



## LJMU Research Online

Sumnall, H, Atkinson, AM, Anderson, M, McAuley, A and Trayner, K

**How to Save a Life: Public awareness of a national mass media take home naloxone campaign, and effects of exposure to campaign components on overdose knowledge and responses.**

<http://researchonline.ljmu.ac.uk/id/eprint/20001/>

### Article

**Citation** (please note it is advisable to refer to the publisher's version if you intend to cite from this work)

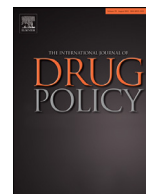
**Sumnall, H, Atkinson, AM, Anderson, M, McAuley, A and Trayner, K (2023) How to Save a Life: Public awareness of a national mass media take home naloxone campaign, and effects of exposure to campaign components on overdose knowledge and responses. International Journal of Drug Policy.**

LJMU has developed [LJMU Research Online](#) for users to access the research output of the University more effectively. Copyright © and Moral Rights for the papers on this site are retained by the individual authors and/or other copyright owners. Users may download and/or print one copy of any article(s) in LJMU Research Online to facilitate their private study or for non-commercial research. You may not engage in further distribution of the material or use it for any profit-making activities or any commercial gain.

The version presented here may differ from the published version or from the version of the record. Please see the repository URL above for details on accessing the published version and note that access may require a subscription.

For more information please contact [researchonline@ljmu.ac.uk](mailto:researchonline@ljmu.ac.uk)

<http://researchonline.ljmu.ac.uk/>



## Research Paper

# How to save a life: Public awareness of a national mass media take home naloxone campaign, and effects of exposure to campaign components on overdose knowledge and responses.



HR Sumnall<sup>a,\*</sup>, AM Atkinson<sup>a</sup>, M Anderson<sup>b,c</sup>, A McAuley<sup>d,e</sup>, KMA Trayner<sup>d,e</sup>

<sup>a</sup> Public Health Institute, Liverpool John Moores University, Liverpool, UK

<sup>b</sup> Scottish Drugs Forum, Glasgow, UK

<sup>c</sup> MRC/CSO Social & Public Health Sciences Unit, University of Glasgow, UK

<sup>d</sup> School of Health and Life Sciences, Glasgow Caledonian University, Glasgow, UK

<sup>e</sup> Health Protection Scotland, Glasgow, UK

## ARTICLE INFO

## Keywords:

Mass media campaign  
Naloxone  
Drug related deaths  
Stigma

## ABSTRACT

**Background:** Take home naloxone (THN) programmes are effective at reducing opioid related mortality, but require high levels of distribution, including to the general public. Mass media campaigns can be effective in improving public understanding of a topic and encouraging behavior change. Whilst mass media campaigns focusing on naloxone have been developed internationally, there is a lack of research on their potential impact. We investigated the effects of components of a recent national mass media campaign (Scotland, UK) designed to improve public awareness of drug related deaths, and readiness to intervene.

**Methods:** We undertook a cross-sectional online experimental study with a randomized design, conducted with a nationally representative sample. Participants (N = 1551; 52.6% female; age 46.1±16.5 years) were assessed on overdose knowledge and readiness to intervene after presentation of eight combinations of campaign components.

**Results:** Compared to a basic campaign description, exposure to all types of campaign component were associated with higher overdose knowledge ( $p < .001$ ), but not knowledge of what to do in response to an overdose ( $p = .374$ ), or readiness to intervene ( $p = .286$ ). The greatest effects were associated with a media rich audio-visual resource (animated video with a popular song on the soundtrack, and narrated by a well-known actor).

**Conclusion:** Our data suggest that harm reduction is an appropriate topic for large-scale mass media campaigns. However, effects may be limited to knowledge and awareness raising in the general public, and may be related to the types of media used. Audience segmentation is important and more general messaging about drug related deaths may be more appropriate for the majority of audiences.

## Introduction

Rates of drug related deaths in Scotland (UK) are amongst the highest in Europe, and were estimated at 22.5 per 100,000 people in 2021 (National Records of Scotland, 2022). Around 84% of deaths involved opioids, although in recent years (polysubstance) deaths involving novel benzodiazepines have also increased (26% in 2008 to 69% in 2021). Scotland's high death rate, which is 3.7 times greater than the UK, is partly explained through historic structural, population, drug market, and policy factors (McAuley et al., 2022; van Amsterdam et al., 2021).

Take home naloxone (THN) programmes are a (cost-) effective intervention that reduce opioid overdose-related mortality at the popu-

lation level (Irvine et al., 2019; McDonald & Strang, 2016). A recent Delphi survey of opioid experts in the United States ranked THN programmes and removal of prescription barriers to naloxone distribution as some of the most helpful responses to reducing opioid related harm (Hamilton et al., 2022). Modelling work has suggested that a high level of distribution (20 times the number of drug related deaths) is required to ensure that THN is available at every witnessed overdose (Bird et al., 2015). In 2011, Scotland was the first country to implement a national naloxone programme which included provision of THN on release from prison, and distribution of THN through community drug services (Bird & McAuley, 2019). Naloxone provision has subsequently been expanded to include supply from non-specialist services and distribution to those

DOI of original article: [10.1016/j.drugpo.2023.104106](https://doi.org/10.1016/j.drugpo.2023.104106)

\* Corresponding author.

E-mail address: [h.sumnall@ljmu.ac.uk](mailto:h.sumnall@ljmu.ac.uk) (H. Sumnall).

<https://doi.org/10.1016/j.drugpo.2023.104111>

professional services most likely to respond to overdose (e.g. police) (Hillen et al., 2022; Public Health Scotland, 2022). In the UK, intranasal and intramuscular naloxone have been licensed for supply without prescription to members of the public at high risk of witnessing overdose, such as friends and family members of people who use drugs (PWUD) (UK Government, 2019). Guidelines on THN recommend public supply should be accompanied by brief training which includes identification and responses to overdose, including first aid (Clark et al., 2014; EMCDDA, 2015; Razaghizad et al., 2021).

In 2021, the Scottish Government funded the *How to Save A Life* (HTSAL) mass media campaign (Trayner et al., 2022). This was a national campaign targeting the general public, utilizing diverse media (e.g. print, audio-visual, social media, advertising), and focused on the prevention of drug related deaths and promotion of THN. Primary objectives of the campaign were to improve public awareness of drug related deaths, the signs and symptoms of overdose, and recommended responses. Audiences were encouraged to sign up for training and/or order a THN kit from a community supplier. In addition to informational components, audio-visual materials prompted audiences to think of drug related deaths as affecting 'sons' and 'daughters'. We are not aware of any explicit theoretical basis to the development of HTSAL. Such framing, however, aligns with findings showing a relationship between greater familiarity and contact with an affected group with lower public stigma and increased supportive action (Corrigan & Nieweglowski, 2019; Pettigrew, 1998). The campaign ran for eight weeks between 30th August 2021 and 24th October 2021, followed by a booster campaign from 13th December 2021 to 13th January 2022. A segmented regression analysis as part of an interrupted time series design estimated that supply of THN kits significantly increased by 75% during the campaign period, primarily through community distribution (92% of kits) (Trayner et al., 2022).

Forty percent of the Scottish population report knowing someone who has experienced problems with drugs, but direct personal experience of the impact of a drug related death is low, and public stigma towards people who use drugs (PWUD) in the UK is high (Sumnall et al., 2021; The Scottish Government, 2016). Furthermore, over half of respondents in the only Scottish study to have examined the topic did not support spending any public money on harm reduction and treatment services. Despite policy support and evidence that THN is effective in reducing the risk of fatal overdose, there are still concerns about expanding provision, and misperceptions persist in both professionals groups and the public about risk compensation, 'moral hazards', and 'inevitability' of future overdose (Agle et al., 2022; Doleac & Mukherjee, 2022; McPhee & Sheridan, 2023; Winograd et al., 2020). Mass media campaigns focusing on health-related topics can be effective in changing public opinion and behavior (Stead et al., 2019). As well as promoting specific actions in target audiences, campaigns may also have secondary effects by influencing discussions and improving public understanding and interest in a topic, or to redefine or reframe a topic as a 'problem' requiring policy attention (Noar, 2006; Randolph & Viswanath, 2004; Stead et al., 2019). This can lead to advocacy for further action, and/or strengthen political commitment to a policy direction that is perceived to have public approval. Mass media approaches to drug policy issues may therefore be useful in improving public support for evidence-based programmes.

Experimental and survey research suggests that public attitudes towards PWUD and public support for drug policy actions, including distribution of naloxone, are strongly influenced by personal characteristics (e.g. education, political orientation). Attitudes can be improved by how drugs issues are framed and the choice of language used to describe them (e.g. Bachhuber et al. (2015); Bandara et al. (2020); McGinty et al. (2015); Sumnall et al. (2020)). For example, presentation of sympathetic narratives about people who had lost a family member to an overdose was shown in experimental research to increase public support for naloxone policies compared to factual information alone (Bachhuber et al., 2015). This body of research suggests

that mass media campaigns have the potential to produce population-level changes in drug-related outcomes. Most previous campaigns in the drugs field have had preventive objectives in adolescents, and in contrast to other health and social domains, have largely found to be ineffective, or have produced only small, short-term effects (Allara et al., 2015; Babor et al., 2018; Buller et al., 2019; Werb et al., 2011). Whilst there are international examples of campaigns similar to HTSAL (e.g. <https://preventoverdoseri.org/safer-drug-use-practices/>; Allen et al. (2020); Hernandez et al. (2018)), there is a lack of evaluation of programme effects, and so it is unknown whether they are effective, or if existing campaign components could be refined or optimized in accordance with intervention development frameworks (e.g. O'Cathain et al. (2019); Skivington et al. (2021)).

In this study we used an experimental design to examine the effects of presentation of HTSAL campaign components on overdose knowledge and readiness to intervene outcomes. This would not only provide useful knowledge on refinement of HTSAL, but also provide evidence for the development of other public communications designed to improve responses to drug related deaths.

We hypothesized that compared to a basic written description of campaign objectives, exposure to media components would be associated with i) greater knowledge about the signs of opioid overdose; ii) greater knowledge of actions to take in response to opioid overdose; and iii) greater self-reported readiness to intervene in an overdose situation after exposure to these materials. Based on review of mass media campaigns that suggest differences in effect between types of media channels used (Anker et al., 2016), we also hypothesized that exposure to media-rich audio-visual components (i.e. TV adverts) would be associated with higher scores than visual or auditory components alone. Finally, incorporation of framing and messaging that emphasized contact and familiarity between the target audience and those at risk of drug related death would be associated with higher scores on these outcomes.

## Methods

### Design

This was a general population anonymous online survey incorporating a cross-sectional randomized experimental design.

### Participants

Adult members of the public ( $n = 1551$ ) were recruited from a research panel provider (Qualtrics, Provo, UT, USA) between 16th February and 9th March 2022. Panel recruitment proceeded in accordance with the International Chamber of Commerce Code on Market, Opinion and Social Research and Data Analytics. The sample was recruited to be representative of the general population of males and females aged 18+ in Scotland. An *a priori* power calculation ( $G^*$ Power 3.1; Faul et al. (2007)), to detect a medium effect size ( $f = 0.25$ ; power 0.95) on the outcome of overdose knowledge change, estimated a minimum sample size of 360 was required. The two sampling criteria were assessed through demographic profiling attributes provided by participants to the panel administrators and checked through screening questions included in the online survey. To account for any under-responding in panel recruitment and attrition, we calculated survey weights (gender and age groupings based on mid-2020 population estimates (National Records of Scotland, 2021b)).

Potential 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 (<£10) managed by the panel provider based on completion time). Clicking the included link took them to an online survey hosted on the Qualtrics survey platform where full study information was provided, and consent obtained.

## Materials

For the experimental component of the survey, four HTSAL media components were presented, and participants were automatically randomized by the survey platform to receive these in one of eight combinations (see below). These components were chosen as they included both visual and audio prompts, and were the most frequently delivered materials over the campaign period (Trayner et al., 2022). Examples of the materials used in the study and links to the HTSAL campaign materials are provided in the Supplementary material.

The media components were:

1. HTSAL description - presenting a text description of the campaign: The How to Save a Life campaign raised awareness of a medicine called naloxone, and encouraged people to carry it. Naloxone is a licensed medicine that reverses the effects of overdose of opioid drugs like heroin, similar to how an Epipen might reverse an allergic reaction. Naloxone is the generic name of the drug, which is sometimes provided under the brand names Prenoxad and Nyxoid in the UK, or Narcan in the US. 'Take home' naloxone kits are distributed via various community settings including pharmacies and drug treatment services, and enable members of the public to intervene in the event of an overdose.
2. *Campaign prompt* – a reproduction of a campaign poster presenting three key campaign messages (1. Recognise the signs of an overdose; 2. Call 999 (UK emergency services number); 3. Carry Naloxone).
3. *Video* – a 40 second video that was broadcast as a TV advert and was also available online and the audio used for radio adverts. The video was an animation that was based on the three campaign messages included in the *campaign prompt* and described the signs of an opioid overdose, the importance of calling the emergency services, and the use of naloxone. This component specifically mentioned that 'Too many sons; too many daughters' died from drug related deaths in Scotland. It was narrated by a well-known contemporary Scottish actor, and included a licensed segment of a successful pop song that was chosen for the campaign because "how to save a life" was included in the song lyrics.
4. *Poster* - a 195-word campaign poster presenting further written information on the three key campaign messages listed in *campaign prompt* and was an abridged version of the transcribed *video* narration.

The eight different component combinations are listed below.

1. HTSAL description (hereafter described as the *control* condition).
2. Campaign prompt (*campaign*).
3. Video (*video*).
4. Poster (*poster*).
5. Video + poster.
6. Campaign + poster.
7. Campaign + video.
8. Campaign + video + poster.

Participants randomized to conditions 2-8 also received the HTSAL description prior to questions on naloxone later in the survey (see additional measures below).

Primary outcome measures relating to the key campaign messages were:

1. *Overdose knowledge* was assessed using an amended version of the signs of an opioid overdose sub-scale of the Opioid Overdose Knowledge Scale (OOKS-signs) (Williams et al., 2013). The original OOKS-signs includes 10 items, and respondents are asked to indicate which are signs of an opioid overdose (e.g. *slow or shallow breathing*), and which are not (e.g. *rapid heartbeat*). For this study we added an additional item (*pale skin*) as this was included as a sign in the HTSAL material. Scores ranged from 0-11 with higher scores representing greater knowledge. In the original OOKS validation study, Cron-

bach's  $\alpha = 0.83$  for the complete scale, indicating a good of internal consistency, and moderate test-retest reliability for the subscale (ICC = 0.69). In this study, Cronbach's  $\alpha = 0.65$  indicating acceptable internal consistency.

2. *Overdose actions* was assessed using the actions to be taken in an opioid overdose sub-scale of the OOKS (Williams et al., 2013). OOKS-actions includes 11 items, and respondents were asked to indicate which should be done when managing an opioid overdose (e.g. *call an ambulance*), and which should not (e.g. *put the person in bed to sleep it off*). Scores ranged from 0 to 11 with higher scores representing greater knowledge of correct actions. There was fair test-retest reliability for the subscale in the original OOKS validation study (ICC = 0.53). In this study, Cronbach's  $\alpha = 0.65$  indicating acceptable internal consistency.
3. *Readiness to intervene* was assessed using an amended version of the readiness to intervene in an opioid overdose domain of the Opioid Overdose Attitudes Scale (OOAS) (Williams et al., 2013). This assessed whether participants thought they or other people were ready to take action or should intervene in the event of witnessing an overdose (e.g. *I couldn't just watch someone overdose, I would have to do something to help; Ordinary members of the public should be prepared to deal with an overdose, even if they don't have a friend or family member who uses drugs*). The original OOAS-readiness scale includes 10 items, and respondents are asked to indicate level of agreement on a Likert scale (1 Completely disagree to Completely agree 5, some items were reverse scored). For this study we added an additional item (*Ordinary members of the public should be prepared to deal with an overdose, even if they don't have a friend or family member who uses drugs*) as the original scale only referred to intervention by family and friends, whilst the HTSAL campaign encouraged anyone who witnesses an overdose to intervene, and naloxone is available to members of the public in Scotland who may not necessarily be at higher risk of witnessing overdose. Scores ranged from 11 to 55 with higher total scores representing greater readiness to intervene in an overdose. In the original OOAS validation study, Cronbach's  $\alpha = 0.90$  for the complete scale, indicating a good internal consistency, and acceptable test-retest reliability for the subscale (ICC = 0.65). In this study, Cronbach's  $\alpha = 0.86$  indicating good internal consistency.

## Other measures

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

To assess spontaneous campaign recall, participants were presented with the main HTSAL logo (which did not include the campaign name) and asked to provide a free text response about what they thought the campaign was about. They were then asked to select the correct option from seven closed-response examples of campaign objectives to assess prompted recall (e.g. *How to stop COVID-19 deaths; How to stop deaths from knife attacks; How to stop deaths from drug overdose*).

Extracts from eight HTSAL campaign materials or activities were presented. These items were presented prior to the experimental component of the survey and were edited to ensure that they did not include campaign information to reduce bias through pre-exposure. These included the TV and radio messages; screenshots of the social media hashtag (#stopthedeaths) and Stop the Deaths website; examples of outdoor media including billboards and electronic posters; a picture of a taxi with HTSAL branding; and an example of a national news report prompted by the campaign. Participants were asked about primary or secondary exposure (i.e. they had personally seen/read/heard the material; or had heard about it from another source). Participants were then asked what, if anything, they had done in response to exposure to the campaign before participating in the study (options included visiting the campaign

website; having a conversation about drug deaths in Scotland; signing up for naloxone training; sharing material on social media).

The survey also included several other measures. These are described here for completeness of reporting (and data are included in Table 1), but were not part of the main analysis.

Support for harm reduction policies was assessed using items developed by Bachhuber and colleagues in an evaluation of messages designed to increase public support for naloxone policies in the United States (Bachhuber et al., 2015). This comprised seven items scored on a Likert scale (1 Strongly oppose to 7 Strongly support) with higher total scores representing greater support for harm reduction policies. Some wording was changed for cultural adaptation. Example items included: *Increased government spending to increase distribution of naloxone to members of the public, including people who use drugs, their families and friends, and other people who might witness an overdose; Providing naloxone to members of the public, including friends and family members of people who use opioid drugs like heroin; Increased government spending on activities that reduce the harms related to drug use, without requiring people to stop using drugs (e.g. needle and syringe exchange services)*. In this study, Cronbach's  $\alpha = 0.92$ , indicating a high level of internal consistency.

Beliefs about naloxone were also derived from Bachhuber and colleagues (2015) and included seven items scored on a Likert scale (1 Strongly oppose to 7 Strongly support) with higher total scores representing greater support for naloxone policies. Some wording was changed for cultural adaptation, and example items included: *Giving out take-home naloxone to members of the public, including friends and family members of people who use drugs would lead to reduced costs to the NHS by reducing A&E visits and hospital admissions; Preventing overdoses is ineffective because people with opioid addiction will continue to use and eventually overdose again; Providing take-home naloxone to friends and family members of people who use opioid drugs like heroin would save lives*. In this study, Cronbach's  $\alpha = 0.80$ , indicating an acceptable level of internal consistency.

Attitudes towards people who use drugs included 18 questions utilized in a 2016 Scottish Government survey of public attitudes towards people with drug dependence, originally adapted from the UK Department of Health's Attitudes to Mental Illness survey (Singleton, 2010), and utilized 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 demonized 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 utilized. Higher total scores represented more negative attitudes. In the present study, Cronbach's  $\alpha = 0.85$ , indicating a good level of internal consistency.

Level of familiarity with people who have substance use problems was assessed using a Level of Familiarity (LOF) scale (Wild et al., 2021). The scale includes 11 dichotomous items ranging from no familiarity (e.g., *I have never observed a person that I was aware had a substance use problem* (LOF score = 1)) to maximum familiarity (e.g., *I have a substance use problem* (LOF score = 11)). Respondents indicated whether each of the statements were true or false for them, and a score was assigned (from 1 to 11) based on respondents' highest level of familiarity. Higher scores represent higher level of familiarity ( $\alpha = 0.74$ ). Respondents who endorsed the item 'none of the above' were recoded as missing. In this study, Cronbach's  $\alpha = 0.75$ , indicating acceptable internal consistency.

Additional questions included naloxone knowledge, which assessed whether participants thought that it reversed the effects of opioids,

amphetamine, cocaine or any drug overdose (answered *True* or *False*); whether respondents carried naloxone (*Yes; No; No, but have in the past*); and whether they had ever received training on how to use naloxone (*Yes; Yes, but more than 12 months ago; No*). Respondents were asked if they had ever witnessed a drugs overdose (*Yes, in the last 12 months; Yes, in lifetime; No*), and to provide a brief substance use history (lifetime and last year use of a number of substances).

### Procedure

An internal pilot ( $n = 150$ ) prior to full panel survey recruitment was used to ascertain completion rates (100%), completion time (median 15 min), and unusual data response patterns (e.g. missing responses to the primary outcome assessments). No subsequent amendment of study materials was required. Median completion time was used as a survey-attention indicator. Participants who completed the survey in less than 7.5 min (one half of the median time), indicating possible lack of attention, were automatically excluded from the full study ( $n = 0$ ).

After reading the study information and providing consent, participants first completed demographic questions. They then completed the evaluation of campaign awareness. Participants were then randomized to receive one of the eight campaign conditions described above. After presentation of the condition, 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 then completed the other measures.

The research was approved by Liverpool John Moores University Research Ethics Committee (22/PHI/001).

### Statistical analysis

Participant characteristics and scale scores were analyzed using descriptive statistics (population weighted estimates are presented) (Table 1). There were no between group differences. Primary outcomes were non-normally distributed, and so analyses were undertaken using Kruskal-Wallis H tests with Bonferroni correction for multiple comparisons. The dependent variables of interest for the experimental component were i) overdose knowledge; ii) overdose actions; and iii) readiness to intervene, with campaign condition as the independent variable. As randomization was judged to be successful, no covariates were included in the model.

Alpha was set at 0.05, and all analyses were undertaken with SPSS v 28.0 (IBM Corp, 2021).

## Results

### Sample and randomization

To assess representativeness, we examined socio-demographic characteristics (age group, gender, ethnicity, economic activity) of survey participants using the un-weighted and weighted responses in comparison to national estimates (Supplementary Table S1) (National Records of Scotland, 2021b; Scottish Government, 2021, 2022). There was overrepresentation of participants with a university degree or higher (+17.2%) and an underrepresentation of those who were economically active (-4.4%).

Sample demographic and other descriptive data are presented by randomized condition in Table 1. Randomization to condition was judged to be successful, although there was a significant lower proportion of participants than expected in employment ( $p < 0.05$ ) in the *Campaign + Poster* and *Campaign + Video* groups.

### HTSAL campaign exposure and responses

Estimates of primary and secondary exposure to different campaign materials prior to study participation are presented in Table 2. Overall, 30.5% (95% CI 28.2–32.9) spontaneously recalled HTSAL (validated

**Table 1**  
Sample characteristics (unweighted data).

	HTSAL description (n= 194)	Campaign prompt (n= 200)	Video (n= 193)	Poster (n= 190)	Video + Poster (n = 198)	Campaign + Poster (n = 189)	Campaign + Video (n = 195)	Campaign + Video + Poster (n = 192)	Differences between groups? (p value)	Total (N = 1551)
Age	45.1 ± 17.0	47.0 ± 17.3	45.8 ± 15.6	45.8 ± 16.5	45.4 ± 15.5	46.6 ± 16.8	47.1 ± 17.0	45.7 ± 16.5	$F_{7,1550} = .59 (.917)$	46.1 ± 16.5
Female (%)	108 (55.7)	97 (48.5)	106 (54.9)	103 (54.2)	110 (55.6)	103 (54.5)	94 (48.2)	95 (49.5)	$\chi^2_7 = 5.92 (.549)$	816 (52.6)
Degree or above (%)	83 (42.6)	83 (41.5)	82 (42.5)	100 (52.6)	83 (41.9)	71 (37.6)	83 (42.6)	86 (44.8)	$\chi^2_7 = 9.97 (.190)$	671 (43.3)
White/White British (%)	185 (95.4)	195 (97.5)	186 (96.4)	183 (96.3)	188 (94.9)	180 (95.2)	188 (96.4)	181 (94.3)	$\chi^2_7 = 4.49 (.722)$	1486 (95.8)
Employment (%)	120 (61.9)	123 (61.5)	135 (69.9)	127 (66.8)	134 (67.7)	108 (57.1)	106 (54.4)	126 (65.6)	$\chi^2_7 = 16.97 (.018)^*$	979 (63.1)
Voting preference (%)										
<i>Left wing</i>	133 (68.6)	130 (65.0)	130 (67.4)	131 (68.9)	126 (63.6)	126 (66.7)	117 (60)	118 (61.5)	$\chi^2_7 = 6.44 (.490)$	1011 (65.2)
<i>Centre</i>	8 (4.1)	11 (5.5)	19 (9.8)	9 (4.7)	6 (3.0)	10 (5.3)	15 (7.7)	13 (6.8)	$\chi^2_7 = 11.54 (.117)$	91 (5.9)
<i>Right wing</i>	24 (12.4)	30 (15.0)	22 (11.4)	25 (13.2)	28 (14.1)	23 (12.2)	34 (17.4)	30 (15.6)	$\chi^2_7 = 4.67 (.701)$	216 (13.9)
Spontaneous recall of HTSAL (%)	47 (24.2)	66 (33.0)	58 (30.1)	55 (28.9)	53 (26.8)	56 (29.6)	66 (33.8)	58 (30.2)	$\chi^2_7 = 6.34 (.501)$	459 (29.6)
Prompted recall of HTSAL theme (%)	104 (53.6)	119 (59.5)	115 (59.6)	114 (60.0)	114 (57.6)	103 (54.5)	123 (63.1)	113 (58.9)	$\chi^2_7 = 5.25 (.629)$	905 (58.3)
Naloxone awareness (% correct)	69 (35.6)	79 (39.5)	80 (41.5)	60 (31.6)	57 (28.8)	63 (33.3)	74 (37.9)	67 (34.9)	$\chi^2_7 = 10.49 (.162)$	549 (35.4)
Currently carry naloxone (%)	2 (1.0)	4 (2.0)	3 (1.6)	4 (2.1)	7 (3.5)	3 (1.6)	3 (1.5)	4 (2.1)	$\chi^2_7 = 4.00 (.780)$	30 (1.9)
Naloxone training (%)	11 (5.7)	12 (6.0)	18 (9.3)	16 (8.4)	22 (11.1)	13 (6.9)	15 (7.7)	21 (10.9)	$\chi^2_7 = 7.87 (.344)$	128 (8.3)
Witnessed a drugs overdose (%)	29 (14.9)	34 (17.0)	33 (17.1)	39 (20.5)	42 (21.2)	29 (15.3)	35 (17.9)	29 (15.1)	$\chi^2_7 = 5.439 (.607)$	270 (17.4)
Overdose knowledge score	6.6 ± 1.40	6.8 ± 1.5	7.5 ± 1.6	8.9 ± 1.9	7.8 ± 1.8	4.5 ± 1.8	7.6 ± 1.6	7.7 ± 1.7	$F_{7,1550} = 15.13^{***}$	7.4 ± 1.7
Actions in response to overdose score	9.8 ± 1.1	9.6 ± 1.4	9.8 ± 1.1	9.7 ± 1.1	9.5 ± 1.4	9.8 ± 1.2	9.8 ± 1.2	9.7 ± 1.3	$F_{7,1550} = 1.16 (.322)$	9.7 ± 1.2
Readiness to intervene in an opioid overdose	41.6 ± 7.1	41.7 ± 7.6	43.1 ± 6.6	42.5 ± 6.6	43.1 ± 7.2	42.8 ± 6.3	42.1 ± 7.0	42.2 ± 7.3	$F_{7,1550} = 1.37 (.216)$	42.4 ± 7.0
Harm reduction policy support score	36.1 ± 10.2	35.0 ± 11.7	37.7 ± 9.8	36.0 ± 9.8	37.7 ± 9.8	37.3 ± 9.2	36.9 ± 9.2	36.0 ± 10.2	$F_{7,1550} = 1.80 (.084)$	36.6 ± 10.1
Beliefs about naloxone score	31.3 ± 8.2	31.2 ± 8.3	33.5 ± 7.6	32.1 ± 7.6	33.0 ± 8.0	32.6 ± 7.8	32.1 ± 7.7	31.8 ± 8.4	$F_{7,1550} = 1.85 (.075)$	32.2 ± 8.0
Lifetime use of drugs (%)										
<i>Amphetamines</i>	29 (14.9)	29 (14.5)	37 (19.2)	26 (13.7)	38 (19.2)	39 (20.6)	32 (16.4)	40 (20.8)	$\chi^2_7 = 7.75 (.355)$	270 (17.4)
<i>Alcohol</i>	175 (90.2)	178 (89.0)	171 (88.6)	178 (93.7)	178 (89.9)	177 (93.7)	177 (90.8)	176 (91.7)	$\chi^2_7 = 6.11 (.527)$	1410 (90.9)
<i>Benzodiazepines (non-medical use)</i>	28 (14.4)	33 (16.5)	45 (23.3)	23 (12.1)	41 (20.7)	27 (13.8)	27 (13.8)	36 (19.8)	$\chi^2_7 = 13.70 (.055)$	269 (17.3)
<i>Cannabis</i>	79 (40.7)	72 (36.0)	84 (43.5)	73 (38.4)	84 (42.4)	84 (44.4)	84 (43.1)	82 (42.7)	$\chi^2_7 = 4.66 (.701)$	642 (41.4)
<i>Powdered cocaine</i>	36 (18.6)	35 (17.5)	43 (22.3)	33 (17.4)	39 (19.7)	40 (21.2)	38 (19.5)	45 (23.4)	$\chi^2_7 = 4.11 (.767)$	309 (19.9)
<i>Crack cocaine</i>	8 (4.1)	8 (4.0)	4 (2.1)	1 (1.1)	10 (5.1)	10 (5.3)	6 (3.1)	11 (5.7)	$\chi^2_7 = 9.80 (.200)$	59 (3.8)
<i>MDMA/Ecstasy</i>	28 (14.4)	31 (15.5)	32 (16.6)	30 (15.8)	40 (20.2)	42 (22.2)	33 (16.9)	43 (22.4)	$\chi^2_7 = 9.02 (.251)$	279 (18.0)
<i>Heroin/methadone</i>	7 (3.6)	10 (5.0)	5 (2.6)	4 (2.1)	12 (6.1)	10 (5.3)	8 (4.1)	14 (7.3)	$\chi^2_7 = 9.57 (.214)$	70 (4.5)
<i>Pharmaceuticals (non-prescribed use)</i>	44 (22.7)	49 (24.5)	45 (23.3)	44 (23.2)	51 (25.8)	43 (22.8)	40 (20.5)	52 (27.1)	$\chi^2_7 = 3.09 (.876)$	368 (23.7)
Attitudes to PWUD	52.5 ± 12.4	53.6 ± 13.0	51.8 ± 11.6	51.8 ± 12.8	52.5 ± 12.9	51.9 ± 11.4	52.6 ± 11.6	53.6 ± 13.2	$F_{7,1550} = .67 (.701)$	52.6 ± 12.4
Level of familiarity with PWUD	6.0 ± 2.9	5.9 ± 2.6	6.1 ± 2.6	6.3 ± 2.8	6.4 ± 2.6	6.1 ± 2.7	6.0 ± 2.7	6.6 ± 2.9	$F_{7,1550} = 1.40 (.185)$	6.2 ± 2.8

Note. \*  $p < 0.05$ , \*\*\*  $p < 0.001$ . HTSAL, How To Save A Life campaign; PWUD, people who use drugs

**Table 2**  
Primary (direct exposure) and secondary (vicarious exposure) campaign exposure.

Media	Primary (%)	Secondary (%)	No exposure or awareness (%)
Overall campaign	679 (43.8) [44.7; 42.2–47.3]	262 (16.9) [16.5; 14.7–18.4]	610 (39.3) [38.8; 36.4–41.3]
TV ad	593 (38.2) [38.2; 35.7–40.7]	170 (11.0) [10.5; 9.0–12.1]	788 (50.8) [65.0; 62.5–67.4]
Social media	363 (23.4) [22.6; 20.6–24.8]	196 (12.6) [12.3; 10.8–14.1]	992 (64.0) [65.0; 62.6–67.4]
Stop the Deaths Website	91 (5.9) [5.5; 4.4–6.7]	295 (19.0) [32.3; 30.0–34.7]	1165 (75.1) [76.4; 74.2–78.4]
Radio	519 (33.5) [32.3; 30.0–34.7]	129 (8.3) [8.1; 6.8–9.6]	903 (58.2) [59.6; 57.1–62.0]
Outdoor media	389 (25.1) [24.5; 22.4–26.7]	147 (9.5) [9.1; 7.7–10.5]	1015 (65.4) [66.5; 64.0–68.8]
Branded Taxi	104 (6.7) [61.4; 5.1–7.4]	111 (7.2) [6.9; 5.7–8.3]	1336 (86.1) [87.0; 85.2–88.5]
News reports about HTSAL	312 (20.1) [19.8; 17.9–21.9]	167 (10.8) [10.4; 9.0–12.0]	1072 (69.1) [69.8; 67.4–72.0]

Note. Shown are sample n and [weighted estimates; 95% CI]. N = 1551.

through cross referencing with a correct answer to the question on campaign objectives), and after prompting, 44.7% (42.2–47.3) recalled seeing materials, whilst a further 16.5% (14.7–18.4) had not seen materials directly but were aware of the campaign. Almost six out of ten (59.4%; 56.9–61.9) correctly identified that HTSAL targeted prevention of drug related deaths. The most frequently seen component was the TV advert.

Campaign engagement activities are shown in Table 3. The most frequent responses were to have a conversation about drug related deaths in Scotland (13.7%; 12.1–15.6), or naloxone (7.1%; 5.9–8.5). Levels of social media engagement were relatively low, and less than 5% reported actions including posting, ‘liking’, or sharing material on topics related to the campaign. Less than 1% signed up for training (0.9%; 0.5–1.5) or ordered (0.6%; 0.3–1.1) naloxone. We found higher odds that those who had ever witnessed an overdose reported undertaking most of the listed actions. Exceptions were for posting material on social media about how to prevent overdose, ordering supplies of naloxone, or undertaking further independent research. For those reporting a lifetime use of a controlled drug, there were similarly higher odds.

#### Experimental component

There was a significant effect of condition on overdose knowledge ( $H_7 = 101.87$ ;  $p < .001$ ) (see Table 1 for scores). Post hoc comparison showed that knowledge was greater in all conditions compared to control (all  $p < .001$ ). Comparing between other conditions, exposure to the campaign prompt was associated with lower knowledge scores than all other conditions ( $p = .06$  for video and campaign+poster;  $p < .001$  for other comparisons); and the video prompt with higher scores than the poster ( $p = .033$ ) or video+poster ( $p = .027$ ).

There were no condition effects on overdose actions ( $H_7 = 7.547$ ;  $p = .374$ ) or readiness to intervene ( $H_7 = 8.558$ ;  $p = .286$ ) scores.

#### Discussion

We undertook a study using a nationally representative sample to investigate public awareness of a mass media campaign that aimed to improve public understanding of drug related deaths in Scotland, the signs and symptoms of overdose, and recommended responses. We examined

whether exposure to campaign components were associated with improvements in key outcomes targeted by the campaign in an experimental design.

Around 31% of respondents reported being aware of the campaign without receiving specific prompts, which rose to 61% after prompting, either through seeing campaign material directly or hearing about it indirectly through the media or other people. Exposure to mass media campaigns is generally passive and incidental to routine media use (e.g., TV and radio) or as part of environment interaction (e.g., outdoor media) (Wakefield et al., 2010). Recall is affected by factors such as campaign budget, longevity and intensity of activity, who is targeted, and competing media messages (e.g. advertising and marketing of health harming products such as alcohol or sugary drinks), and so comparisons between different types of campaign can be difficult (Wakefield et al., 2010). Although there are no other (international) evaluated naloxone or drug policy campaigns we can draw direct comparison to, unprompted recall of HTSAL compares well to other more traditional health and social behavior campaigns that have been assessed as having good target audience reach. For example, an evaluation of the UK Government’s FRANK drugs education mass media campaign estimated that based on the likely audience profile of purchased advertising slots, 74% of the intended target audience (young people aged 15–21) was reached through TV, radio, and digital platforms (HM Government, 2015). Prompted adult general population recognition of a campaign raising awareness of the links between alcohol and cancer was around 67% in Australia and 50% in Denmark (Christensen et al., 2019; Dixon et al., 2015). An evaluation of a four week national television campaign promoting physical exercise in Scottish adults estimated that around 70% of the population were aware of it during the broadcast period and 54% after it had ended (Wimbush et al., 1998).

Despite there being a high level of awareness of the HTSAL campaign, almost three quarters of respondents reported doing nothing in follow up. Of the activities endorsed, the most frequently reported was having a conversation about drug related deaths in Scotland (14%), followed by discussion of the campaign itself (8%), overdose prevention (7%), or naloxone (7%). Conversations and discussions may be mediators of distal changes including knowledge, attitudes and self-efficacy beliefs (McGuire, 1984). When aligned with campaign objectives they may help to disseminate messages to those that weren’t reached by the original campaign, and help to shape norms and advocacy within social networks that might lead to further action beyond the lifespan of a campaign (Abroms & Maibach, 2008; Stead et al., 2019; Wakefield et al., 2010). As we did not assess the nature of these conversations, these may have included ‘negative’ conversations, including inaccurate information or stigmatizing or pejorative content, undermining campaign objectives. However, analysis of popular media reporting and social media comments on HTSAL suggested that public negative responses were in the minority (Trayner et al., 2022).

Less than 1% signed up for naloxone training or ordered naloxone. Despite drug related deaths being at historically high levels in Scotland, and with high levels of media attention (Atkinson et al., 2019; Nicholls et al., 2022), respondents may not have personal familiarity with the issue or the topic may not be personally salient, leading to lower motivation to take follow-up action (Corrigan et al., 2001; Kennedy-Hendricks et al., 2017; Rusch et al., 2012; Sattler et al., 2017). The total number of drug deaths in Scotland (1,339 in 2020; 25.2 per 100,000 people) is lower than more familiar forms of substance-related mortality (e.g. approximately 10,000 annual smoking deaths; 300 per 100,000 people) (National Records of Scotland, 2021a). Level of Familiarity scores suggest that around half of our participants were only familiar with people who experience problems with drugs through representation in media or perceived public encounters, indicating low familiarity. In previous research conducted in the Scottish population, 60% of respondents had no experience of drug-related problems in relation to themselves or others (typically ‘an acquaintance’ or friend where this was endorsed) (The Scottish Government, 2016). However, in our

**Table 3**  
Activities undertaken in response to the campaign.

Activity	% sample reporting (95% CI)	Witnessing overdose OR (95% CI)	Reporting a lifetime use of controlled substance OR (95% CI)
No prior awareness of campaign	38.8; 35.7–40.6	0.55 (0.41–0.74)	0.67 (0.54–.83)
Heard about HTSAL but did nothing	33.8; 31.4–36.3	0.71 (0.52–0.95)	0.97 (0.78–0.20)
Explored the Stop the Deaths Website	3.9 3.0–4.9	2.78 (1.62–4.77)	2.10 (1.20–3.57)
Had a conversation about HTSAL	8.2; 6.9–9.6	1.77 (1.16–2.70)	1.89 (1.28–2.78)
Had a conversation about drug related deaths in Scotland	13.7; 12.1–15.6	2.17 (1.55–3.05)	1.57 (1.17–2.14)
Had a conversation about how to prevent overdoses	6.6; 5.4–7.9	4.00 (2.62–6.11)	1.82 (1.12–2.81)
Liked or shared material on social media about the How to Save a Life campaign	3.8; 3.0–4.8	3.91 (2.34–6.54)	3.00 (1.65–5.39)
Liked or shared material on social media about drug deaths in Scotland	4.1; 3.2–5.2	2.75 (1.63–4.64)	2.45 (1.41–4.23)
Liked or shared material on social media about how to prevent overdoses	3.4; 2.6–4.4	4.09 (2.35–7.12)	2.03 (1.13–3.67)
Posted material or commented on social media about the How to Save a Life campaign	0.9; 0.5–1.5	3.65 (1.34–9.95)	13.13 (12.73–15.99)
Posted material or commented on social media about drug deaths in Scotland	1.1; 0.7–1.7	5.54 (2.08–14.77)	2.40 (0.76–7.72)
Posted material or commented on social media about how to prevent overdoses	0.8; 0.4–1.3	2.06 (0.62–6.82)	2.67 (0.71–10.10)
Had a conversation about the naloxone	7.1; 5.9–8.5	3.10 (2.03–4.72)	1.99 (1.29–3.05)
Signed up for naloxone training course	0.9; 0.5–1.5	8.33 (2.91–23.84)	3.57 (0.75–16.84)
Ordered naloxone website or through a local drugs service	0.6; 0.3–1.1	2.40 (0.61–9.52)	1.03 (0.61–7.76)
Did my own further independent research about drugs, drug deaths, and/or overdoses	3.6; 2.8–4.7	1.24 (0.64–2.40)	1.03 (0.61–1.76)

Note. Shown are weighted estimates; 95% CI) and odds ratios of activity comparing those who i) had ever witnessed an overdose (16.8%; 15.1–18.8) and ii) reported lifetime use of any controlled substance, to those who hadn't. Respondents could report more than one action.

survey, participants who reported ever witnessing an overdose (17%) were significantly more likely to report having undertaken most of the presented actions, suggesting previous experiences influenced campaign response. Furthermore, the analysis of trends in naloxone distribution reported in Trayner et al (2022) suggested that although there was a statistically significant trend in the increase of naloxone distribution to the public over the campaign period, the total number of kits provided through community supply was 2512. Assuming that this was to members of the public who perceived themselves to be at most risk of encountering overdose (e.g., family members and friends, those living and working in urban centers), then the small percentage of respondents who reported signing up for training or ordering THN is put into perspective.

The findings from the experimental component of the survey suggested that a single exposure to any of the campaign materials included in the experiment was associated with increased knowledge of overdose compared to just receiving a description of HTSAL. We assessed this immediately after exposure to materials, and so whilst we can conclude that they increase knowledge, we cannot predict whether this would be retained in the long term, or considering other experimental findings, applied in responses to overdose. Examining the different combinations of material, the video had a larger effect compared to written material, but providing written information alongside the video, or multiple forms of written information did not seem to be associated with better knowledge. Videos (and other highly visual materials) provide a creative and potentially more engaging way to capture attention and provide information than other types of media and are easily shared on social media platforms (Stanczyk et al., 2014). The use of a professionally produced animation narrated by a well-known actor, and a popular soundtrack clip that reinforced the main campaign message may have meant that participants retained the presented information better (Anker et al., 2016; Noar, 2006). Whilst the campaign poster was professionally designed, and presented the same information as the video, the written format may have been less appealing, and required increased cognitive effort to process (Guimarães et al., 2000). As both the video and poster included familiarity prompts (i.e. “Too many sons, too many daughters” die from drug overdose) design features may be more important in improving knowledge. Whilst the campaign prompt was also professionally designed, it only included three overarching campaign messages, hence was associated with lower knowledge scores, although exposure was still associated with higher knowledge scores than the control condition.

In contrast, whilst knowledge about overdose was higher, there were no differences between groups with respect to knowing what to do in

response to an overdose, or if they would be prepared to intervene. Scores for these two outcomes were similar across campaign components, and when compared to the control description of HTSAL. These findings may relate to the content of the campaign materials presented, and/or the questionnaires used to assess these outcomes. Across all HTSAL resources, response messages were limited to calling the emergency services (“Call 999”) and carrying naloxone. From a practical perspective, the first of these would be a well-known and common response to any medical emergency, whilst the second would require audiences to register for training and order naloxone (for those who do not already have access). With respect to our assessment of outcomes, the overdose actions scale included 11 items, and only two of these (*call an ambulance*; *give naloxone*; and potentially *stay with the person until an ambulance arrives*) directly related to campaign messages. Many of the other items were common first-aid actions (e.g. *give mouth to mouth resuscitation*, *check for breathing*). Mean scores across groups were high, and so this scale may not have been sensitive enough to distinguish between exposure effects and general first aid knowledge in a cross-sectional design. The *readiness to intervene* scale also produced high scores across all groups. Whilst this suggests that participants may be prepared to act if witnessing an overdose, qualitative research with public bystanders, including those who have received naloxone/overdose training, suggest that prior intentions to intervene do not always correspond with appropriate actions (Frisher et al., 2012; Grella et al., 2021; Miller et al., 2022; Rome et al., 2008). Readiness to act may be affected by individual factors including negative attitudes towards people who have overdosed, and concerns about the (violent) behavior of resuscitated people, incomplete skills (and lack of confidence to apply them), attribution of blame and refusal to intervene, as well as situational factors such as presence of others, bystander hesitancy effects, the (potential) attendance of law enforcement, and perceptions of unhygienic/unpleasant environment or people.

It is important to acknowledge limitations of our study and potential implications for interpretation. We recruited a large representative sample by age and gender, but the distribution was skewed towards those who more educated, and who supported left wing political parties. These differences have also been observed in samples drawn from other commercial online survey panels (Levay et al., 2016), including those assessing harm reduction support (Agle et al., 2022). Although groups in the experimental component of the study were balanced on these characteristics, these factors have been previously show to predict greater public support for drug and harm reduction policies in some North American studies (Kulesza et al., 2015; McGinty et al., 2018; Sylvester et al., 2022).



We utilized a cross-sectional experimental design to assess the effects of campaign components, hence we do not try to draw any conclusions about the impact of delivery of the national HTSAL campaign on changes in public understanding and attitudes. Ideally, evaluation would be embedded in a prospective cohort or repeated cross-sectional design to allow for assessment of the effects of frequency and intensity of campaign exposure on outcomes (Noar, 2006; Stead et al., 2019). Furthermore, our assessment of a single presentation of a campaign component does not reflect natural audience exposure. Mass media campaigns like HTSAL utilize sustained, diverse, and complementary communication strategies with the objective of ensuring multiple audience exposures, and these compete with existing and sometimes counteracting news and entertainment narratives (Harrington et al., 2015). Nevertheless, we were still able to assess the potential effects of exposure to components of HTSAL, and our data will be useful in refining future iterations, or in the design of similar campaigns elsewhere.

In conclusion, our findings suggest that well-funded, nationally implemented multi-platform mass media campaigns focusing on drug policy and harm reduction can achieve high audience recall. Although posters and written communications may be useful, campaigns should include short mixed-media components that reinforce the central message and these can be easily shared on social media. However, our findings also suggest that whilst components may lead to improvements in public understanding of campaign topics, this may not necessarily lead to action and behavior change. Although the effectiveness of mass media campaigns in driving behavior change is generally mixed, improvements in awareness, understanding and attitudes towards public health and social issues is still valuable (Abrams & Maibach, 2008; Noar et al., 2010; Randolph & Viswanath, 2004; Stead et al., 2019). Audience segmentation, message tailoring, and message mapping is a common feature of campaign and communication design (Covello, 2006; Noar et al., 2010). For drug related deaths (or related drug policy) campaigns, specific messaging could target relatively small higher-risk audience segments; including people who use drugs, their friends and family members, and those working in relevant services or localities. Complementary messages designed to raise awareness of the topic and to foster support for policy and people who use drugs would target the majority.

### Ethics approval

The authors declare that they have obtained ethics approval from an appropriately constituted ethics committee/institutional review board where the research entailed animal or human participation.

Liverpool John Moores University. Registration number: 22/PHI/001.

### Funding sources

This research received funding from the following sources

This research was funded by the Scottish Government through a campaign grant awarded to the Scottish Drugs Forum. The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. MA was employed by the Scottish Drugs Forum at the time of this work, but was not involved in the delivery of the HTSAL campaign.

### Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

### CRedit authorship contribution statement

**HR Sumnall:** Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review &

editing. **AM Atkinson:** Methodology, Writing – review & editing. **M Anderson:** Methodology, Writing – review & editing. **A McAuley:** Conceptualization, Methodology, Writing – review & editing, Funding acquisition. **KMA Trayner:** Methodology, Writing – review & editing, Funding acquisition.

### Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:[10.1016/j.drugpo.2023.104111](https://doi.org/10.1016/j.drugpo.2023.104111).

### References

- Abrams, L. C., & Maibach, E. W. (2008). The effectiveness of mass communication to change public behavior. *Annual Review of Public Health*, 29, 219–234. [10.1146/annurev.publhealth.29.020907.090824](https://doi.org/10.1146/annurev.publhealth.29.020907.090824).
- Agley, J., Xiao, Y., Eldridge, L., Meyerson, B., & Golzarri-Arroyo, L. (2022). Beliefs and misperceptions about naloxone and overdose among U.S. laypersons: A cross-sectional study. *BMC Public Health*, 22(1), 924. [10.1186/s12889-022-13298-3](https://doi.org/10.1186/s12889-022-13298-3).
- Allara, E., Ferri, M., Bo, A., Gasparrini, A., & Faggiano, F. (2015). Are mass-media campaigns effective in preventing drug use? A Cochrane systematic review and meta-analysis. *BMJ Open*, 5(9), Article e007449. [10.1136/bmjopen-2014-007449](https://doi.org/10.1136/bmjopen-2014-007449).
- Allen, B., Sisson, L., Dolatshahi, J., Blachman-Forshey, J., Hurley, A., & Paone, D. (2020). Delivering opioid overdose prevention in bars and nightclubs: A public awareness pilot in New York city. *The Journal of Public Health Management & Practice*, 26(3), 232–235. [10.1097/phh.0000000000001014](https://doi.org/10.1097/phh.0000000000001014).
- Anker, A. E., Feeley, T. H., McCracken, B., & Lagoe, C. A. (2016). Measuring the effectiveness of mass-mediated health campaigns through meta-analysis. *Journal of Health Communication*, 21(4), 439–456. [10.1080/10810730.2015.1095820](https://doi.org/10.1080/10810730.2015.1095820).
- Atkinson, A. M., McAuley, A., Trayner, K., & Sumnall, H. R. (2019). We are still obsessed by this idea of abstinence: A critical analysis of UK news media representations of proposals to introduce Drug Consumption Rooms in Glasgow, UK. *International Journal of Drug Policy*, 68, 62–74.
- Babor, T. F., Caulkins, J. P., Fischer, B., Foxcroft, D. R., Humphreys, K., Medina, M. E., Obot, I. S., Rehm, J., Reuter, P., Room, R., Rossow, I., & Strang, J. (2018). *Drug policy and the public good* (2nd ed.). Oxford University Press.
- Bachhuber, M. A., McGinty, E. E., Kennedy-Hendricks, A., Niederdeppe, J., & Barry, C. L. (2015). Messaging to Increase public support for naloxone distribution policies in the United States: Results from a randomized survey experiment. *PLoS One*, 10(7), Article e0130050. [10.1371/journal.pone.0130050](https://doi.org/10.1371/journal.pone.0130050).
- Bandara, S. N., McGinty, E. E., & Barry, C. L. (2020). Message framing to reduce stigma and increase support for policies to improve the wellbeing of people with prior drug convictions. *The International Journal of Drug Policy*, 76, Article 102643. [10.1016/j.drugpo.2019.102643](https://doi.org/10.1016/j.drugpo.2019.102643).
- Bird, S. M., & McAuley, A. (2019). Scotland's national naloxone programme. *The Lancet*, 393(10169), 316–318. [10.1016/S0140-6736\(18\)33065-4](https://doi.org/10.1016/S0140-6736(18)33065-4).
- Bird, S. M., Parmar, M. K., & Strang, J. (2015). Take-home naloxone to prevent fatalities from opiate-overdose: Protocol for Scotland's public health policy evaluation, and a new measure to assess impact. *Drugs (Abingdon Engl)*, 22(1), 66–76. [10.3109/09687637.2014.981509](https://doi.org/10.3109/09687637.2014.981509).
- Buller, D., Walkosz, B., & Woodall, G. (2019). Use of media and social media in the prevention of substance use. In Z. Sloboda, H. Petras, E. Robertson, & R. Hingson (Eds.), *Prevention of Substance Use* (pp. 319–334). Springer. [10.1007/978-3-030-00627-3\\_20](https://doi.org/10.1007/978-3-030-00627-3_20).
- Christensen, A. S. P., Meyer, M. K. H., Dalum, P., & Krarup, A. F. (2019). Can a mass media campaign raise awareness of alcohol as a risk factor for cancer and public support for alcohol related policies? *Preventive Medicine*, 126, Article 105722. [10.1016/j.ypmed.2019.05.010](https://doi.org/10.1016/j.ypmed.2019.05.010).
- Clark, A. K., Wilder, C. M., & Winstanley, E. L. (2014). A systematic review of community opioid overdose prevention and naloxone distribution programs [Review]. *Journal of Addiction Medicine*, 8(3), 153–163. [10.1097/ADM.0000000000000034](https://doi.org/10.1097/ADM.0000000000000034).
- Corrigan, P. W., Edwards, A. B., Green, A., Diwan, S. L., & Penn, D. L. (2001). Prejudice, social distance, and familiarity with mental illness. *Schizophrenia Bulletin*, 27(2), 219–225. [10.1093/oxfordjournals.schbul.a006868](https://doi.org/10.1093/oxfordjournals.schbul.a006868).
- Corrigan, P. W., & Nieweglowski, K. (2019). How does familiarity impact the stigma of mental illness? *Clinical Psychology Review*, 70, 40–50. [10.1016/j.cpr.2019.02.001](https://doi.org/10.1016/j.cpr.2019.02.001).
- Covello, V. T. (2006). Risk communication and message mapping: A new tool for communicating effectively in public health emergencies and disasters. *Journal of Emergency Management*, 4(3), 25–40. [10.5055/jem.2006.0030](https://doi.org/10.5055/jem.2006.0030).
- Dixon, H. G., Pratt, I. S., Scully, M. L., Miller, J. R., Patterson, C., Hood, R., & Slevin, T. J. (2015). Using a mass media campaign to raise women's awareness of the link between alcohol and cancer: cross-sectional pre-intervention and post-intervention evaluation surveys. *BMJ Open*, 5(3), Article e006511. [10.1136/bmjopen-2014-006511](https://doi.org/10.1136/bmjopen-2014-006511).
- Doleac, J. L., & Mukherjee, A. (2022). The effects of naloxone access laws on opioid abuse, mortality, and crime. *The Journal of Law and Economics*, 65(2), 211–238. [10.1086/719588](https://doi.org/10.1086/719588).
- EMCDDA. (2015). *Preventing fatal overdoses: A systematic review of the effectiveness of take-home naloxone*.
- Faul, F., Erdfelder, E., Lang, A.-G., & Buchner, A. (2007). G\*Power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, 39(2), 175–191. [10.3758/BF03193146](https://doi.org/10.3758/BF03193146).

- Frisher, M., Baldacchino, A., Crome, I., & Bloor, R. (2012). Prevalence, consequences and data management unit preventing opioid overdoses in Europe: A critical assessment of known risk factors and preventative measures Final report.
- Grella, C. E., Ostlie, E., Scott, C. K., Dennis, M. L., Carnevale, J., & Watson, D. P. (2021). A scoping review of factors that influence opioid overdose prevention for justice-involved populations. *Substance Abuse Treatment, Prevention, and Policy*, 16(1), 19. [10.1186/s13011-021-00346-1](https://doi.org/10.1186/s13011-021-00346-1).
- Guimariés, N., Chambel, T., & Bidarra, J. (2000). From cognitive maps to hypervideo: Supporting flexible and rich learner-centred environments. *Interactive Multimedia Electronic Journal of Computer-Enhanced Learning*, 2.
- Hamilton, L. K., Wheeler-Martin, K., Davis, C. S., Martins, S. S., Samples, H., & Cerda, M. (2022). A modified Delphi process to identify experts' perceptions of the most beneficial and harmful laws to reduce opioid-related harm. *International Journal of Drug Policy*, 108, Article 103809. [10.1016/j.drugpo.2022.103809](https://doi.org/10.1016/j.drugpo.2022.103809).
- Harrington, N. G., Helme, D. W., & Noar, S. M. (2015). Message design approaches to health risk behavior prevention. In L. M. Scheier (Ed.), *Handbook of adolescent drug use prevention: Research, intervention strategies, and practice* (pp. 381-396). American Psychological Association. [10.1037/14550-022](https://doi.org/10.1037/14550-022).
- Hernandez, Y., Meyers-Ohki, S., Farkas, S., Ball, S., Leonard, K., Rotrosen, J., & Saitz, R. (2018). How Massachusetts, Vermont, and New York are taking action to address the opioid epidemic. *The American Journal of Public Health*, 108(12), 1621-1622. [10.2105/ajph.2018.304741](https://doi.org/10.2105/ajph.2018.304741).
- Hillen, P., Speakman, E., Dougall, N., Heyman, I., Murray, J., Jamieson, M., Aston, E., & McAuley, A. (2022). *Naloxone in Police Scotland: Pilot Evaluation*.
- Government, HM (2015). *Drug Strategy 2010: 'A balanced approach. Third Annual Review*. IBM Corp. (2021). *IBM SPSS Statistics for Windows, Version 28.0*. IBM Corp. <https://www.ibm.com/uk-en/products/spss-statistics>
- Irvine, M. A., Kuo, M., Buxton, J. A., Balshaw, R., Otterstatter, M., Macdougall, L., Milloy, M.-J., Bharmal, A., Henry, B., Tyndall, M., Coombs, D., & Gilbert, M. (2019). Modelling the combined impact of interventions in averting deaths during a synthetic-opioid overdose epidemic. *Addiction*, 114(9), 1602-1613. [10.1111/add.14664](https://doi.org/10.1111/add.14664).
- Kennedy-Hendricks, A., Barry, C. L., Gollust, S. E., Ensminger, M. E., Chisolm, M. S., & McGinty, E. E. (2017). Social stigma toward persons with prescription opioid use disorder: Associations with public support for punitive and public health-oriented policies. *Psychiatric Services*, 68(5), 462-469. [10.1176/appi.ps.201600056](https://doi.org/10.1176/appi.ps.201600056).
- Kulesza, M., Teachman, B. A., Wertz, A. J., Gasser, M. L., & Lindgren, K. P. (2015). Correlates of public support toward federal funding for harm reduction strategies [journal article]. *Substance Abuse Treatment, Prevention, and Policy*, 10(1), 25. [10.1186/s13011-015-0022-5](https://doi.org/10.1186/s13011-015-0022-5).
- Levay, K. E., Freese, J., & Druckman, J. N. (2016). The demographic and political composition of mechanical Turk samples. *SAGE Open*, 6(1), Article 2158244016636433. [10.1177/2158244016636433](https://doi.org/10.1177/2158244016636433).
- McAuley, A., Matheson, C., & Robertson, J. R. (2022). From the clinic to the street: The changing role of benzodiazepines in the Scottish overdose epidemic. *The International Journal of Drug Policy*, 100, Article 103512. [10.1016/j.drugpo.2021.103512](https://doi.org/10.1016/j.drugpo.2021.103512).
- McDonald, R., & Strang, J. (2016). Systematic review utilizing application of the Bradford Hill criteria. *Addiction*, 111(7), 1177-1187. [10.1111/add.13326](https://doi.org/10.1111/add.13326).
- McGinty, E. E., Barry, C. L., Stone, E. M., Niederdeppe, J., Kennedy-Hendricks, A., Linden, S., & Sherman, S. G. (2018). Public support for safe consumption sites and syringe services programs to combat the opioid epidemic. *Preventive Medicine*, 111, 73-77. [10.1016/j.ypmed.2018.02.026](https://doi.org/10.1016/j.ypmed.2018.02.026).
- McGinty, E. E., Goldman, H. H., Pescosolido, B., & Barry, C. L. (2015). Portraying mental illness and drug addiction as treatable health conditions: Effects of a randomized experiment on stigma and discrimination. *Social Science & Medicine*, 126, 73-85. [10.1016/j.socscimed.2014.12.010](https://doi.org/10.1016/j.socscimed.2014.12.010).
- McGuire, W. J. (1984). Public communication as a strategy for inducing health-promoting behavioral change. *Preventive Medicine*, 13(3), 299-319. [10.1016/0091-7435\(84\)90086-0](https://doi.org/10.1016/0091-7435(84)90086-0).
- McPhee, L., & Sheridan, B. (2023). Policy traps and policy placebos: Assessing drug policy network responses to drug related deaths. *Drugs, Habits and Social Policy*, 24(1), 39-52. [10.1108/DHS-06-2022-0023](https://doi.org/10.1108/DHS-06-2022-0023).
- Miller, N. M., Waterhouse-Bradley, B., Campbell, C., & Shorter, G. W. (2022). How do naloxone-based interventions work to reduce overdose deaths: A realist review. *Harm Reduction Journal*, 19(1), 18. [10.1186/s12954-022-00599-4](https://doi.org/10.1186/s12954-022-00599-4).
- National Records of Scotland. (2021a). *Drug-related deaths in Scotland in 2020*.
- National Records of Scotland. (2021b). *Mid-2020 Population Estimates*, Scotland.
- National Records of Scotland. (2022). *Drug-related deaths in Scotland in 2021*.
- Nicholls, J., Livingston, W., Perkins, A., Cairns, B., Foster, R., Trayner, K. M. A., Sumnall, H. R., Price, T., Cairney, P., Dumbrell, J., & Parkes, T. (2022). Drug consumption rooms and public health policy: Perspectives of Scottish strategic decision-makers. *International Journal of Environmental Research and Public Health*, 19(11), 6575. [10.3390/ijerph19116575](https://doi.org/10.3390/ijerph19116575).
- Noar, S. M. (2006). A 10-year retrospective of research in health mass media campaigns: Where do we go from here? *Journal of Health Communication*, 11(1), 21-42. [10.1080/108107305000461059](https://doi.org/10.1080/108107305000461059).
- Noar, S. M., Harrington, N. G., & Helme, D. W. (2010). The contributions of health communication research to campaign practice. *Health Communication*, 25(6-7), 593-594. [10.1080/10410236.2010.496832](https://doi.org/10.1080/10410236.2010.496832).
- O' Cathain, A., Croot, L., Sworn, K., Duncan, E., Rousseau, N., Turner, K., Yardley, L., & Hoddinott, P. (2019). Taxonomy of approaches to developing interventions to improve health: A systematic methods overview. *Pilot and Feasibility Studies*, 5(1), 41. [10.1186/s40814-019-0425-6](https://doi.org/10.1186/s40814-019-0425-6).
- Pettigrew, T. F. (1998). Intergroup contact theory. *Annual Review of Psychology*, 49, 65-85. Public Health Scotland. (2022). *National Naloxone Programme Scotland: Monitoring Report 2019/20 & 2020/21*.
- Randolph, W., & Viswanath, K. (2004). Lessons learned from public health mass media campaigns: Marketing health in a crowded media world. *Annual Review of Public Health*, 25(1), 419-437. [10.1146/annurev.publhealth.25.101802.123046](https://doi.org/10.1146/annurev.publhealth.25.101802.123046).
- Razaghizad, A., Windle, S. B., Filion, K. B., Gore, G., Kudrina, I., Paraskevopoulos, E., Kimmelman, J., Martel, M. O., & Eisenberg, M. J. (2021). The effect of overdose education and naloxone distribution: An umbrella review of systematic reviews. *American Journal of Public Health*, 111(8), e1-e12. [10.2105/ajph.2021.306306](https://doi.org/10.2105/ajph.2021.306306).
- Rome, A., Shaw, A., & Boyle, K. (2008). *Reducing Drug Users' Risk of Overdose*.
- Rusch, N., Evans-Lacko, S., & Thornicroft, G. (2012). What is a mental illness? Public views and their effects on attitudes and disclosure. *Australian and New Zealand Journal of Psychiatry*, 46(7), 641-650. [10.1177/0004867412438873](https://doi.org/10.1177/0004867412438873).
- Sattler, S., Escande, A., Racine, E., & Goritz, A. S. (2017). Public stigma toward people with drug addiction: A factorial survey. *Journal of Studies on Alcohol and Drugs*, 78(3), 415-425. [10.15288/jsad.2017.78.415](https://doi.org/10.15288/jsad.2017.78.415).
- Scottish Government. (2021). *Scotland's Labour Market: People, Places and Regions*.
- Scottish Government. (2022). *2011 Census Results*. Scottish Government. Retrieved 23/05/2022 from <https://www.scotlandscensus.gov.uk/search-the-census/#/>
- Singleton, N. (2010). *Attitudes to Drug Dependence. Results from a Survey of People Living in Private Households in the UK*. <https://www.bl.uk/collection-items/attitudes-to-drug-dependence-results-from-a-survey-of-people-living-in-private-households-in-the-uk#>
- Skivington, K., Matthews, L., Simpson, S. A., Craig, P., Baird, J., Blazeby, J. M., Boyd, K. A., Craig, N., French, D. P., McIntosh, E., Petticrew, M., Rycroft-Malone, J., White, M., & Moore, L. (2021). A new framework for developing and evaluating complex interventions: Update of Medical Research Council guidance. *BMJ*, 374, n2061. [10.1136/bmj.n2061](https://doi.org/10.1136/bmj.n2061).
- Stanczyk, N., Bolman, C., van Adrichem, M., Candel, M., Muris, J., & de Vries, H. (2014). Comparison of text and video computer-tailored interventions for smoking cessation: Randomized controlled trial. *The Journal of Medical Internet Research*, 16(3), e69. [10.2196/jmir.3016](https://doi.org/10.2196/jmir.3016).
- Stead, M., Angus, K., Langley, T., Katikireddi, S. V., Hinds, K., Hilton, S., Lewis, S., Thomas, J., Campbell, M., Young, B., & Bauld, L. (2019). Mass media to communicate public health messages in six health topic areas: A systematic review and other reviews of the evidence. *Public Health Research*, 7(8). [10.3310/phr07080](https://doi.org/10.3310/phr07080).
- Sumnall, H. R., Atkinson, A. M., Gage, S. H., Hamilton, I., & Montgomery, C. (2021). Less than human: Dehumanisation of people who use heroin. *Health Education*, 121(6), 649-669. [10.1108/He-07-2021-0099](https://doi.org/10.1108/He-07-2021-0099).
- Sumnall, H. R., Atkinson, A. M., Trayner, K. M. A., Gage, S. H., & McAuley, A. (2020). Effects of messaging on public support for drug consumption rooms in Scotland. *International Journal of Drug Policy*, 83, Article 102855. [10.1016/j.drugpo.2020.102855](https://doi.org/10.1016/j.drugpo.2020.102855).
- Sylvester, S. M., Haeder, S. F., & Callaghan, T. (2022). Public attitudes about supportive and punitive policies to combat the opioid epidemic. *Journal of Public Policy*, 42(2), 270-297. [10.1017/S0143814x21000155](https://doi.org/10.1017/S0143814x21000155).
- The Scottish Government. (2016). *2016 Scottish Public Attitudes Towards People with Drug Dependence and People in Recovery*. <https://www.gov.scot/publications/public-attitudes-towards-people-drug-dependence-people-recovery-research-findings/>.
- Trayner, K., Sumnall, H. R., Anderson, M., Atkinson, A. M., & McAuley, A. (2022). *Multi-method evaluation of the 'How to save a life' mass media campaign*.
- UK Government. (2019). *Widening the Availability of naloxone*. Retrieved 17/8/22 from <https://www.gov.uk/government/publications/widening-the-availability-of-naloxone/widening-the-availability-of-naloxone>
- van Amsterdam, J., van den Brink, W., & Pierce, M. (2021). Explaining the differences in opioid overdose deaths between Scotland and England/Wales: Implications for European opioid policies. *European Addiction Research*, 27(6), 399-412. [10.1159/000516165](https://doi.org/10.1159/000516165).
- Wakefield, M. A., Loken, B., & Hornik, R. C. (2010). Use of mass media campaigns to change health behaviour. *Lancet (London, England)*, 376(9748), 1261-1271. [10.1016/S0140-6736\(10\)60809-4](https://doi.org/10.1016/S0140-6736(10)60809-4).
- Werb, D., Mills, E. J., Debeck, K., Kerr, T., Montaner, J. S., & Wood, E. (2011). The effectiveness of anti-illicit-drug public-service announcements: A systematic review and meta-analysis. *The Journal of Epidemiology and Community Health*, 65(10), 834-840. [10.1136/jech.2010.125195](https://doi.org/10.1136/jech.2010.125195).
- Wild, T. C., Koziol, J., Anderson-Baron, J., Asbridge, M., Belle-Isle, L., Dell, C., Elliott, R., Hathaway, A., MacPherson, D., McBride, K., Pauly, B., Strike, C., Galovan, A., & Hyshka, E. (2021). Public support for harm reduction: A population survey of Canadian adults. *PLoS One*, 16(5), Article e0251860. [10.1371/journal.pone.0251860](https://doi.org/10.1371/journal.pone.0251860).
- Williams, A. V., Strang, J., & Marsden, J. (2013). Development of Opioid Overdose Knowledge (OOKS) and Attitudes (OOAS) Scales for take-home naloxone training evaluation. *Drug and Alcohol Dependence*, 132(1-2), 383-386. [10.1016/j.drugalcdep.2013.02.007](https://doi.org/10.1016/j.drugalcdep.2013.02.007).
- Wimbush, E., Macgregor, A., & Fraser, E. (1998). Impacts of a national mass media campaign on walking in Scotland. *Health Promotion International*, 13(1), 45-53. [10.1093/heapro/13.1.45](https://doi.org/10.1093/heapro/13.1.45).
- Winograd, R. P., Werner, K. B., Green, L., Phillips, S., Armbruster, J., & Paul, R. (2020). Concerns that an opioid antidote could "make things worse": Profiles of risk compensation beliefs using the Naloxone-Related Risk Compensation Beliefs (NaRRC-B) scale. *Substance Abuse*, 41(2), 245-251. [10.1080/08897077.2019.1616348](https://doi.org/10.1080/08897077.2019.1616348).