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**Edmundson, C, Croxford, S, Emanuel, E, Njoroge, J, Ijaz, S, Hope, V, Phipps, E and Desai, M (2023) Recent increases in crack injection and associated risk factors among people who inject psychoactive drugs in England and Wales. International Journal of Drug Policy. p. 104262. ISSN 0955-3959**

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## **Recent increases in crack injection and associated risk factors among people who inject psychoactive drugs in England and Wales**

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**Word count (abstract):** 293 words (300 max)

**Word count (text):** 4,506 words (5,000 max)

1 **Recent increases in crack injection and associated risk factors among people who**  
2 **inject psychoactive drugs (PWID) in England and Wales**

3 **Keywords** (3-6): crack, cocaine, injecting, drugs, people who inject drugs, risk factors

4 **ABSTRACT**

5 **Background:** Crack use is higher in the United Kingdom (UK) than other European countries.

6 Crack is a stimulant with a short half-life, requiring frequent injection to maintain its euphoric  
7 effects, thus increasing the risk of blood borne viruses (BBVs) and skin and soft tissue  
8 infections (SSTIs). We assessed trends in the prevalence of current crack injection among  
9 people who inject drugs (PWID) and investigated harms and other factors associated with its  
10 use.

11 **Methods:** We used data from the annual Unlinked Anonymous Monitoring Survey of PWID,  
12 which recruits people who have ever injected psychoactive drugs through specialist services.  
13 Participants provide a biological sample and self-complete a questionnaire. We included  
14 participants from England and Wales who had injected in the past month. We examined trends  
15 in crack injection over time (2011-2021) and factors associated with crack injection using  
16 multivariable logistic regression (2019-2021).

17 **Results:** The proportion of people self-reporting crack injection in the past month almost  
18 doubled between 2011-2020/21, from 34% (416/1,237) to 57% (483/850). Crack injection was  
19 more frequently reported by males than females (adjusted odds ratio 1.46, 95% confidence  
20 interval: 1.15-1.87) and injected alongside heroin (6.67, 4.06-10.97) more frequently than  
21 alone. Crack injection was independently associated with injecting equipment sharing (1.64,  
22 1.30-2.07), groin injection (2.03, 1.60-2.56) in the past month, overdosing in the past year  
23 (1.90, 1.42-2.53), homelessness in the past year (1.42, 1.14-1.77) and ever having hepatitis  
24 C infection (1.64, 1.31-2.06).

25 **Conclusion:** Crack injection has increased significantly over the past decade in England and  
26 Wales. People injecting crack are more likely to engage in behaviours that increase the risk of  
27 BBV and SSTI acquisition, such as needle/syringe sharing, groin injection and polydrug use.

- 28 Harm reduction and drug treatment services should adapt to support the needs of this growing
- 29 population of people injecting stimulants.

30 **BACKGROUND**

31 The United Kingdom (UK) has one of highest reported levels of drug use in Western Europe  
32 (EMCDDA, 2021). Although heroin is the preferred drug for the majority of people who inject  
33 drugs (PWID) in the UK (EMCDDA, 2019), crack cocaine is the most commonly used stimulant  
34 (Public Health England, 2021a). Patterns of drug use change over time and are often impacted  
35 by drug availability, purity, price and associated stigma, with different secondary drugs phasing  
36 in and out of popularity (UK Health Security Agency, 2022).

37 In recent years, there has been a notable increase in the availability of crack cocaine to the  
38 UK drug market (EMCDDA, 2019; Public Health England *et al.*, 2021; United Nations Office  
39 on Drugs and Crime, 2021), thought to be driven by a large increase in Colombian cocaine  
40 production since 2013 due to political changes in the country (Home Office, 2020). Crack  
41 cocaine is an alkaloid form of cocaine obtained by heating a solution of cocaine hydrochloride  
42 and sodium bicarbonate until small crystalline rocks form (Hope *et al.*, 2005). Crack cocaine  
43 can either be smoked or dissolved in an acid and injected (Hope *et al.*, 2005); although globally  
44 smoking is the most common route of administration (National Drug Intelligence Center, 2003).  
45 The majority of crack cocaine in the UK is manufactured locally from imported powder cocaine;  
46 the availability and purity of powder and crack cocaine are therefore similar (Public Health  
47 England *et al.*, 2021). Currently crack use in the UK is higher than in any other European  
48 nation (Home Office, 2020).

49 Crack cocaine has been associated with a number of health-related harms and behaviours,  
50 each impacting the individual and society as a whole (Hope *et al.*, 2005). Stimulants such as  
51 crack provide a short-lived intense euphoria. As a result, injecting frequency is often higher  
52 than that seen in people who inject opiates (Hatsukami & Fischman, 1996) with “binging”  
53 behaviour often exhibited. Frequent injecting increases an individual’s potential for exposure  
54 to blood borne viruses (BBVs) through contaminated injecting equipment and could increase  
55 the risk of developing bacterial injection site infections through poor injection hygiene  
56 (Paquette *et al.*, 2013; Trayner *et al.*, 2020).

57 Concurrent use alongside available brown heroin, through the practice of "snowballing", is  
58 common in the UK, as both are soluble in acid and can be dissolved and injected together  
59 (Drug Science, 2023; Public Health England, 2019). Concurrent use places the individual at  
60 increased risk of overdose (Public Health England, 2019). Deaths associated with cocaine  
61 have increased to levels over five times that seen in 2012 (Home Office, 2020). During a crack  
62 cocaine "binge", an individual's sole focus can be on sourcing drugs, often impacting health  
63 needs and criminal behaviours (Hope *et al.*, 2005). Opiate and cocaine use is thought to be  
64 responsible for 95% of drug-related crime in the UK (Home Office, 2020), with acquisitive  
65 crimes such as shoplifting and burglary most commonly associated with crack use (Gossop *et*  
66 *al.*, 2006; Public Health England, 2019).

67 Although national estimates for crack cocaine use and drug treatment data indicate that crack  
68 use in the UK has increased in recent years (Public Health England *et al.*, 2021), little data  
69 are available to describe the prevalence of crack injection among PWID outside of drug  
70 treatment settings. Use of drugs by injecting increases the risk of human immunodeficiency  
71 virus (HIV), hepatitis B (HBV) and C (HCV), as well as the risk of other injecting related harms;  
72 the increased frequency of injecting associated with crack use amplifies these risks. Here, we  
73 describe trends in crack cocaine injection among people currently injecting drugs in England  
74 and Wales over the last decade and investigate factors associated with current injection of  
75 crack in recent years.

## 76 **METHODS**

### 77 **Data source**

78 We used data from a long-standing cross-sectional survey of PWID conducted annually across  
79 England, Wales and Northern Ireland, the Unlinked Anonymous Monitoring (UAM) Survey.  
80 Survey methods are described elsewhere (Hope *et al.*, 2014; Noone *et al.*, 1993). Briefly,  
81 individuals who have ever injected drugs are recruited through a variety of services provided  
82 by specialist drug and alcohol agencies (e.g., harm reduction, drug treatment, outreach, etc.).  
83 Participants are asked to provide a dry blood spot (DBS) sample and self-complete a short

84 questionnaire containing questions on demographics, injecting and sexual behaviours and  
85 uptake of harm reduction interventions, as well as BBV testing and treatment. The participant's  
86 questionnaire and DBS sample are linked; however, as no personal identifiers are collected  
87 in the questionnaire, data remain anonymous. Participants are eligible to take part once every  
88 calendar year if they have ever injected a psychoactive drug.

89 DBS samples are tested for markers of ever infection with BBVs: antibodies to HIV (anti-HIV),  
90 HBV core antigen (anti-HBc) and HCV (anti-HCV) to determine ever infection. Testing of HCV  
91 RNA is conducted to determine current HCV infection status. All laboratory testing is  
92 conducted at the Virus Reference Department, UK Health Security Agency (UKHSA), London,  
93 using previously reported methods (Cullen *et al.*, 2015). The UAM Survey has multi-site ethical  
94 approval (London Research Ethics Committee: 98/2/051 and UKHSA).

95 Information on UAM Survey recruitment for the years used in these analyses (2011-2021) can  
96 be found in Supplementary Table 1.

### 97 **Statistical analyses**

98 Participants were eligible for inclusion if they took part in the UAM Survey in England or Wales;  
99 data for Northern Ireland were excluded due to a continued low prevalence of crack cocaine  
100 injection there. Individuals were excluded from all analyses if they had incomplete data for age  
101 (n=220) and/or gender (n=37). Current crack injection was defined as self-reported injection  
102 of crack in the past month (28 days). All analyses were carried out using Stata 15 (College  
103 Station, TX: StataCorp LP). Further information on variables used in these analyses can be  
104 found in Supplementary Table 2.

#### 105 *Trends in current crack injection*

106 Ten-year trends in current crack injection were explored between 2012 and 2021. As  
107 participants can take part in the UAM Survey every year, repeat participations during the ten-  
108 year period were excluded (n=1,264). The proportion of people currently injecting crack each  
109 year between 2012 and 2021 were compared to 2011 as baseline using logistic regression  
110 and adjusting for gender, age at participation and region of survey recruitment. Trends are

111 presented for all people currently injecting and a subset of this population who reported first  
112 injecting drugs in the past three years (recent initiates). Data for 2020 and 2021 were  
113 combined due to limited recruitment during these years as a result of the coronavirus-19  
114 (COVID-19) pandemic (UK Health Security Agency, 2022).

#### 115 *Injection of crack compared to the injection of other drugs in recent years*

116 Descriptive analysis was carried out to characterise people currently injecting crack cocaine  
117 in recent years (2019-2021) and compare them to those currently injecting other drugs  
118 (statistical significance  $p<0.05$ ); data from 2019-2021 were combined to allow for a sufficient  
119 sample size for analyses. People missing data on current drug injection were excluded  
120 ( $n=419$ ), as well as those who indicated they had already taken part in the UAM Survey in the  
121 three-year period ( $n=98$ ).

#### 122 *Factors associated with current crack injection in recent years*

123 Factors associated with current crack injection in recent years (2019-2021) were explored  
124 using multivariable logistic regression (complete-case analysis). Only data for first  
125 participations were included; participants who indicated they had already taken part in the  
126 UAM Survey within the three-year period were excluded ( $n=98$ ). Demographic, biological, and  
127 behavioural variables were considered for inclusion in these analyses if they were associated  
128 with crack injection in prior literature or hypothesised to be of interest. All variables found to  
129 be significant in univariate analyses (statistical significance  $p<0.05$ ) were included in the  
130 multivariable model. Polydrug use was not included due to collinearity with heroin and  
131 amphetamine injection. A backward stepwise approach was used to construct the final model  
132 (likelihood ratio test:  $p<0.05$ ).

## 133 **RESULTS**

### 134 **Trends in current crack injection**

135 Among all people currently injecting drugs recruited in 2011, 21% ( $n=272$ ) were female; this  
136 rose to 25% ( $n=232$ ) in 2020/2021 ( $p=0.03$ ). The median age at participation was 34 years  
137 (interquartile range (IQR): 29 to 40 years) in 2011 and rose to 40 (IQR: 35 to 46 years) in



138 2020/2021 ( $p<0.001$ ). Among recent initiates currently injecting drugs, 30% ( $n=42$ ) were  
139 female in 2011, compared with 40% ( $n=27$ ) in 2020/2021 ( $p=0.174$ ). Median age of  
140 participation was 27 (IQR: 22 to 35 years) in 2011, rising to 35 (IQR: 29 to 40 years) in  
141 2020/2021 ( $p<0.001$ ).

142 The proportion of people self-reporting currently injecting crack almost doubled over the last  
143 decade, from 34% in 2011 to 57% in 2020/2021, with people currently injecting in 2020/2021  
144 being over two times more likely to report crack injection than in 2011 (adjusted odds ratio  
145 (aOR) 2.46, 95% confidence interval (CI) 2.05-2.96) [Table 1]. An increase was also seen in  
146 the proportion of recent initiates currently injecting crack, from 30% in 2011 to 65% in  
147 2020/2021, with recent initiates reporting in 2020/2021 having over four times the odds of  
148 reporting crack injection compared to in 2011 (aOR 4.45, 95% CI 2.33-8.48).

149 **[INSERT TABLE 1]**

#### 150 **Characteristics of people currently injecting in recent years**

151 Between 2019 and 2021, 4,821 eligible participants with age and gender reported, took part  
152 in the UAM Survey and answered the question about current injecting (92% of total sample).  
153 Of these, 49% (2,365/4,821) reported that they had injected any psychoactive drug in the past  
154 28 days, thus “currently” injecting.

155 Among those reporting currently injecting, the median age of participation was 40 years (IQR  
156 34-46 years), the majority were male (73%, 1,737/2,365), had ever experienced  
157 homelessness (80%, 1,826/2,296) and reported ever being imprisoned (68%, 1,541/2,257). In  
158 the past month, 93% (2,142/2,302) reported heroin injection, 10% (236/2,302) amphetamine  
159 injection and 58% (1,334/2,302) crack injection. The proportion of people currently injecting  
160 reporting crack injection remained high in recent years and was not significantly different  
161 across surveys (2019 vs. 2020/2021 aOR 0.91, 95% CI 0.77-1.08).

162 Under two thirds (62%, 1,274/2,055) of those reporting current injection of any drug between  
163 2019 and 2021 had ever had HCV infection (anti-HCV positive), while 24% (510/2,117) had

164 chronic HCV infection (HCV RNA positive). A small proportion of people currently injecting  
165 drugs were living with HIV (0.58%, 12/2,056) and 8.0% (165/2,057) had ever had HBV  
166 infection (HBV core antigen positive).

### 167 **Injection of crack compared to the injection of other drugs in recent years**

168 The characteristics of participants during 2019-2021 who reported currently injecting crack are  
169 compared to those of participants who reported currently injecting other drugs in Table 2. A  
170 higher proportion of people who reported current crack injection were male (76% vs. 71%;  
171  $p=0.010$ ) and had ever been imprisoned (73% vs. 63%;  $p<0.001$ ), than people who reported  
172 current injection of other drugs. Age ( $p=0.022$ ), region of recruitment ( $p<0.001$ ) and  
173 homelessness ( $p<0.001$ ) were also significantly different among those people who reported  
174 currently injecting crack compared to people who injected other drugs.

### 175 **[INSERT TABLE 2]**

176 With regard to injecting risk behaviours in the past month, a higher proportion of people who  
177 reported current crack injection also reported injecting heroin (97% vs. 87%;  $p<0.001$ ) and/or  
178 any polydrug injection (99% vs. 18%;  $p<0.001$ ), groin injection (43% vs. 27%;  $p<0.001$ ) and  
179 sharing of any injecting equipment (43% vs. 31%;  $p<0.001$ ) than people who reported currently  
180 injecting other drugs; a lower proportion reported injecting amphetamines in the last month  
181 (9.0% vs. 12%;  $p=0.020$ ). Those reporting current crack injection were more likely to report  
182 injecting drugs more than once a day on the last day they injected (77% vs. 65%;  $p<0.001$ )  
183 and a non-fatal overdose in the past year (26% vs. 16%;  $p<0.001$ ) than people currently  
184 injecting other drugs.

185 Infections among those injecting crack in the past month and those who injected drugs other  
186 than crack in the past month were similar. However, a higher proportion of people reporting  
187 crack injection ever had HCV (anti-HCV positive) (68% vs. 54%;  $p<0.001$ ).

188 **Factors associated with current crack injection in recent years**

189 Factors associated with current crack injection in multivariable analyses are presented in  
190 Table 3. Self-reported current crack injection varied regionally across England. Individuals  
191 recruited in the South of England had over three times the odds of reporting current crack  
192 injection than the baseline group, the North (aOR 3.48, 95% CI: 2.53-4.78). The odds of  
193 reporting current crack injection were also significantly higher in participants recruited in  
194 London and the Midlands and East of England when compared with baseline (aOR 2.46, 95%  
195 CI 1.66-3.63 and aOR 2.21, 95% CI 1.65-2.97 respectively). Current crack injection was more  
196 frequently reported by males than females (aOR 1.46, 95% CI: 1.15-1.87), among those who  
197 had ever been imprisoned (aOR 1.36, 95% CI: 1.07-1.73) and among individuals homeless in  
198 the past year (aOR 1.42, 95% CI: 1.14-1.77).

199 Individuals reporting crack injection in the past month had over six times the odds of reporting  
200 that they also injected heroin (aOR 6.67, 95% CI: 4.06-10.97). Current crack injection was  
201 also independently associated with sharing any injecting equipment in the past month (aOR  
202 1.64, 95% CI: 1.30-2.07) and groin injection in the past month (aOR 2.03, 95% CI: 1.60-2.560),  
203 injecting more than once on the last day of injection (aOR 1.76, 95% CI: 1.39-2.23) and  
204 reporting a non-fatal overdose in the past year (aOR 1.90, 95% CI: 1.42-2.53).

205 PWID reporting current crack injection had almost double the odds of having ever been  
206 infected with HCV (anti-HCV positive) (aOR 1.64, 95% CI: 1.31-2.06) compared to those  
207 injecting other drugs.

208 Although significant in univariable analyses, after adjustment, no association was found  
209 between current crack injection and age ( $p=0.980$ ), reporting injecting amphetamines in the  
210 past month ( $p=0.051$ ) or having a skin and soft tissue infection in the past year ( $p=0.295$ ).

211 **[INSERT TABLE 3]**

## 212 **DISCUSSION**

213 The UK has the largest reported opioid-using population and highest levels of problematic  
214 crack cocaine use in Europe (Public Health England, 2021a). Our analyses identified a near  
215 doubling in prevalence of crack cocaine injection among PWID in contact with services in  
216 England and Wales over the past decade. This increase was seen among recent initiates to  
217 injecting, as well as people who had been injecting longer term.

218 Global estimates for cocaine use suggest consumption is highest in North America and  
219 Western and Central Europe, and an increasing trend has been noted in some countries  
220 (Janssen *et al.*, 2020; Jones *et al.*, 2021; Roy *et al.*, 2012; United Nations Office on Drugs and  
221 Crime, 2021; Valdez *et al.*, 2015). Our findings support other UK data sources demonstrating  
222 a significant increase in crack use among people using drugs in England and Wales (Hay *et*  
223 *al.*, 2019; Public Health England, 2020a). Data for England indicate a 36% increase in the  
224 number of people accessing treatment for problematic crack cocaine use between 2013/14  
225 and 2019/20 (Public Health England, 2020b). National prevalence estimates for crack cocaine  
226 use have also shown a statistically significant rise of 8.5% between 2011/12 and 2016/17 (Hay  
227 *et al.*, 2019), with 180,748 people using crack cocaine in England in 2016/17. The increase in  
228 crack injection among recent initiates participating in the UAM Survey is particularly  
229 concerning, as people less experienced with injecting are known to be at higher risk of BBV  
230 infection, overdose (especially when cocaine is injected alongside other drugs), and are more  
231 likely to have poor injecting technique, increasing the potential for missed “hits” and skin and  
232 soft tissue infections (Becker Buxton *et al.*, 2004; Folch *et al.*, 2016; Hacker *et al.*, 2005;  
233 Hickman *et al.*, 2007; Maher *et al.*, 2006).

234 A national inquiry found that increased availability, purity and aggressive sales tactics by  
235 dealers were key drivers of the rise in cocaine use in the UK (EMCDDA, 2021; Public Health  
236 England, 2019). Global estimates for cocaine production indicate a sharp rise since 2013;  
237 purity was at a record high in England and Wales in 2018. Both of these factors likely impacted  
238 the UK drug market, making cocaine a more attractive drug to consume (Public Health

239 England *et al.*, 2021). Drugs trends vary geographically, depending on supply lines, availability  
240 and preference; the same is true for crack use. The rise in the county lines business model,  
241 in which a group supplying drugs from an urban hub establishes network(s) within rural or  
242 coastal towns, is thought to be a major factor in the growth in the crack cocaine market in  
243 England and Wales (Black, 2020). When compared with England and Wales, crack injection  
244 in Scotland is comparatively low, with injection of powder cocaine much more prevalent and  
245 increasing in recent years (UK Health Security Agency, 2022). Drug use trends can also be  
246 driven by structural factors, such as poverty, a lack of opportunity, unemployment, austerity,  
247 a lack of available health and social services, trauma and adverse life events (House of  
248 Commons Scottish Affairs Committee, 2019).

249 Consistent with the literature, in this study, crack injection in the past month was found to be  
250 associated with behavioural factors known to increase the risk of BBV and SSTI transmission  
251 including: groin injection, injecting more frequently and sharing any injecting equipment  
252 (Hickman *et al.*, 2007; Leri *et al.*, 2004, Hope *et al.*, 2015). Given increased injecting frequency  
253 is expected for stimulant injection due to the short half-life, it is vitally important that needle  
254 and syringe programme (NSP) provision remains sufficient to meet injecting need. In 2019,  
255 35% of PWID in England, Wales and Northern Ireland reported inadequate provision of NSP;  
256 after adjusting for missed “hits”, the proportion reporting that NSP provision did not meet their  
257 need rose to 51% (Slater *et al.*, 2023). Alongside education of the harms and risks of groin  
258 injection, interventions should be available to support injection site management and hygiene  
259 to minimise vein damage, reducing vascular access and the need to initiate groin injecting  
260 (Hope *et al.*, 2015).

261 In these analyses, crack injection was also found to be associated with structural inequalities,  
262 with higher odds of injecting among those experiencing homeless and/or imprisonment  
263 (Hickman *et al.*, 2008; McAuley *et al.*, 2019; Public Health England, 2019; Werb *et al.*, 2010).

264 Although the price of crack and powder cocaine per pure gram is similar, crack is often sold  
265 in smaller quantities, meaning a smaller cost to achieve intoxication (Caulkins, 1997; Public

266 Health England, 2019). This likely to be attractive to those with little funds, like those  
267 experiencing homelessness (Caulkins, 1997). Crack use may also be a driver for  
268 homelessness among PWID, as behaviours linked to stimulant use may result in  
269 unemployment. It is thought that for many, maintaining crack use is more expensive than  
270 maintaining heroin use due to increased frequency of injecting (Public Health England, 2019).  
271 As a result, some may resort to acquisitive crimes to help fund their drug use (Public Health  
272 England, 2019).

273 Crack injection was significantly higher among those reporting concurrent heroin injection, a  
274 finding which is in line with what is seen through drug treatment data; in 2019/20, just less  
275 than half of the individuals commencing drug treatment for problematic heroin use also cited  
276 use of crack cocaine (Public Health England, 2020a). This was also noted through anecdotal  
277 evidence gathered through a national inquiry, with reports of dealers selling heroin and crack  
278 together (Public Health England, 2019). Polydrug use is known to heighten risk of overdose.  
279 In fact, most cocaine-related deaths in Europe in 2019 were also associated with opiate use  
280 (EMCDDA, 2021). Our findings support this, with people reporting crack injection in the past  
281 month having double the odds of reporting a non-fatal overdose in the past year. In the United  
282 States, a “fourth wave” of high mortality among people who use drugs has been found to be  
283 associated with the use of cocaine and methamphetamine alongside opioids (Ciccarone,  
284 2021).

285 Although we found people reporting current crack injection had almost double the odds of  
286 being anti-HCV positive, no association was found between current crack injection and chronic  
287 HCV infection, being HIV positive or ever having had a HBV infection. Across Europe there  
288 have been a number of local HIV outbreaks associated with stimulant injection (Arendt *et al.*,  
289 2019; EMCDDA, 2021; Fotiou *et al.*, 2012; Ragonnet-Cronin *et al.*, 2018) and strong  
290 associations have been found between crack injection and HIV and/or hepatitis infection  
291 (Butler *et al.*, 2017; Tavitian-Exley *et al.*, 2015). It is likely that routine HIV testing in England,  
292 Wales and North Ireland has helped to mitigate transmission, preventing large outbreaks even

293 when changing drug use patterns place individuals at greater risk. Also, as HIV prevalence is  
294 low in the UK due to early and effective implementation of harm reduction programmes  
295 (Croxford *et al.*, 2022), small changes due to localised outbreaks may not be identifiable  
296 through UAM Survey due to sample size constraints. The higher odds of ever exposure to  
297 HCV found through our analyses suggest an increased level of lifetime risk; however, any  
298 differences in the prevalence of chronic HCV infection between individuals injecting crack in  
299 the past month and those injecting other drugs were non-significant. This could be because  
300 those participating in the UAM Survey are in contact with drug and alcohol services, with each  
301 contact allowing for engagement in diagnostic BBV testing and HCV treatment.

302 Engaging in transactional sex was not significantly associated with crack injection in our  
303 analyses; however, is worth noting that numerous studies worldwide have found a link  
304 between either smoking or injection of crack and increased engagement in transactional sex,  
305 especially among women (Duff *et al.*, 2013; Edwards *et al.*, 2006; Guimarães *et al.*, 2016;  
306 Public Health England, 2019; Werb *et al.*, 2010).

307 Our findings highlight the increased risk behaviours associated with crack cocaine injection.  
308 Further research is needed on ways to better engage and support individuals who inject crack  
309 cocaine. Currently no substitute treatment exists for individuals using crack and most people  
310 injecting crack in touch with drug treatment engage with these services to address their  
311 concurrent opiate addiction (Public Health England, 2019). Services have greater challenges  
312 engaging people who use crack in treatment and retaining them than they do people using  
313 opiates, with unmet need for drug treatment among those using crack reported to be 61% vs.  
314 46% for opiates (UK Health Security Agency, 2019). This level of unmet need is likely to have  
315 increased in recent years, given the disruption to harm reduction and drug treatment services  
316 due to the COVID-19 pandemic (Croxford *et al.*, 2021).

317 With the announcement of the UK government's new drug strategy (HM Government, 2021),  
318 which allocates additional funding to the sector, improvements to access and provision of harm  
319 reduction are essential. Local authority commissioners and harm reduction services should

320 be aware of the unmet need of this particularly marginalised and vulnerable group of people  
321 injecting stimulants. Adequate provision of injecting equipment is essential given their  
322 increased injecting frequency; novel approaches to enhance reach are essential, for example  
323 online distribution of injecting equipment via NSPdirect (Exchange Supplies, no date).  
324 Interventions to raise awareness for risks associated with polydrug use are needed in order to  
325 try to minimise overdose risk, as well as advice for safer injecting and wound packs in order  
326 to minimise vascular damage and SSTI risk. This education is vital not only for people who  
327 have been injecting long term, but also for recent initiates who may have less experience in  
328 how to consume drugs safely. Given the high levels of imprisonment and homelessness  
329 among those currently injecting crack, strong local partnerships with hostels and the justice  
330 system can offer support, treatment and/or harm reduction engagement through means other  
331 than drug services.

332 Finally, consideration should be given to interventions to promote alternative modes of drug  
333 consumption, such as smoking, which is safer than injecting but not without risk. Research is  
334 underway to understand the extent to which safe inhalation pipe provision could reduce health  
335 risks and enhance service engagement among people who use crack cocaine (Harris, 2023);  
336 supply of equipment to reduce risk when smoking crack is currently prohibited by law in the  
337 UK (Harris, 2020). Approaches taken to reduce stimulant-related harm outside the UK include  
338 safe supply, defined as the prescription of pharmaceutical-grade drugs to individuals at high  
339 overdose risk, and drug de-criminalisation (Health Canada, 2022; McNeil, *et al.*, 2022). It is  
340 important that all interventions implemented are properly evaluated.

### 341 **Strengths and limitations**

342 This study utilises data from an annual, cross-sectional, bio-behavioural survey of PWID that  
343 has been running for over 30 years. The UAM Survey uses an established approach that has  
344 informed the understanding of the burden of disease and related risk behaviours among  
345 stigmatized and socially marginalised populations (World Health Organization *et al.*, 2017).



346 However, this study has several limitations. Recruiting a representative sample of PWID is  
347 difficult due to the illicit and marginalised nature of drug injection. The UAM Survey aims to be  
348 nationally reflective of PWID by recruiting through targeted services (including a range of drug  
349 treatment, harm reduction and outreach services). Although uptake and use of these services  
350 has been found to be high across England, Wales and Northern Ireland (Hickman *et al.*, 2007),  
351 the survey sample is only reflective of those in contact with services and not generalisable to  
352 the PWID population as a whole. Furthermore, the sample of PWID recruited during the  
353 COVID-19 pandemic in 2020 was slightly different to previous years in terms of geographic  
354 distribution, demographics and risk (Public Health England, 2021b). This may have been due  
355 to increased recruitment through outreach and/or services reserving face-to-face  
356 appointments for emergencies or for clients experiencing lifestyles characterised by unstable  
357 housing, unemployment or financial difficulties, mental illness, and/or social relationships  
358 centred around substance misuse (Davies *et al.*, 2015) and may have affected observed  
359 trends in drug use. UAM questionnaire data may be subject recall bias or a reluctance to report  
360 accurate information due to fear of stigma or judgement. Despite this, the reliability of self-  
361 reported risk behaviours among people who inject drugs has been previously shown to be  
362 high (Latkin *et al.*, 1993) and bias was minimised through self-completion. In these analyses,  
363 we utilised a stepwise approach to logistic regression; repeated model fitting may have  
364 resulted in overfitting the data, biased estimates, and inflated type one error (Harrell, 2015). If  
365 there were participants who did not disclose previously taking part in the UAM Survey, then it  
366 is possible that there were some duplicate observations in our dataset, which would have led  
367 to a violation of the logistic regression assumption of independence and incorrect statistical  
368 inference. Finally, as the UAM is a cross-sectional survey, we could only explore the factors  
369 associated with crack use and could not assess causation.

## 370 **Conclusions**

371 Over the past decade the prevalence of crack injection among PWID in England and Wales  
372 has almost doubled. PWID reporting crack injection were more likely to engage in injecting

373 risk behaviours such as sharing injecting equipment, groin injection, more frequent injecting,  
374 and poly-drug use. This is concerning as these behaviours could increase risk of BBV and  
375 SSTI acquisition, as well as overdose. Services for PWID should adapt to support the specific  
376 needs of this growing population of people injecting stimulants, with provision of adequate  
377 harm reduction and education to encourage safer drug consumption and a reduction in risk.  
378 As we return to a “new normal” as a result of the COVID-19 pandemic, funding from the UK  
379 Drug Strategy should provide opportunities for the redevelopment of local services to be more  
380 reactive to the needs of the population they care for.

381 **Funding statement:** There was no funding received for this work.

382 **Declaration of interest:** No competing interests to declare.

383 **CRedit author statement:** Claire Edmundson: Conceptualization, Methodology, Software,  
384 Formal analysis, Data curation, Visualisation, Writing-Original draft preparation. Sara  
385 Croxford: Conceptualization, Methodology, Validation, Visualisation, Writing-review and  
386 editing. Eva Emanuel: Data curation, Investigation, Writing-review and editing. Jaquelyn  
387 Njoroge: Data curation, Investigation, Writing-review and editing. Samreen Ijaz: Resources,  
388 Investigation, Writing-review and editing. Vivian Hope: Conceptualization, Supervision,  
389 Writing-reviewing and editing. Emily Phipps: Conceptualization, Supervision, Writing-  
390 reviewing and editing. Monica Desai: Supervision, Writing-reviewing and editing.

391 **Acknowledgements:** We gratefully acknowledge the drug and alcohol services that have  
392 facilitated delivery of the UAM Survey, and the participants recruited for giving their time to  
393 take part. We would also like to thank Ross Harris (UKHSA) for his statistical advice.

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**Table 1: Trends in crack injection among i) people current injecting drugs and ii) recent initiates to injecting who report current drug injection participating in the UAM Survey: England and Wales, 2011 to 2021**

Population	Year	N	Crack injection		Univariable analyses			Multivariable analyses		
			n	%	OR	95% CI	p value <sup>a</sup>	aOR	95% CI	p value <sup>b</sup>
PWID reporting current drug injection <sup>§</sup>	2011	1,237	416	34	1.00	.	.	1.00	.	.
	2012	1,590	581	37	1.14	0.97 - 1.33	0.108	1.18	1.00 - 1.38	0.047
	2013	1,458	557	38	1.22	1.04 - 1.43	0.014	1.33	1.13 - 1.56	0.001
	2014	1,306	544	42	1.41	1.20 - 1.66	<0.001	1.51	1.28 - 1.78	<0.001
	2015	1,208	570	47	1.76	1.50 - 2.08	<0.001	1.87	1.58 - 2.21	<0.001
	2016	1,275	694	54	2.36	2.01 - 2.77	<0.001	2.51	2.13 - 2.97	<0.001
	2017	1,152	595	52	2.11	1.79 - 2.49	<0.001	2.35	1.98 - 2.79	<0.001
	2018	1,273	780	61	3.12	2.65 - 3.68	<0.001	3.00	2.54 - 3.55	<0.001
	2019	1,259	734	58	2.76	2.34 - 3.25	<0.001	2.84	2.41 - 3.36	<0.001
	2020/2021	850	483	57	2.60	2.17 - 3.11	<0.001	2.46	2.05 - 2.96	<0.001
Recent initiates to injecting reporting currently injecting drugs <sup>^</sup>	2011	132	40	30	1.00	.	.	1.00	.	.
	2012	235	71	30	1.00	0.63 - 1.58	0.986	1.15	0.71 - 1.86	0.546
	2013	163	52	32	1.08	0.66 - 1.77	0.768	1.26	0.75 - 2.10	0.388
	2014	137	42	31	1.02	0.60 - 1.71	0.950	1.06	0.62 - 1.80	0.994
	2015	118	52	44	1.81	1.08 - 3.05	0.025	2.00	1.17 - 3.42	0.014
	2016	108	55	51	2.39	1.41 - 4.05	0.001	2.91	1.68 - 5.04	<0.001
	2017	106	48	45	1.90	1.12 - 3.24	0.018	2.22	1.27 - 3.87	0.005
	2018	129	80	62	3.76	2.25 - 6.28	<0.001	3.58	2.11 - 6.09	<0.001
	2019	140	70	50	2.30	1.40 - 3.78	0.001	2.44	1.45 - 4.10	0.001
	2020/2021	66	43	65	4.30	2.30 - 8.06	<0.001	4.45	2.33 - 8.48	<0.001

OR - Odds ratio, aOR - Adjusted odds ratio, CI - Confidence interval

<sup>a</sup> p value generated using Pearson's chi-squared test.

<sup>b</sup> p value generated using logistic regression analyses, adjusting for age gender and region of recruitment.

<sup>§</sup> Current drug injection is defined as reporting drug injecting in the past month

<sup>^</sup> A recent initiate to injecting is someone who began injecting drugs within the 3 years prior to their survey participation.



**Table 2. Characteristics of people participating in the UAM Survey who reported current crack injection compared with those who reported current injection of any other drug\*: England and Wales, 2019-2021 (N=2,365)**

<i>Characteristics</i>		<b>PWID currently injecting other drugs</b>		<b>PWID currently injecting crack</b>		<i>p value</i> <sup>a</sup>
		<b>n</b>	<b>%</b>	<b>n</b>	<b>%</b>	
<b>Demographics</b>						
Gender	Female	282	29%	325	24%	0.010
	Male	686	71%	1,009	76%	
Age	<25 years	32	3.3%	24	1.8%	0.022
	25-34 years	240	25%	300	22%	
	≥35 years	696	72%	1,010	76%	
Region	North of England	317	33%	255	19%	<0.001
	London	102	11%	151	11%	
	Midlands & East of England	265	27%	405	30%	
	South of England	180	19%	440	33%	
	Wales	104	11%	83	6.2%	
<b>Risk behaviours</b>						
Recent initiate to injecting <sup>^</sup>	No	345	94%	454	91%	0.188
	Yes	23	6.3%	43	8.7%	
Drugs injected <sup>§</sup>	Heroin	843	87%	1,299	97%	<0.001
	Powder cocaine	153	16%	253	19%	0.050
	Amphetamine	116	12%	120	9.0%	0.020
	Other	30	3.1%	47	3.5%	0.576
Polydrug use <sup>§</sup>	No	307	82%	7	1.4%	<0.001
	Yes	69	18%	502	99%	
Sharing of needles or syringes <sup>§</sup>	No	789	83%	982	75%	<0.001
	Yes	158	17%	323	25%	
Sharing of any injecting equipment <sup>§</sup>	No	651	69%	743	57%	<0.001
	Yes	298	31%	568	43%	
Injecting frequency on last day injected	Once a day	301	35%	278	23%	<0.001
	Two times or more	567	65%	942	77%	

Groin injection <sup>§</sup>	No	700	73%	753	57%	<0.001
	Yes	264	27%	572	43%	
Overdose in past year	No	774	84%	931	74%	<0.001
	Yes	150	16%	329	26%	
Ever engaged in transactional sex	Never	305	84%	418	85%	0.886
	At some point	57	16%	76	15%	
<b>Structural factors</b>						
Homelessness	No	246	26%	209	16%	<0.001
	Yes, but not the past year	281	30%	338	26%	
	Yes, in the past year	414	44%	754	58%	
Ever imprisonment	No	345	37%	351	27%	<0.001
	Yes	581	63%	928	73%	
<b>Infection status</b>						
Ever having HCV infection (anti-HCV)	Negative	394	46%	371	32%	<0.001
	Positive	454	54%	780	68%	
Having chronic HCV infection (HCV RNA)	Negative	269	59%	471	60%	0.695
	Positive	185	41%	309	40%	
Ever having HIV infection	Negative	846	100%	1,143	99%	0.680
	Positive	4	0.5%	7	0.6%	
Ever having HBV infection (anti-HBc)	Negative	780	92%	1,062	92%	0.681
	Positive	70	8.2%	89	7.7%	
Skin or soft tissue infection in past year	No	229	67%	313	65%	0.685
	Yes	115	33%	167	35%	

\* Current injection is reporting injecting a drug in the 4 weeks prior to survey participation

<sup>a</sup> *p* value generated using Pearson's chi-squared test.

<sup>^</sup> A recent initiate to injecting is someone who began injecting drugs within the 3 years prior to their survey participation.

<sup>§</sup> in the past month

Variable completeness: recent initiate to injecting 98%, injecting heroin 97%, injecting powder cocaine 97%, injecting amphetamine 97%, injecting any other drug 97%, polydrug use 100%, sharing needles and syringes 97%, sharing needles, syringes and other injecting equipment 97%, injecting frequency on last day injected 90%, groin injection 99%, overdose in the past year 94%, ever transactional sex 95%, homelessness 97%, ever imprisonment 95%, ever HCV infection 87%, chronic HCV infection 90%, ever HIV infection 87%, ever HBV infection 87%, skin or soft tissue infection 94%.

**Table 3. Factors associated with self-reported crack injection in the preceding month among PWID in England and Wales: 2019 to 2021 (N=1,669)**

Factors		Univariable analyses			Multivariable analyses		
		OR	95% CI	p value <sup>a</sup>	aOR	95% CI	p value <sup>b</sup>
<b>Demographics</b>							
Gender	Female	1.00	.		1.00	.	
	Male	<b>1.28</b>	1.06 - 1.54	0.010	<b>1.46</b>	1.15 - 1.87	0.002
Age	<25 years	1.00	.		†		
	25-34 years	<b>1.80</b>	0.96 - 2.91				
	≥35 years	<b>2.40</b>	1.09 - 3.19	0.022			
Region	North	1.00	.		1.00	.	
	London	<b>1.84</b>	1.36 - 2.49		<b>2.46</b>	1.66 - 3.63	
	Midlands & East of England	<b>1.90</b>	1.52 - 2.38		<b>2.21</b>	1.65 - 2.97	
	South	<b>3.04</b>	2.39 - 3.86		<b>3.48</b>	2.53 - 4.78	
	Wales	0.99	0.71 - 1.38	<0.001	0.94	0.61 - 1.44	<0.001
<b>Risk behaviours</b>							
Injected heroin*	No	1.00	.		1.00	.	
	Yes	<b>5.50</b>	3.75 - 8.09	<0.001	<b>6.67</b>	4.06 - 10.97	<0.001
Injected amphetamine*	No	1.00	.		†		
	Yes	<b>0.73</b>	0.55 - 0.95	0.02			
Sharing needles, syringes, spoons, filters or mixing containers*	No	1.00	.		1.00	.	
	Yes	<b>1.67</b>	1.40 - 1.99	<0.001	<b>1.64</b>	1.30 - 2.07	<0.001
Injecting frequency on last day injected	Once a day	1.00	.		1.00	.	
	Two times or more	<b>1.80</b>	1.48 - 2.18	<0.001	<b>1.76</b>	1.39 - 2.23	<0.001
Groin injection*	No	1.00	.		1.00	.	
	Yes	<b>2.01</b>	1.68 - 2.41	<0.001	<b>2.03</b>	1.60 - 2.56	<0.001
Overdose in past year	No	1.00	.		1.00	.	
	Yes	<b>1.82</b>	1.47 - 2.26	<0.001	<b>1.90</b>	1.42 - 2.53	<0.001

<b>Structural factors</b>							
Homeless in the past year	No	1.00	.		1.00	.	
	Yes	<b>1.75</b>	1.48 - 2.08	<0.001	<b>1.42</b>	1.14 - 1.77	<0.001
Ever imprisoned	No	1.00	.		1.00	.	
	Yes	<b>1.57</b>	1.31 - 1.88	<0.001	<b>1.36</b>	1.07 - 1.73	0.013
<b>Infection status</b>							
Ever having HCV infection (anti-HCV)	Negative	1.00	.		1.00	.	
	Positive	<b>1.82</b>	1.52 - 2.19	<0.001	<b>1.64</b>	1.31 - 2.06	<0.001
Skin or soft tissue infection in past year	No	1.00	.		†		
	Yes	<b>1.22</b>	1.02 - 1.45	0.685			

OR - odds ratio, aOR - Adjusted odds ratio, CI - Confidence intervals

<sup>a</sup> *p* value generated using Pearson's chi-squared test.

<sup>b</sup> *p* value generated using the likelihood ratio test.

† Entered in to the multivariable analysis, but not significant so not included in the final model

\* In the past month