors among depressed  
6  
7 drug injectors. *American Journal of Drug and Alcohol Abuse*, 31(3), 417–432.  
8  
9  
10 Sterk, C. E., Theall, K. P., Elifson, K. W., & Kidder, D. (2003). HIV risk reduction  
11  
12 among African-American women who inject drugs: a randomized controlled trial.  
13  
14 *AIDS Behavior*, 7:73-86.  
15  
16 Tohme, R. A., & Holmberg, S. D. (2010). Is sexual contact a major mode of hepatitis  
17  
18 C virus transmission? *Hepatology*, 52(4), 1497–1505.  
19  
20  
21 Tompkins, C. N. E., Sheard, L., Wright, N. M. J., Jones, L., & Howes, N. (2006).  
22  
23 Exchange, deceit, risk and harm: The consequences for women of receiving  
24  
25 injections from other drug users. *Drugs: Education, Prevention, and Policy*,  
26  
27 13(3), 281–297.  
28  
29  
30 Torrens, M., Gilchrist, G., & Domingo-Salvany, A. (2011). Psychiatric comorbidity in  
31  
32 illicit drug users: Substance-induced versus independent disorders. *Drug and*  
33  
34 *Alcohol Dependence*, 113(2-3), 147–156.  
35  
36  
37 Tracy, D., Hahn, J. A., Fuller Lewis, C., Evans, J., Briceño, A., Morris, M. D., et al.  
38  
39 (2014). Higher risk of incident hepatitis C virus among young women who inject  
40  
41 drugs compared with young men in association with sexual relationships: a  
42  
43 prospective analysis from the UFO Study cohort. *BMJ Open*, 4(5):e004988  
44  
45  
46 Treloar, C., Newland, J., & Maher, L. (2015). A qualitative study trialling the  
47  
48 acceptability of new hepatitis C prevention messages for people who inject  
49  
50 drugs: symbiotic messages, pleasure and conditional interpretations. *Harm*  
51  
52 *Reduction Journal*, 12:5  
53  
54 University of the West of Scotland: Health Protection Scotland and West of Scotland  
55  
56 Specialist Virology Centre. (2012). *The Needle Exchange Surveillance Initiative*  
57  
58  
59  
60



(NESI): Prevalence of HCV and injecting risk behaviours among injecting drug users attending needle exchanges in Scotland, 2008/09 & 2010/2011. University of the West of Scotland, Paisley.

Vescio, M. F., Longo, B., Babudieri, S., Starnini, G., Carbonara, S., Rezza, G., & Monarca, R. (2008). Correlates of hepatitis C virus seropositivity in prison inmates: a meta-analysis. *Journal of Epidemiology and Community Health*, 62(4), 305–13.

Wagner, K. D., Hudson, S. M., Latka, M. H., Strathdee, S. A., Thiede, H., Mackesy-Amity, M., & Garfein, R. S. (2009). The effect of intimate partner violence on receptive syringe sharing among young female injection drug users: an analysis of mediation effects. *AIDS and Behavior*, 13:217–224.

Wechsberg, W. M., Krupitsky, E., Romanova, T., Zvartau, E., Kline, T. L., Browne, F., et al. (2012). Double jeopardy--drug and sex risks among Russian women who inject drugs: initial feasibility and efficacy results of a small randomized controlled trial. *Substance Abuse Treatment, Prevention and Policy*; 10:1.

Wiessing, L., Likatavicius, G., Hedrich, D., Guarita, B., van de Laar, M.J. & Vicente, J. (2011) Trends in HIV and hepatitis C virus infections among injecting drug users in Europe, 2005 to 2010. *Eurosurveillance*, 16(48): pii=20031.

Wood, E. (2007). Gender and risk factors for initiation into injection drug use. *Drug and Alcohol Review*, 26:333-334.

Zule, W. A., Costenbader, E. C., Coomes, C. M., & Wechsberg, W. M. (2009). Effects of a hepatitis C virus educational intervention or a motivational intervention on alcohol use, injection drug use, and sexual risk behaviors among injection drug users. *American Journal of Public Health*, 99 Suppl 1, S180–6.



Figure 1. REDUCE group intervention session content

Session	Goals	Content ((38) unless otherwise cited)
1 Understanding Hepatitis C transmission risks	<ol style="list-style-type: none"> <li>1. Introduce the REDUCE project and intervention.</li> <li>2. Build group cohesion.</li> <li>3. Establish group rules.</li> <li>4. Engage participants.</li> <li>5. Increase knowledge about Hepatitis C and transmission injecting risk behaviours.</li> <li>6. Motivate participants to change their risk behaviours.</li> </ol>	<ol style="list-style-type: none"> <li>1.1 Introduction and welcome</li> <li>1.2 Group rules</li> <li>1.3 Myths and facts (game) about Hepatitis C</li> <li>1.4 Injecting risks: cross contamination (video)</li> <li>1.5 Transmission risks pyramid (exercise)</li> <li>1.6 Strategies for reducing injection risk</li> <li>1.7 Deciding whether or not to change your behaviour</li> <li>1.8 Distribution of leaflet on Hepatitis C transmission risks and local resources</li> <li>1.9 Close</li> </ol>
2 Hepatitis C and sexual wellbeing – negotiating safety	<ol style="list-style-type: none"> <li>1. Increase knowledge about hepatitis C transmission and sexual well-being.</li> <li>2. Identify barriers to reducing sexual and injecting risk behaviours.</li> <li>3. Identify strategies for reducing hepatitis C risk with intimate partners and others.</li> <li>4. Increase knowledge about hepatitis C transmission during pregnancy and from mother to child.</li> <li>5. Motivate participants to change their risk behaviours.</li> </ol>	<ol style="list-style-type: none"> <li>2.1 Welcome and feedback on Session 1</li> <li>2.2 Sexual transmission of Hepatitis C (40)</li> <li>2.3 Pregnancy, motherhood and Hepatitis C (41)</li> <li>2.4 Rate the risk activity</li> <li>2.5 Why do women do risky things that can put them at risk of Hepatitis C?</li> <li>2.6 Skills building: using TALK to negotiate safer sex and injection behaviours</li> <li>2.7 Review and close</li> </ol>
3 Hepatitis C and emotional wellbeing – reducing negative mood	<ol style="list-style-type: none"> <li>1. Increase knowledge about the association between Hepatitis C treatment and depression.</li> <li>2. Increase knowledge about the potential relationship between risk behaviours and negative mood.</li> <li>3. Identify symptoms of negative mood.</li> <li>4. Introduce the behavioural model of depression.</li> <li>5. Identify strategies for managing negative mood.</li> <li>6. Develop an understanding of self-talk and how to use it.</li> <li>7. Motivate participants to change their risk behaviours.</li> </ol>	<ol style="list-style-type: none"> <li>3.1 Welcome and feedback on Session 2</li> <li>3.2 What is depression? (42)</li> <li>3.3 Understanding the link between depression and Hepatitis C (43)</li> <li>3.4 What can we do to change the way we feel? (44-46)</li> <li>3.5 The depression model (44-46)</li> <li>3.6 Skills Building: Using Safe-Coping and Self-Talk (42)</li> <li>3.7 Review and close</li> </ol>

Table 1. Compliance and attrition by country

	Number attending each intervention session			Number completing assessments at each time frame	
	1	2	3	Baseline (pre-intervention)	One month post intervention
Austria	10	10	10	10	8
Italy	5*	5	5	6	6
Poland	5	4**	3**	5	5
Scotland	7	6	4	7	6
Spain	8	4	6	8	7
Total	35	29	28	36	32

\* one participant did not attend session 1 but attended session 2 (where the key learnings from session 1 were reviewed) and session 3

\*\* Sessions delivered individually to participants absent in sessions 2 and 3.

**Table 2. Injecting risk behaviours**

<b>In the last month....</b>	<b>Baseline (pre- intervention) N=36 Mean (SD)</b>	<b>One month post intervention N=36 Mean (SD)</b>	<b>t</b>	<b>(df)</b>	<b>P</b>
Of all needles and syringes used to inject in the last month, how many were new and unused (i.e. from a packet) on a scale of 0 to 10 (where 0 was none and 10 was all)	8.44 (2.91)	9.50 (1.08)	-2.14	(35)	0.040
Times injected with a needle/ syringe that had already been used by someone else	0.69 (1.95)	0.36 (1.69)	1.080	(35)	0.287
Number different people received used needles/syringes from	0.33 (0.63)	0.19 (0.86)	1.405	(35)	0.169
Number different people passed used needles/syringes on to	0.28 (0.51)	0.22 (0.48)	0.627	(35)	0.535
<b>In the last month....</b>	<b>Baseline (pre-intervention) N=36 N (%)</b>	<b>One month post intervention N=36 N (%)</b>			<b>P</b>
Shared needles/syringes with someone you knew had HCV	5 (13.9)	3 (8.5)			0.625
Used spoons or containers for mixing that had previously been used by someone else	18 (50.0)	8 (22.2)			0.031
Used filters that had previously been used by someone else	10 (27.8)	5 (13.9)			0.227
Prepared drugs or rinsed your works with water that had already been used by someone else	9 (25.0)	4 (11.1)			0.063

1				
2				
3	Used an alcohol swab when	23 (63.9)	18 (50.0)	0.227
4	you injected drugs before			
5	the injection			
6				
7	Used an alcohol swab when	23 (63.9)	13 (36.1)	0.006
8	you injected drugs after the			
9	injection			
10				
11	Shared filters, spoons,	10 (27.8)	4 (11.1)	0.031
12	cookers or water with			
13	someone you knew was			
14	HCV positive			
15				
16				
17	Shared a drug with another	20 (55.6)	19 (52.8)	1.000
18	person before preparing it			
19	(i.e. divide up the drug in			
20	powder form)			
21				
22				
23	Shared a drug with another	23 (63.9)	18 (50.0)	0.125
24	person after preparing it			
25	(i.e. after adding water to			
26	make it into a solution)			
27				
28				
29				
30				
31				
32				
33				
34				
35				
36				
37				
38				
39				
40				
41				
42				
43				
44				
45				
46				
47				
48				
49				
50				
51				
52				
53				
54				
55				
56				
57				
58				
59				
60				

Table 3. Drug preparation behaviours

In the last month when you shared a drug with another person before or after preparing it were you able at least some of the time to....	Baseline (pre- intervention) N=28*	One month post intervention N=27*	p
Take the initiative of preparing the drugs	18 (64.3%)	21 (77.8%)	0.250
Refuse to inject because you believed the drugs were prepared unsafely	15 (53.6%)	19 (70.4%)	0.344
Make sure drug preparation and injection was done safely	24 (85.7%)	25 (92.6%)	1.000
Use drugs without feeling obliged to share equipment	22 (78.6%)	23 (85.2%)	1.000
Tell your injecting partner how to prepare it and inject safely	21 (75.0%)	24 (88.9%)	0.289
Declare your hepatitis C status	21 (75.0%)	22 (81.5%)	0.727
Share equipment with only those whose HIV or HCV status is the same as yours	12 (42.9%)	17 (63.0%)	0.109

\*Analyses only conducted for those participants who reported that they had shared a drug with another person before or after preparing it in the last month