

Effects of messaging on public support for drug consumption rooms in Scotland, UK

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Abstract

Background

There is evidence to suggest that medically supervised drug consumption rooms (DCRs) may form part of responses to reduce drug-related harm. Although DCRs have been established globally, they are perceived by some to be a controversial approach in the UK, and Government has repeatedly rejected proposals to establish one in Glasgow, Scotland. As public support is an important component of policy development and enactment, we sought to investigate the effects of different types of message framing on public support for DCR.

Methods

We undertook a cross-sectional online study with a randomised design, conducted with a nationally representative sample. Participants were randomised to one of six message conditions comprising combinations of four components. All conditions included i) a *basic* description of a DCR, and conditions included combinations of ii) *factual* information; iii) pre-emptive *refutation* of common public concerns about DCR; and/or iv) a *sympathetic* narrative describing a mother whose son died from a heroin overdose. After reading each message, participants completed a bespoke measure assessing support for DCR. Data were analysed using ANCOVA.

Results

Complete data were obtained from 1591 participants (50.3% Female; mean age 44.9 ± 16.1 years). Compared to reading a basic description of DCR alone, there was greater support for DCR in participants receiving the *refutation* ($p < .001$); *sympathetic* + *factual* ($p < .05$); and *sympathetic* + *factual* + *refutation* ($p < .001$) message conditions. Presenting *factual* or *sympathetic* messages alone were not associated with increased support.

Conclusion

Our findings suggest that public support for DCRs is not improved through communication of factual statements outlining potential benefits of the intervention alone. Advocates seeking to foster public support, and thus influence policy making, should also consider communication campaigns that address common concerns that the public might have about DCRs, and present the intervention in relation to potential benefits that they hold for people indirectly affected by drug-related harm.

Keywords: drug consumption rooms; drug policy; agenda setting; public communication

Introduction

Drug-related mortality and morbidity are significant public health concerns in the UK. Despite provision of evidence-based treatment and harm reduction interventions, there are historically high levels of drug-related deaths, and people who inject drugs (PWID) experience high levels of other long-term conditions (Lewer, Freer, et al., 2019; Lewer, Tweed, Aldridge, & Morley, 2019; Maisa, et al., 2019; McAuley, Palmateer, et al., 2019; National Records of Scotland, 2019; Northern Ireland Statistic Research Agency, 2019; Office for National Statistics, 2019; Trayner, et al., 2020). Rapid increases in HIV prevalence in PWID have been recently recorded in the Scottish (UK) city of Glasgow (McAuley, Palmateer, et al., 2019), and in Hepatitis C virus (HCV) prevalence in other regional areas of Scotland (UK) (McAuley, Yeung, et al., 2019). In 2018, 10.8% of clients sampled from injecting equipment services in Glasgow city centre tested positive for HIV, representing the largest documented HIV outbreak among this population in the UK for 30 years (McAuley, Palmateer, et al., 2019). Infections were associated with homelessness, incarceration, and, in particular, stimulant injecting (McAuley, Palmateer, et al., 2019). Similarly, public drug injection, a risk factor for blood borne viruses (BBV), soft tissue infections, and drug overdose, was reported by 16.0% of PWID in Scotland, and 47.0% in Glasgow city centre (Trayner, et al., 2020).

A number of individual and structural interventions have been proposed as part of the development of a co-ordinated strategy to reduce these drug related harms in Glasgow (Trayner, et al., 2020; Tweed, Rodgers, Priyadarshi, & Crighton, 2018). Alongside other intervention and systems-improvement activities, a case was developed for the introduction of a drug consumption room (DCR) (Tweed & Rodgers, 2016). These are facilities, typically located in health-care settings, that allow the consumption of pre-obtained drugs in safer and more hygienic conditions, through supervision by medically-trained staff and provision of clean injecting equipment (ACMD, 2016; European Monitoring Centre for Drugs and Drug Addiction, 2018; Jauffret-Roustide & Cailbault, 2018). In Glasgow, proposals were developed for a DCR

which would primarily target PWID with experience of homelessness and public injecting (Tweed & Rodgers, 2016). However, the introduction of DCRs in the UK requires a new legal framework, as the operation of DCRs, including service users' possession of controlled drugs, is subject to a range of (potential) criminal and civil law offences (Fortson & McCulloch, 2018). Despite support from policy actors including local cross-sector partnerships, the Scottish Government, the Advisory Council on the Misuse of Drugs (ACMD), Members of the UK Parliament, and sections of national media, DCRs have not received support from the UK government (summarised in Atkinson, McAuley, Trayner, and Sumnall (2019)). Indeed, prior to a national summit on responses to drug-related deaths held in Glasgow in February 2020, the UK Minister with portfolio responsibility for drugs policy described discussion of DCRs as a 'distraction' (BBC, 2020).

Despite operating in around 100 sites across 10 countries, in the UK DCRs are seen by some as a 'controversial' intervention (Atkinson, et al., 2019; Home Office, 2017; Lloyd, Stöver, Zurhold, & Hunt, 2017). Published evidence on their effectiveness is relatively limited (Kennedy, Karamouzian, & Kerr, 2017; Pardo, Caulkins, & Kilmer, 2018), particularly when delivered in the context of other harm reduction interventions. However, there is sufficient evidence from international implementations to support DCR pilots, in order to better understand their impact in areas with high levels of drug-related harm, such as Glasgow (Caulkins, Pardo, & Kilmer, 2019; Tweed, et al., 2018).

In a recent analysis of news-media reporting of the proposals to introduce a DCR in Glasgow, we found that although a majority of articles (67%) positively represented the intervention, they were presented in ways that reflected broader and more complex public discourses about drug use and PWID, national politics, and the purpose and intent of harm reduction and drug treatment, particularly with regards to abstinence (Atkinson, et al., 2019). Research evidence on DCR and targeted harms were framed, contested, and utilised in ways that revealed these underlying motivations, and it was notable that media reporting rarely included the voices of

the intended beneficiaries, PWID. This work also found there was misunderstanding about the aims of DCR, and media frequently reproduced stigmatising and moralising narratives.

International studies, including those conducted in Scotland (Trayner et al., (2020)), have consistently found a high degree of willingness of PWID to use DCRs, particularly those most at-risk of drug-related harm (e.g. Bouvier, Elston, Hadland, Green, and Marshall (2017); Butler, Chapman, and Terry (2018); Hunt, Lloyd, Kimber, and Tompkins (2007)). However, there has been less research investigating public attitudes and support for the introduction and operation of DCR, and little conducted in the UK (Potier, Lapr  v  te, Dubois-Arber, Cottencin, & Rolland, 2014). Work in Australia, Canada, and Germany has suggested that despite some initial resistance, once DCRs were introduced, public and local business support for the intervention increased, with little change in the proportion of those strongly opposed to the facilities (Cruz, Patra, Fischer, Rehm, & Kalousek, 2007; Potier, et al., 2014; Salmon, Thein, Kimber, Kaldor, & Maher, 2007; Strike, et al., 2014). In countries currently without sanctioned DCRs, the limited research available suggests that the public may not favour their introduction. An opinion survey conducted to coincide with an unsuccessful earlier attempt to introduce a DCR in the city of Brighton and Hove (UK) in 2013 showed that the majority of a nationally representative sample of the British population were opposed to the intervention (YouGov, 2013). Similarly, only 29% of a nationally representative sample of US adults (data collected in 2017) supported the approach, with positive responses dependent upon age, political preference, employment status, and lower levels of stigmatising attitudes towards people who use drugs (PWUD) (McGinty, Barry, et al., 2018). Further examination of the strength of agreement for arguments in favour or opposition to DCR in this sample found that the most highly rated opposing arguments were that running DCR were a poor use of public funds, or that they encouraged people to break the law and use controlled drugs (Barry, et al., 2019). In contrast (but still receiving less support than all opposing arguments), the most favoured arguments in support of DCR were that they were a better alternative to arresting people who use opioids, that they would reduce BBV transmission, and that they would reduce healthcare related costs.

Arguments in favour of DCRs, such as reducing public drug use, or providing a safe site where PWUD would be treated with dignity and respect, received little support (Barry et al., 2019). These findings mirrored those of our analysis of UK media reporting (Atkinson et al., 2018).

Low public support presents a significant barrier to the introduction of drug policy that might have public health benefits (Jauffret-Roustide & Cailbault, 2018; Lloyd, et al., 2017; Smith, Favril, Delhauteur, Vander Laenen, & Nicaise, 2019). Whilst public support is only one form of ‘evidence’ utilised (and created) in complex policy development processes (Cairney, 2016; Lancaster, Ritter, & Stafford, 2013; Lancaster, Sutherland, & Ritter, 2014; Oliver & de Vocht, 2015; Stevens & Zampini, 2018), it is still important (Burstein, 2003). Reviews of approaches that communicate evidence on policy effectiveness have shown that these can lead to changes in public beliefs that lead to more supportive attitudes towards that policy, including some substance use (alcohol) policies (Reynolds, Stautz, Pilling, van der Linden, & Marteau, 2020). However, in relation to controlled drug policy, this is complicated by the strong moral and political positions taken towards these types of substances and the people who use them, leading to differential public and political support for response preferences, and prioritisation of those populations and individuals who are perceived as ‘deserving’ of support (Brown & Wincup, 2019; da Silveira, de Tostes, Wan, Ronzani, & Corrigan, 2018; Hopwood, Brener, Frankland, & Treloar, 2010; Kelly, Dow, & Westerhoff, 2010; Lloyd, 2013; Radcliffe & Stevens, 2008; Sattler, Escande, Racine, & Goritz, 2017; Stevens, 2018; Stevens & Zampini, 2018). This means that simple presentation of evidence on the effectiveness or cost-effectiveness of drug policy approaches may not be sufficient to foster supportive attitudes.

Message framing, the way in which information is selected and presented to audiences, influences how people develop a particular conceptualisation of an issue or reorient their thinking about it, particularly for those issues that are unfamiliar, and/or where audiences hold ambiguous attitudes (Chong & Druckman, 2007). In a study examining the effects of different message framing on public attitudes towards take-home naloxone policies in the USA, it was

found that presenting factual information about naloxone, refutation of common concerns about naloxone provision, or a sympathetic narrative about a mother whose daughter died of an opioid overdose were all associated with increased policy support (Bachhuber, McGinty, Kennedy-Hendricks, Niederdeppe, & Barry, 2015). Presenting factual information alongside the sympathetic narrative was found to be the most effective approach, as the combination of an emotional appeal humanising the policy proposals, and factual information drawing attention to contextual/environmental determinants of drug-related harm may have countered attribution of personal blame, leading to greater support (Bandara, McGinty, & Barry, 2020; Gross, 2008). The importance of message framing has been confirmed in other studies, including those investigating public support for criminal justice reform, public stigma towards PWUD, and belief in the effectiveness and willingness to pay for drug treatment (Ashford, Brown, & Curtis, 2018; Bandara, et al., 2020; Hopwood, et al., 2010; Kennedy-Hendricks, Barry, & McGinty, 2016; McGinty, Goldman, Pescosolido, & Barry, 2015; Robinson & Adinoff, 2018).

In this study we adapted the methodology of Bachhuber and colleagues (2015) to investigate the effects of message framing on public support for the introduction of DCRs in a representative sample of the Scottish population. We hypothesised that presentation of a narrative that combined a summary of evidence that DCR could reduce drug-related harms in Scotland with a sympathetic account of how a drug-related death affected a family, would lead to greater support for DCR, compared with a description of the intervention alone. Considering that UK media reports often misrepresented the aims of DCR (Atkinson, et al., 2019), we further hypothesised that the inclusion of information that refuted common misconceptions about DCR would also be associated with higher levels of support.

Methods

Design

The study utilised a cross-sectional randomised design, and participants completed an anonymous online survey.

Participants

Adult members of the public ($n = 1591$) were recruited from a nationally representative research panel (provided by Qualtrics, Provo, UT, USA) between 6th and 29th March 2020. An *a priori* power calculation (G*Power 3.1; Faul, Erdfelder, Lang, and Buchner (2007)) to detect a medium effect size ($f = 0.25$; power 0.95), estimated a minimum sample size of 413 was required. Inclusion criteria were people who were currently living in Scotland, and aged over 18 years. These two criteria were assessed through demographic profiling attributes provided by participants to the panel administrators, and checked through screening questions included in the online survey. The sample was representative of the population of males and females aged 18+ in Scotland. Participants received an invitation email from the panel provider inviting them to take part in the research. The email did not specify the research topic, only that the survey was for research purposes, how long it took to complete, and the compensation available (small monetary and non-monetary rewards managed by the panel provider). Clicking the included link took them to an online survey hosted on the Qualtrics platform (Qualtrics, Provo, UT, USA) where full study information was provided, and consent obtained.

Materials

Four message components were written in accordance with the approach of Bachhuber and colleagues (2015), and participants were randomised to receive one of six types of message combination (see below). The full text of message elements are provided in Supplementary Material S1. As we could not assume that participants had prior understanding of a DCR, a

description of the service was included in all message combinations, and this was based on the proposed Glasgow model of delivery (Tweed & Rodgers, 2016):

Drug consumption rooms (DCRs), also known as supervised injection facilities or supervised consumption facilities, are designated places that legally permit the injection of drugs (or other forms of consumption), including those that are purchased illegally, under the supervision of medically-trained staff. These facilities also provide sterile injecting equipment (such as needles and syringes), to reduce behaviours such as syringe sharing and provide access to health and social care staff. Some facilities also support people to enter drug treatment to help them deal with their drug use. UK drug laws do not currently permit the operation of DCR, and therefore none are currently in operation in the UK.

Other content was derived from published evidence, including local need assessments, reviews of evaluation and economic studies:

The message components were:

- 1) *DCR description only* (presenting the DCR description above);
- 2) *Factual information* (presenting evidence on safety and (cost) efficacy of DCR in preventing overdose death and infection) (European Monitoring Centre for Drugs and Drug Addiction, 2018; Kennedy, Karamouzian, & Kerr, 2017; Pardo, Caulkins, & Kilmer, 2018).
- 3) *Pre-emptive refutation* (providing counterarguments to three common ethical and moral concerns around DCR identified in our previous media analysis (Atkinson, et al., 2019); i) that they encouraged drug use and prevent recovery, ii) that they pose a public disorder/safety threat (e.g. discarded injecting equipment, crime and disorder around the site), and iii) that they are a poor or inappropriate use of public ('tax payers') money);
- 4) *Sympathetic narrative* (text about a mother whose son died from a heroin overdose. This text was based on the structure of the narrative presented in Bacchuber et al., (2015), but adapted from three case studies published in the NHS Greater Glasgow and Clyde report

Taking Away the Chaos (2016), which presented a health and social care needs assessment of public drug use in the region (Tweed & Rodgers, 2016)).

The six message combinations are listed below, and message components were arranged to form a coherent narrative. All combinations included the DCR description:

1. DCR description (hereafter described as the *basic* condition);
2. Factual information (*factual*);
3. Factual information + pre-emptive refutation (*factual + refutation*);
4. Sympathetic narrative (*sympathetic*);
5. Sympathetic + factual (*sympathetic + factual*);
6. Sympathetic + factual + pre-emptive refutation (*sympathetic + factual + refutation*)

We created a bespoke primary outcome measure assessing support for DCR (hereafter *support for DCR*). This comprised 25 items scored on a Likert scale (1 Strongly disagree to 5 Strongly agree, some items were reverse scored), with higher total scores representing greater support for DCR (see Supplementary Material S2). Questions were based on previous attitudinal research undertaken in Sydney (Australia), the US, and Vancouver (Canada) assessing public support for DCR (Barry, et al., 2019; Strike, et al., 2014; Thein, Kimber, Maher, MacDonald, & Kaldor, 2005). Example items included *Drug consumption rooms will increase drug users' contact with health and social workers*; *Drug consumption rooms will reduce infectious diseases such as HIV and Hepatitis C among drug users*; *Areas that have a drug consumption room operating will be less desirable to live or run a business in*; *Drug consumption rooms are not a good use of public funds*. In this study, Cronbach's $\alpha = 0.94$, indicating a high level of internal consistency.

Additional measures

Demographic questions included age, gender, education, ethnicity, and employment. Participants were asked about frequency of their media use (news, entertainment, and social media), and voting preference (main UK political parties; recoded into *left*, *right*, *centre* parties for analysis).

Bespoke measures were created from existing tools, to assess participants' attitudes to homelessness, and PWUD. Attitudes towards people who are homeless were assessed through three questions taken from the Scottish Social Attitudes Survey General Attitudes to Homeless Module (The Scottish Government, 2006). These were *Most homeless people have just been unlucky in their lives*; *Most homeless people could find somewhere to live if they really tried*; *Many people say they are homeless just to try and get a house from the council*. Questions were scored on a Likert scale (1 Strongly Disagree to 5 Strongly Agree, with appropriate reverse scoring) with higher total scores representing more positive attitudes. In the present study, Cronbach's $\alpha = 0.61$, indicating an acceptable level of internal consistency.

Attitudes towards PWUD were assessed through 18 questions taken from a public attitudes measure, originally adapted from the UK Department of Health's Attitudes to Mental Illness survey (Singleton, 2010), and utilised in the 2016 Scottish Government's Public Attitudes Towards People with Drug Dependence and People in Recovery survey (The Scottish Government, 2016) (hereafter referred to as *attitudes to people in recovery*). Questions were scored on a five point Likert scale (1 Strongly Disagree to 5 Strongly Agree, with appropriate reverse scoring) and assessed attitudes towards people with a history of drug dependence (e.g. *Parents should not let their children play with the children of someone with a history of drug dependence*; *People with a history of drug dependence are too often demonised in the media*; *Increased spending on helping people overcome drug dependence is a waste of money*). Principal components analysis identified four factors (blame and intolerance; sympathy and care; fear and social exclusion; acceptance and integration) (Singleton, 2010); but as the scale score was used as a covariate in the current analysis, only the total score

was utilised. Higher total scores represented more positive attitudes. In the present study, Cronbach's $\alpha = 0.91$, indicating a high level of internal consistency.

Participants were also asked to give a brief substance use history (lifetime and last year use of a number of substances); and to indicate if i) they; and ii) a family member/close friend, had ever received drug treatment (coded 0 = no; 1 = yes). They also self-rated their knowledge of the reasons why some people develop problems with substances and others do not; and self-rated their knowledge of DCRs prior to the survey. Both items were scored on a 10-point scale. Finally, participants were asked to indicate if they had seen a media report about DCRs in the last 6 months, and if so, whether they judged these to be in favour, opposed to, or balanced towards the introduction of DCRs.

Procedure

The online survey comprised three sections, and took between 8-15 minutes to complete depending upon which messaging condition was presented. A pilot study utilising a convenience sample ($n = 180$) recruited from the authors' social media networks was used prior to panel survey recruitment in order to ascertain completion rates (85%), completion time (range: 10-15 minutes), and unusual data response patterns (e.g. missing responses to the primary outcome assessment). No subsequent amendment of study materials was required. After reading the study information and providing consent, participants first completed demographic questions. Participants were then randomised to receive one of the six messaging conditions described above. After presentation of the message, they were asked to confirm that they had read it (lack of confirmation led to survey termination; no responses were withdrawn in this way), and to complete the primary outcome measure. Participants were then asked to complete the remaining questions. Soft-launch of the survey ($n = 100$ participants) indicated a median completion time of 9.5 minutes, and this was used as a survey-attention indicator. Participants who subsequently completed the survey in under 4.75

minutes (one half of the median time), indicating possible lack of attention, were automatically excluded from the full launch ($n = 0$).

The research was approved by Liverpool John Moores University Research Ethics Committee. Panel recruitment proceeded in accordance with the International Chamber of Commerce Code on Market, Opinion and Social Research and Data Analytics.

Statistical analysis

The primary analysis was undertaken using ANCOVA with planned contrasts (reference category = *basic* message condition). The dependent variable was support for DCR score, with message condition as the independent variable. Covariates were scores for prior self-rated knowledge about substance use and DCRs, attitudes towards people in recovery, attitudes towards people who are homeless, and personal experience of treatment or knowing someone who had received treatment. These covariates were chosen on the basis of previous research showing that people can become more entrenched in beliefs about policy effectiveness when faced with evidence that supports or challenges pre-existing views, and that stigma towards PWUD, and familiarity with drug-related topics, including personal experience are important predictors of support for DCR and other drug treatment interventions (e.g. Barry, et al. (2019); Kennedy-Hendricks, et al. (2017); Matheson, et al. (2014); McGinty, Barry, et al. (2018); Reynolds, et al. (2020); Zarkin, Cates, and Bala (2000)). Attitudes towards people experiencing homelessness was specifically included as a covariate because this population has been identified as one of the main primary beneficiary group of the Glasgow DCR (Tweed, et al., 2018). Furthermore, substance use in this population has been shown to further exacerbate public stigma, and social attitudes surveys indicate sympathy towards affected groups in the Scottish general population depends on demographic characteristics (Alexandrescu, 2020; Atkinson, et al., 2019; The Scottish Government, 2006). Preliminary

analysis showed all covariates were independent of message presentation condition effects (see Table 1).

An exploratory hierarchical linear regression analysis was then undertaken with support for DCR score as the dependent variable in order to investigate individual-level predictors of support. Message condition was entered into step 1 (reference category = *basic*); demographics (age, gender, education) in step 2; and political orientation, exposure to DCR in the media, self-rated knowledge about substance use and DCR, attitudes towards people in recovery, attitudes to people who are homeless, and personal experience of treatment or knowing someone who had received treatment into step 3.

Alpha was set at 0.05, and all analyses were undertaken with jamovi (jamovi project (2020) v1.2.9.0).

Results

Sample demographic and other descriptive data are presented by randomised condition in Table 1. Randomisation to condition was judged to be successful, as conditions were equivalent on all variables of interest, except use of crack cocaine, where a significantly higher number than expected of the *sympathetic + factual + refutation* group reported lifetime use (7.9% compared with a sample mean of 4.3%).

INSERT TABLE 1 HERE

The overall ANCOVA model was significant ($F(11, 1489) = 170.594$; $p < .001$ (Table 2)). The covariates, attitudes to homelessness ($F(1, 1489) = 21.354$, $p < .001$); attitudes to recovery ($F(1, 1489) = 1061.353$, $p < .001$); and self-rated knowledge about DCRs ($F(1, 1489) = 14.594$, $p < .001$) were all significantly related to DCR support score. More positive attitudes were associated with greater support for DCRs, whilst lower self-rated knowledge about DCRs prior

to participation was associated with greater support after message exposure. After controlling for model covariates, there was a significant effect of the message condition on support for DCRs ($F(5,1489) = 5.555, p < .001$). Analysis comparing the different conditions showed that compared to the *basic* condition there was greater support for DCRs in the *factual + refutation* ($p < .001$); *sympathetic + factual* ($p = .012$); and *sympathetic + factual + refutation* ($p < .001$) message conditions. Examining β coefficients, the *factual + refutation* message condition was associated with the highest support, followed by *sympathetic + factual + refutation*; and *sympathetic + factual*. The *sympathetic* ($p = .645$) and *factual* ($p = .05$) conditions were not associated with support for DCRs.

INSERT TABLE 2 HERE

The regression analysis predicting support for DCRs and model parameters are presented in **Error! Reference source not found..** The final model was statistically significant ($R^2 = .679$; $F(19,570) = 63.56, p < .001$). In the first step (inclusion of message condition only), none of the predictors were significant. In the second step (inclusion of demographics), older age ($\beta = .095, p < .05$) was associated with greater support for DCRs. In the final step, compared to the *basic* message condition, the *factual + refutation* ($\beta = .302, p < .05$) and *sympathetic + factual + refutation* ($\beta = .281, p < .001$) conditions were associated with greater support for DCRs. Other significant predictors included older age ($\beta = .149, p < .001$), more positive attitudes to people in recovery ($\beta = -.732, p < .001$) or who are homeless ($\beta = .078, p < .05$), lower self-reported knowledge about drug use ($\beta = -.083, p < .01$) and recalling fewer balanced ($\beta = -.281, p < .001$) or oppositional ($\beta = -.427, p < .001$) media representations of DCR compared to supportive representations. Political orientation towards centre parties compared with those that are left-wing was associated with less support for DCRs ($\beta = -.220, p < .05$).

INSERT TABLE 3 HERE

Discussion

We examined the effects of random presentation of different messages about DCRs on public support for the intervention in a nationally representative sample. We found that compared to presentation of a basic description of DCRs, and controlling for a number of confounding variables, presentation of i) factual information about the potential benefits of the intervention with refutation of arguments frequently presented in UK media opposing the intervention; ii) factual information with a sympathetic narrative about a family affected by a drug-related death; and iii) a combination of the sympathetic narrative, factual information, and refutation of opposing arguments, were all associated with increased support for DCRs. Our study hypotheses were supported, although unlike the work of Bachhuber and colleagues (2015), who investigated naloxone policies, and upon which our methodology was based, we found that presentation of factual information or a sympathetic narrative alone were not associated with increased support.

Our findings have a number of implications for activities that aim to generate public support for DCRs, and in turn contribute to policy change. These results suggest that advocates wishing to build support for DCR should emphasise benefits of DCRs for PWID, challenge misconceptions about the intervention, as well as incorporate sympathetic experiences of those indirectly affected by drug-related harm, such as family members. Recent UK news media reporting on proposals to implement a DCR in Glasgow prioritised quantitative evidence, and there was a lack of inclusion of the experiences of PWID and others affected by drug related harms (Atkinson et al., 2019). Presentation of quantitative ('factual') evidence can lead to increased policy support, but confirmation bias can lead to selective dis/crediting of evidence in accordance with pre-existing cultural, moral, and socio-political beliefs or personal behaviours (e.g. substance use) that are relevant to the policy question (Baumgaertner, Carlisle, & Justwan, 2018; Reynolds, et al., 2020). Previous work has shown that policy advocacy activities may be most persuasive when they combine relevant scientific evidence with narratives that acknowledge the public's ethical concerns and have high

emotional appeal that puts a 'human face' on complex societal issues, including how the lack of a policy response affects people (Jones, McBeth, & Shanahan, 2014; Oliver & Cairney, 2019; Reynolds, et al., 2020; Shanahan, McBeth, & Hathaway, 2011). This may suggest one reason why the combination of factual information with a sympathetic narrative was associated with increased support for DCR in this study. Whilst we did not assess it, sympathetic narratives can elicit emotions that lead audiences to adopt attitudes and beliefs that are similar to those of the character that they identify with (Bachhuber, et al., 2015; Correa, Stone, Stikic, Johnson, & Berka, 2015; Murphy, Frank, Chatterjee, & Baezconde-Garbanati, 2013). Morality is an important component of successful narrative strategies, and this can be used to help shape relevant calls-to-action (Jones & Crow, 2017). In our study, and in keeping with similar research (Bachhuber, et al., 2015; Bandara et al., 2020), when combined with clear health and economic information (e.g. the number and economic costs of drug-related deaths and infections), the account of parental distress may have provided a moral focus that suggested a relevant policy response, i.e. introduction of a DCR. In the drugs policy field, biographical and moral narratives are often drawn upon by policy makers and other policy actors such as the media, to frame policy agendas or promote preferred responses. However, these have typically taken a narrow and selective perspective (e.g. 'decline and redemption' arcs), that emphasises vulnerability and deficit in PWUD (Pienaar & Dilkes-Frayne, 2017; valentine, et al., in press), and the moral framing of recovery and abstinence in UK drugs policy (Duke, 2013; Stevens, 2018) may be at odds with a harm reduction service such as a DCR (Atkinson et al., 2019; Lloyd et al., 2017). This suggests that there needs to be careful consideration of the choice of subject in such public communications narratives. In the current study we did not include a sympathetic message component depicting the potential benefits of a DCR for PWID. Comparing presentation of family members and primary intervention target groups will be important to examine in follow up studies, but the latter may be less likely to evoke a sympathetic response in audiences. As noted by Bandara and colleagues (2020), depiction of 'active' or 'untreated' substance use is associated with higher levels of stigmatising attitudes, and this interacts with other subject characteristics (e.g. gender, ethnicity, socioeconomic

status), leading to a lower likelihood of audience-subject identification (Kennedy-Hendricks, et al., 2016; McGinty, et al., 2015). Furthermore, an experimental manipulation that led to decreased stigmatising attitudes towards PWUD, did not lead to a corresponding increase in public support for treatment policies that required public spending (McGinty et al., 2015).

Importantly, we found that the presentation of factual information or a sympathetic narrative alone were not associated with increased support, compared to the basic description. This contrasted with the findings of Bachhuber and colleagues (2018) who found that all message conditions increased support for specific naloxone policies. Our study was sufficiently powered, and the content of the two message conditions was similar between the two studies, although we included additional economic information in our factual condition. Those authors found that whilst exposure to factual information increased policy support, without a mitigating effect of a refutation message, it also increased negative beliefs about naloxone, such as that it would encourage opioid use or would not be effective in preventing overdose. However, we did not find any associations between policy support and the factual or sympathetic conditions when examining supportive and oppositional beliefs about DCR separately (Supplementary material S3). It is therefore uncertain why there were differences between the two studies, although they might be related to study components such as the policy topic, samples (US vs UK), or analytical strategies used (i.e. dichotomised measures of support for different naloxone policies vs a linear scale of support for one policy). A further consideration around provision of factual information is that in policy areas with a limited or emerging evidence base, or where there have been no relevant studies conducted in target geographies, it may be difficult to provide direct evidence of benefit (Caulkins, et al., 2019), or audiences may have been exposed to competing narratives (Atkinson, et al., 2019; Home Office, 2017; Jauffret-Roustide & Cailbault, 2018). Therefore, the inclusion of refutation messages might be important, as they not only counter emerging beliefs about unintended consequences of a policy (e.g. DCRs encourage drug use and law breaking), but might also inoculate against weaker oppositional

arguments in the future (McGinty & Barry, 2020; McGinty, Pescosolido, Kennedy-Hendricks, & Barry, 2018).

Reflecting upon possible practical application of our work, a number of campaigns have been developed that aim to change public narratives around substance use, including work with media professionals. Recent examples include the Australian *Overdose Lifesavers* (<https://overdoselifesavers.org/>) and *Lives of Substance* (Fraser, et al., 2016) initiatives, and the US *Changing the Narrative* project (<https://www.changingthenarrative.news/>). Activities include the promotion of a 'person-first' language (Botticelli & Koh, 2016); explanations of substance use and its potential consequences that move beyond narratives focussed on individual choice; highlighting structural barriers to treatment and support; and the provision of advice and guidance on reporting, including access to expert sources including people with lived experience. To the best of our knowledge, there have been no evaluations of campaigns such as these on the public's drug policy preference or actual policy change, nor consideration of how communication activities are influenced by the media environment in which they are delivered (also see McGinty and Barry (2020)). A relevant body of research investigating influences on public attitudes in related fields (e.g. HIV, mental health) is more developed, and although still limited, highlights additional societal norms (and structures) that influence public attitudes and behaviour (e.g. Clement, et al. (2013); Corrigan, Morris, Michaels, Rafacz, and Rusch (2012); Stangl, Lloyd, Brady, Holland, and Baral (2013)). This work suggests that whilst public communications (and other activities) are important, these are unlikely to be effective without simultaneously addressing wider contextual and cultural factors. Substance use is newsworthy, and is often reported through 'drug scare' narratives, in which PWUD are presented as dangerous and criminal, and status quo policy responses of law and order are prioritised (Atkinson & Sumnall, in press; Bright, Bishop, Kane, Marsh, & Barratt, 2013; Forsyth, 2012). Such reporting is more common in populist sources, with high readership and public reach, and as such, may be more influential in determining overall public attitudes (Atkinson and Sumnall, in press; Atkinson et al., 2019). Moreover, there is declining news

readership in countries such as the UK (Ofcom, 2019), and set within a context of reduced revenue, time pressures and increased competition within- and between newsrooms, and along with declining public trust in media, and prominence of belief-reinforcing social media ‘echo-chambers’ (Barberá, Jost, Nagler, Tucker, & Bonneau, 2015; McConnell, 2016; Saltzis & Dickinson, 2008; Vosoughi, Roy, & Aral, 2018), news stories and particular drug narratives are often reproduced, meaning that attempts to change narratives and foster support for a particular policy approach may face additional obstacles. However, access may be easier to establish at local level, and with national news stories often being initiated within the local media (Atkinson & Sumnall, in press; Forsyth, 2012), establishing relationships with local news outlets and journalists is an important component of advocacy.

There were several limitations in this study, some of which are acknowledged here as they are also relevant for understanding practical interpretation. Although we presented a description of a DCR and asked participants to self-rate their knowledge about DCRs, it cannot be assumed that there was measurement invariance, or that participants fully understood how the intervention would operate in practice or what the health and social care aims are. In our analysis of UK media discussions of DCRs (Atkinson et al., 2019) we noted that DCRs were often presented in opposition to more traditional drug treatment and harm reduction approaches, or presented alongside descriptions of heroin assisted treatment, and the two were sometimes conflated, so prior exposure to such articles may have led to some confusion over objectives of the intervention. However, in our basic description of DCRs, which formed part of all message conditions, we tried to present a clear overview of services that could be provided through a DCR, and considering potential confusion about facilitating access to drug treatment (also highlighted in the study of Barry, et al. (2019)), included this as an intervention objective. Message conditions were also of different lengths, and it took less time for participants to read the *basic* message than others. We tried to control for this by ascertaining whether respondents had read and understood the message they were presented with, but it remains that attentional effects could have affected responses. Longer messages may have

required greater attention, and consequently differences in message valence could have led to greater salience which would affect agreement scores. Follow up studies should therefore attempt to include messaging conditions of similar length and affective quality. Consideration of message format, length, and frequency of presentation is important with respect to the practical applications of this research. Public communication campaigns with persuasive intent typically utilise a combination of different communicators, message formats, lengths, and platforms (e.g. video, written, audio), with multiple audience exposures (e.g. Harrington, Helme, and Noar (2015)). As discussed above, these campaigns also compete with existing media narratives on substance use and the people who use them. Hence, written, single-exposure strategies that show efficacy in experimental research such as this may therefore not necessarily be effective in fostering sustained support in public communication campaigns. Finally, although our sample was nationally representative with respect to age and gender, we recruited from an online panel survey, and participants may therefore differ from the Scottish general population with respect to important factors such as media engagement, understanding of drugs issues, and support for public funding of drug treatment more generally. Similarly, we do not know if oversampling of residents in urban areas such as Glasgow occurred. As the majority of public discussions of DCRs in the UK have focused on plans to introduce a service in this city, residents may have had differential support compared to other parts of the country.

Conclusion

Previous research has shown that although there is high willingness to use DCRs by Scottish PWID, and media representations are generally supportive, the intervention is still considered to be 'controversial', and there is a lack of national government support at UK level. We found that public support for DCRs may be improved by communication campaigns that clearly explain the potential health and economic benefits of the approach, include counter-arguments to common concerns about DCRs, and present other benefits in relation to people indirectly affected by drug-related harm.

Author contribution (CRediT)

HRS: conceptualisation, formal analysis, funding acquisition, methodology, writing - original draft, reviewing and editing;

AMA: methodology, writing – reviewing and editing;

KMAT: methodology, writing – reviewing and editing;

SHG: methodology, writing – reviewing and editing;

AMcA: funding acquisition, methodology, writing – reviewing and editing.

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Table 1 Sample characteristics; * $p < 0.05$; ¹ higher scores represent more negative attitudes

	Basic (n= 267)	Factual (n= 267)	Factual + refutation (n= 267)	Sympathetic (n= 267)	Sympathetic + Factual (n= 268)	Sympathetic + Factual + Refutation (n= 255)	Differences between groups? (p value)	All participants (N= 1591)
Age	45.7 ± 16.1	44.6 ± 15.8	44.2 ± 16.2	43.9 ± 16.5	45.7 ± 16.4	45.0 ± 15.7	$F_{5,739} = .588 (.709)$	44.9 ± 16.1
Female (%)	51.7	50.9	50.6	47.1	49.3	52.2	$X^2_5 = 1.76 (.882)$	50.3
Degree or above (%)	45.7	43.4	45.3	39.0	48.9	48.2	$X^2_5 = 6.97 (.223)$	45.1
White/White British (%)	94.4	96.3	97.0	95.9	94.4	92.9	$X^2_5 = 6.38 (.271)$	95.2
Employment (%)	61.6	60.0	56.8	59.8	60.8	62.0	$X^2_5 = .90 (.970)$	60.1
Voting preference (%)								
<i>Left wing</i>	56.2	57.3	58.9	53.8	56.3	53.3	$X^2_5 = 2.90 (.715)$	57.7
<i>Centre</i>	6.5	7.7	5.3	6.8	4.9	8.2	$X^2_5 = 3.81 (.576)$	6.7
<i>Right wing</i>	33.1	35.1	35.8	39.4	34.0	32.9	$X^2_5 = 2.32 (.804)$	35.6
Received drug treatment - Family member/close friend (%)	29.3	27.6	31.2	27.3	32.9	21.8	$X^2_5 = 9.05 (.107)$	28.4
Received drug treatment - self (%)	5.3	7.5	5.6	8.0	7.5	7.2	$X^2_5 = 2.59 (.762)$	6.9
Witnessed street-based injection	12.7	15.4	15.4	16.1	14.9	17.6	$X^2_5 = 2.60 (.762)$	15.3
Witnessed street-based drug litter	33.3	42.7	33.3	39.0	38.4	36.5	$X^2_5 = 7.45 (.189)$	37.2
Seen media report about DCR (%)	37.8	40.8	39.7	42.7	43.7	38.0	$X^2_5 = 8.75 (.556)$	40.5
Supportive	37.6	36.7	34.9	33.3	45.3	39.2	$X^2_5 = 4.27 (.511)$	37.9
Opposed	9.9	10.1	15.1	13.2	11.1	10.3	$X^2_5 = 2.23 (.816)$	11.6
Balanced	52.5	53.2	50.0	53.5	43.6	50.5	$X^2_5 = 3.14 (.679)$	50.5
Lifetime use of drugs (%)								
<i>Amphetamines</i>	19.2	17.7	15.0	18.7	17.3	18.9	$X^2_5 = 8.44 (.586)$	17.8
<i>Alcohol</i>	90.2	91.0	90.6	92.9	90.6	89.0	$X^2_5 = 8.09 (.620)$	90.7
<i>Cannabis</i>	42.3	48.1	39.1	48.1	48.5	45.1	$X^2_5 = 9.18 (.515)$	45.2
<i>Powdered cocaine</i>	19.7	20.0	17.4	20.4	19.9	16.9	$X^2_5 = 11.20 (.339)$	19.1
<i>Crack cocaine</i>	2.2	4.2	4.1	4.2	3.4	7.9	$X^2_5 = 22.70 (.012^*)$	4.3
<i>MDMA/Ecstasy</i>	19.1	19.2	12.8	18.1	17.5	20.4	$X^2_5 = 15.0 (.132)$	17.8
<i>Heroin/methadone</i>	2.6	5.7	3.7	3.0	1.9	6.3	$X^2_5 = 13.20 (.214)$	3.8
<i>Prescription drugs</i>	32.6	24.2	26.6	28.8	29.5	26.4	$X^2_5 = 15.50 (.113)$	28.0
Self-reported prior knowledge about DCR (mean ± SD)	4.4 ± 2.8	4.5 ± 2.7	4.4 ± 2.8	4.8 ± 2.5	4.6 ± 2.8	4.9 ± 2.7	$F_{5,739} = 1.05 (.388)$	4.6 ± 2.7
Self-reported knowledge about substance use problems (mean ± SD)	5.9 ± 2.2	5.8 ± 2.1	5.9 ± 2.4	5.9 ± 2.2	6.0 ± 2.3	6.2 ± 2.1	$F_{5,739} = 1.35 (.243)$	5.9 ± 2.2
Attitudes to people who are homeless ¹	10.3 ± 2.6	10.5 ± 2.5	10.3 ± 2.5	10.7 ± 2.3	10.4 ± 2.5	10.2 ± 2.4	$F_{5,739} = 1.48 (.194)$	10.4 ± 2.5
Attitudes to people in recovery ¹	61.2 ± 14.0	61.9 ± 14.9	61.3 ± 13.6	62.8 ± 13.3	61.9 ± 14.3	60.4 ± 12.7	$F_{5,739} = 1.01 (.413)$	61.6 ± 13.8
Total support for DCR score	84.1 ± 15.4	87.2 ± 1.2	88.5 ± 18.7	86.5 ± 17.4	87.3 ± 19.3	87.4 ± 17.5	$F_{5,739} = 2.15 (.057)$	86.8 ± 18.1

Table 2 Attitudes to DCR score - results of ANCOVA. $F(11,1489) = 170.594$, $p < .001$. For all between subjects effects $F df = 1,1489$ (5,1489 for message condition). * $p < .05$; ** $p < .01$; *** $p < .001$

Parameter	F	p-value	B	SE	β
<i>Factors</i>					
Message Condition	5.555**	.001			
<i>Covariates</i>					
Attitudes to Homelessness	21.354***	.001	.707	.153	.096
Attitudes to Recovery	1061.353***	.001	.903	.028	.691
Self-rated knowledge about drug use	3.288	.070	-.309	0.170	-.038
Self-rated knowledge about DCR	14.594**	.001	0.513	.134	.077
Received drug treatment - Family member/close friend	1.368	.242	-.882	0.754	-.049
Received drug treatment - self	3.710	.054	-2.541	1.319	-.141
<i>Contrasts (ref = basic)</i>	t (1489)				
Factual	1.958	.050	2.095	1.070	.116
Factual + refutation	3.974***	<.001	4.248	1.069	.254
Sympathetic	0.461	.645	.495	1.074	.023
Sympathetic + factual	2.516*	.012	2.705	1.075	.150
Sympathetic + factual + refutation	3.854***	<.001	4.182	1.085	.232

Table 3 Summary of hierarchical regression for variables predicting support for DCR. R^2 step 1 = .005; ΔR^2 step 2 = .015, ΔR^2 step 3 = .659, $p < .001$; * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Variable	B	SE	β	p-value
Step 1				
Intercept	88.906	1.977		< .001
Message Condition (ref = basic)				
<i>Factual</i>	.176	2.789	.009	.950
<i>Factual + refutation</i>	2.541	2.811	.131	.366
<i>Sympathetic</i>	1.377	2.742	.071	.616
<i>Sympathetic + factual</i>	.697	2.706	.036	.797
<i>Sympathetic + factual + refutation</i>	2.116	2.851	.109	.458
Step 2				
Intercept	82.658	3.290		< .001
Message Condition (ref = basic)				
<i>Factual</i>	.081	2.779	.004	.977
<i>Factual + refutation</i>	2.281	2.801	.118	.416
<i>Sympathetic</i>	1.260	2.742	.065	.646
<i>Sympathetic + factual</i>	1.224	2.705	.063	.651
<i>Sympathetic + factual + refutation</i>	2.032	2.839	.105	.475
Age	.118*	.054	.095	.030
Gender (ref = male)	.536	1.644	.028	.744
Education (ref = degree)	-1.352	1.611	-.070	.402
Employment status (ref = full time)	2.107	1.702	.109	.216
Step 3				
Intercept	16.448	3.800		< .001
Message Condition (ref = basic)				
<i>Factual</i>	2.337	1.6111	.121	.148
<i>Factual + refutation</i>	5.848***	1.628	.302	< .001
<i>Sympathetic</i>	.592	1.590	.031	.710
<i>Sympathetic + factual</i>	1.984	1.573	.103	.208
<i>Sympathetic + factual + refutation</i>	5.436***	1.653	.281	< .001
Age	.184***	.033	.149	< .001
Gender (ref = male)	-1.278	.964	-.067	.185
Education (ref = degree)	-.316	.952	-.016	.740
Employment status (ref = full time)	.212	.992	.011	.830
Political orientation (ref = Left wing)				
Right	-1.759	1.007	-.091	.081
Centre	-4.260*	2.158	-.220	.049
Attitudes to Homelessness	.614*	.244	.078	.012
Attitudes to Recovery	.999***	.043	.732	< .001
Self-reported knowledge about drug use	-.760**	.273	-.083	.006
Self-reported knowledge about DCR	.442	.240	.053	.066
Received drug treatment - Family member/close friend	-.402	1.104	-.021	.716
Received drug treatment - self	-3.164	1.687	-.164	.061
Exposure to DCR media (ref = supportive)				
Opposed	-8.249***	1.567	-.427	< .001
Balanced	-5.441***	1.056	-.281	< .001

Supplementary material

S1 Message Elements

1. *Basic DCR Description*

Drug consumption rooms (DCRs), also known as supervised injection facilities or supervised consumption facilities, are designated places that legally permit the injection of drugs (or other forms of consumption), including those that are purchased illegally, under the supervision of medically-trained staff. These facilities also provide sterile injecting equipment (such as needles and syringes), to reduce behaviours such as syringe sharing and provide access to health and social care staff. Some facilities also support people to enter drug treatment to help them deal with their drug use. UK drug laws do not currently permit the operation of DCR, and therefore none are currently in operation in the UK.

2. *Factual information*

In 2017, around 2500 people died in the UK after overdosing on opioid drugs such as heroin – equal to about 7 people a day. This is an increase of almost 50% since 2007 when 1700 people died. These are some of the highest number of deaths ever recorded after taking drugs, and is more than the 1710 people who died on UK roads in 2017.

People who inject drugs are also at risk from being infected with blood-borne viruses such as HIV and Hepatitis C through sharing of needles and other injecting equipment like spoons and filters. For example, in 2015 there was a large outbreak of HIV in people in Glasgow who inject drugs. Over 150 people were infected, which was much higher than expected, and the vast majority of these people reported that they usually injected in public places, such as in backstreets and tenement closes, abandoned buildings, public toilets, and car parks. There were also other outbreaks of serious infectious diseases among people who inject drugs such as botulism and anthrax. People who inject in public places are at an even higher risk of drug-related harms (including overdose and infectious diseases like blood-borne viruses) due to the lack of access to a clean and safe environment, including access to clean water and injecting equipment.

Research studies have shown that DCRs are successful at attracting the most vulnerable people who inject drugs, including people who inject in public places, and people who are experiencing homelessness.

Research also shows that DCRs can reduce overdose deaths in people who use the facilities, can promote safer injection conditions, and enhance access to health and treatment services. There has never been an overdose death reported in any of the international scientific studies that have examined DCRs. By providing a safer and more hygienic injecting environment, DCRs also reduce the risk of sharing needles and injecting equipment, and so could potentially reduce transmission of blood-borne virus and other diseases.

Economists have concluded that although DCRs can be expensive to set up, they could end up saving the NHS and the public money in the long-term, because of the overdose deaths and infections that they prevent. For example, it has been estimated that a DCR costs approximately £2 million per year to run, but the estimated costs to society of each drug death are £1.6 million, and lifetime cost of treating someone with HIV ranges from £250,000 to £500,000.

There are currently over 100 DCRs in operation across cities in Europe, Canada, and Australia, and some of these have been operating for more than 30 years.

NHS Greater Glasgow and Clyde want to open a DCR in Glasgow in order to try to reduce deaths and disease from injecting drug use. Other cities in the UK have also expressed interest in these facilities. However, UK law does not currently permit DCRs to open, as a number of drug-related offences are likely to be committed by allowing people to bring in and use illegally bought drugs onto the premises. The UK Government announced at the beginning of 2020 that it did not have any plans to change the law.

3) *Pre-emptive refutation*

Some people argue that we shouldn't have DCRs. They say that these facilities encourage people to keep using drugs, and to keep breaking the law. They say that the best way to reduce death and disease from drug use is to stop people using drugs altogether. They also worry that the sites will attract drug users from other areas, and that drug dealing and crime in the neighbourhood will get worse. They are also concerned that drug litter such as the number of discarded needles and syringes on the street will increase. Opponents of DCRs have also argued that at a time when health and social services are financially stretched, it is wrong to spend money helping people to use illegal drugs.

But in fact, DCRs provide people who use drugs with an ideal opportunity to make contact with drug treatment services. Research from Canada, where these facilities have been operating for over 15 years, show that they encourage people to enter drug detoxification services, often for the first time. Most people who use drugs eventually go on to successfully recover and stop using with the right sort of support, but they can't recover if they're already dead from an overdose.

As the medical costs to care for someone living with infections such as HIV/AIDS are so high, by helping to prevent transmission of these infections in the first place, DCRs provide good value for money. Medical staff in DCRs can also provide general healthcare services, which can reduce later burden on the NHS. This is important for people such as those experiencing homelessness who may rarely be in contact with a doctor.

Drug consumption rooms will always be controversial, and it is important to spend time to find the right location for them, but in countries where public opinion has been assessed, research shows that despite initial fears about the potential negative impacts on the surrounding community, residents and business owners become more supportive of these facilities once they have opened. These studies also show that there are no changes in the number of crimes reported in the neighbourhood, and there is no evidence to suggest that drug dealing or drug-related litter increases.

In fact, most DCRs in Europe have been established with the support of the police, who have worked closely with local councils, health and social services, and drug treatment charities. In Germany, for example, the police said that their support for the introduction of DCR didn't mean they'd gone 'soft on crime'. Instead, they welcomed the introduction as it meant drug scenes moved away from public 'hot spots' into smaller areas that could be more easily managed.

These countries have shown that it is possible to change the law to permit DCRs as part of a set of wider response to the reduce harms of drug use. Drug consumption rooms are not a 'magic bullet', but where they are needed, they play an important part of this wider response.

4) *Sympathetic narrative*

September 25th has become a very difficult time for Mary Paterson. That's her son Peter's birthday, who died of a heroin overdose two years ago.

Things began to change for Peter when he moved away from his home town to live in the city with his partner. Things were going well, he had a job, but had plans to go to college to complete a course, and he was looking forward to the future. However, his relationship with his partner broke down when the couple lost a child to cot death, and he became depressed. Following this, Peter gave up his job, but due to unemployment he was unable to afford somewhere to live and started begging to fund accommodation in a hostel. However, he left the hostel due to threats of violence and ended up sleeping rough in the city centre. It was then that he started smoking heroin, and within a few months, he began injecting.

Peter felt ashamed and believed that he had let his family down, and so he began contacting them much less often. Peter's family always loved him, but didn't know what to do or where to get help for him. Like most people, Mary didn't know anything about drugs, and when she found out Peter was using heroin she couldn't believe it was happening to her son.

A local charity befriended Peter on the streets and registered him with homeless health services, but Peter's heroin use made it difficult for him to keep appointments. He began walking with a bad limp due to an unhealed infection resulting from his heroin use, and he was also malnourished due to a poor diet.

Then in Summer 2017, Peter was found unconscious in a car park in the city centre, barely breathing. Despite a passer-by calling 999 it was too late, and he was pronounced dead from a heroin overdose. Peter was aged 29.

Thinking back, Mary wonders what could have been done to help her son. She misses him every day, especially around his birthday. But she felt powerless to help, and anyway, before his death, Peter had become distant, and when he died, she didn't even know which city he was in.

About a year after Peter's death, Mary learned of a national charity for families who had been affected by the death of a child from drugs. She got lots of support from them, and found it helped to talk about her son with other parents who had experienced similar losses. Through the charity she learned a lot more about the sorts of support that people who use drugs could benefit from, and to help keep them alive until they could stop their use. This included a lot of discussion of plans to introduce drug consumption rooms in Scotland, which had been in the news a lot.

Whilst Mary didn't want her son to ever have used heroin, she wished that until he was ready and able to stop, he could have used heroin in a place like a DCR, under the eye of a doctor or nurse, who could have helped in case of an emergency, and helped with his other healthcare needs. Instead, Peter died alone in a car park.

On top of her full-time job, and in her own way, Mary now works tirelessly to prevent more drug overdose deaths – talking at local events to community members, and at conferences for doctors about her family's experiences. She even visited her local Member of Parliament, asking her to argue for a change in law that would allow DCRs to open in the UK. These activities are always difficult for her, but she does them because she believes no parent should have to go through the pain of losing a child in the way she did.

S2 Primary outcome measure

All items scored on a 5-point Likert Scale, Strongly Disagree (scored 1) to Strongly Agree (scored 5). R = reverse scored item.

Question text: *Please read the following statements and then indicate to what extent you agree or disagree with it.*

1. Drug consumption rooms will encourage safer drug injection.
2. Drug consumption rooms will reduce overdose deaths.
3. Drug consumption rooms will reduce infectious diseases such as HIV and Hepatitis C among drug users.
4. Drug consumption rooms will increase drug users' contact with health and social workers.
5. Drug consumption rooms will reduce neighbourhood problems related to injecting drug use.
6. Drug consumption rooms will increase the number of people entering drug treatment services.
7. UK law should be changed to allow drug consumption rooms to open and operate.
8. Access to drug consumption rooms will improve the general health of people who use drugs.
9. Opening drug consumption rooms will make people think it's legal to possess drugs. R
10. Drug consumption rooms will reduce the number of people injecting in public.
11. Drug consumption rooms will reduce the number of discarded needles and syringes.
12. Drug consumption rooms will encourage people to start using drugs. R
13. Drug consumption rooms will discourage people to stop using drugs. R
14. Drug consumption rooms will attract drug users into an area. R
15. Drug consumption rooms will attract drug dealers into an area. R
16. Drug consumption rooms will lead to an increase in crime in an area. R
17. Drug consumption rooms make drug law enforcement more difficult. R
18. Drug consumption rooms are not a good use of public funds. R
19. Areas that have a drug consumption room operating will be less desirable to live or run a business in. R
20. It's unethical for staff working in a drug consumption room to encourage harmful behaviour such as the injection of drugs. R
21. Allowing people to use drugs in a drug consumption room is a better alternative to dealing with drug use than arresting people.
22. Drug consumption rooms would lead to reduced costs to the NHS by reducing A&E visits and hospital admissions.
23. Opening a drug consumption room will allow the police to focus on more serious crimes.
24. Drug consumption rooms create a space where people who use drugs are treated with dignity and respect.
25. All things considered, I support the introduction of drug consumption rooms.

In principal components analysis (oblimin rotation; parallel analysis), all positively scored items (*supportive beliefs*) loaded onto a single component (Eigenvalue = 9.25, 37.0% of variance after rotation), and all reverse scored items (*oppositional beliefs*) loaded on a single component (Eigenvalue = 5.23, 20.9% of variance after rotation). Kaiser-Meyer-Olkin = .958, confirming sampling adequacy, and all KMO values for individual items were $\geq .78$. Bartlett's Test of Sphericity $X^2_{300} = 27016$, $p < .001$. Factor loadings for all items were $\geq .60$ and so no questions were deleted from the scale.

Cronbach's α for complete measure = .952

Cronbach's α for *supportive* beliefs = .952

Cronbach's α for *oppositional* beliefs = .885

S3 Analysis of *supportive* and *oppositional* beliefs

Table S3.1 *Supportive* beliefs about DCR score - results of ANCOVA. $F(11,1489) = 43680.1$, $p < .001$. For all between-subjects effects F $df = 1,1489$ (5,1489 for message condition). * $p < .05$; ** $p < .01$; *** $p < .001$

Parameter	F	p	B	SE	β
<i>Factors</i>					
Message Condition	1.67	.139			
<i>Covariates</i>					
Attitudes to Homelessness	28.79***	< .001	.436	.081	.128
Attitudes to Recovery	559.93***	<.001	.348	.015	.575
Self-rated knowledge about drug use	10.41***	<.001	-.292	.090	-.078
Self-rated knowledge about DCR	1.09	.297	.074	.071	.024
Received drug treatment - Family member/close friend	1.04	.307	-.409	.400	-.049
Received drug treatment - self	5.83*	.016	-1.692	.701	-.203
<i>Contrasts (ref = basic)</i>	t (1489)				
Factual	1.52	.130	.861	.568	.103
Factual + refutation	2.43*	.015	1.376	.578	.165
Sympathetic	1.01	.315	.573	.570	.069
Sympathetic + factual	.94	.349	.534	.571	.064
Sympathetic + factual + refutation	.28*	.023	1.315	.576	.158

Table S3.1 *Oppositional beliefs about DCR score - results of ANCOVA. F (11,1489) = 96.061, p < .001. For all between subjects effects F df = 1,1489 (5,1489 for message condition). * p < .05; ** p < .01; *** p < .001*

Parameter	F	p	B	SE	β
<i>Factors</i>					
Message Condition	4.75***	<.001			
<i>Covariates</i>					
Attitudes to Homelessness	4.79*	.029	.271	.124	.053
Attitudes to Recovery	611.95***	<.001	.555	.022	.603
Self-rated knowledge about drug use	.015	.902	-.018	.138	-.124
Self-rated knowledge about DCR	16.30***	<.001	.439	.109	.093
Received drug treatment - Family member/close friend	.60	.439	-.473	.610	-.037
Received drug treatment - self	.63	.426	-.849	1.067	-.067
<i>Contrasts (ref = basic)</i>	t (1489)				
Factual	1.43	.154	1.234	.866	.097
Factual + refutation	3.32***	<.001	2.871	.865	.226
Sympathetic	-.09	.929	-.078	.869	-.006
Sympathetic + factual	2.50*	.013	2.171	.870	.171
Sympathetic + factual + refutation	3.27**	.001	2.867	.878	.226