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# Overdose education and naloxone distribution among women with a history of OUD transitioning to the community following jail release

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## Abstract

**Background** The criminal legal system (CLS) provides a critical intervention point for women at high risk for overdose, and the need continues to rise as the number of incarcerated women increases. Effective, targeted prevention interventions to reduce overdose risk for CLS-involved women are needed, such as naloxone distribution. This study describes the overdose education and naloxone distribution (OEND) procedures used in the Kentucky-hub of the Justice Community Opioid Innovation Network (JCOIN).

**Method** Participants included women incarcerated in nine Kentucky jails ( $N=900$ ) who were randomly selected, screened for opioid use disorder, and consented for the study. They were followed three-months following jail release to examine naloxone utilization and overdose experiences.

**Results** Study findings indicate that about three-quarters (74.4%) of women in this study reported lifetime injection and more than half (54.9%) had a lifetime history of a non-fatal overdose prior to entering jail. About 70% of women reported receiving a study naloxone unit upon jail release, and of those, 30 women reported using the unit during the three-month post-release window. About 4% of the sample reported a non-fatal overdose during this same time period.

**Conclusions** Incarcerated women in this sample reported a history of behaviors that may signal overdose risk upon release to the community such as injection drug use and non-fatal overdose. Study findings suggest targeted OEND efforts for women in general are desperately needed, and particularly among women at highest risk during community re-entry.

**Keywords** Women, Overdose prevention, Opioid use disorder

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## Background

Overdose is a significant public health concern across United States (U.S.) communities with age-adjusted death rates increasing from 8.2 in 2002 per 100,000 to 32.6 per 100,000 in 2022 (Spencer et al., 2024), and individuals leaving correctional facilities are disproportionately impacted (e.g., Brinkley-Rubinstein et al., 2018; Gan et al., 2021; Mital et al., 2020). In general, incarcerated individuals with a history of substance use, and opioid use specifically, have a significantly higher risk for overdose following release (Mital et al., 2020) due to tolerance loss during incarceration, limited access to medications and other treatment, and disruptions in social support networks (Joudrey et al., 2019; Sinkman & Dorchak, 2022). These factors translate to a period of highest risk immediately following release from carceral settings that continues during community re-entry (Binswanger et al., 2007; Grella et al., 2021).

Although most sources suggest a higher overdose death rate among men compared to women in the general population (Butelman et al., 2023; Spencer et al., 2024), the gender gap significantly narrows among individuals leaving correctional facilities and re-entering the community (Hartung et al., 2023; Springer et al., 2020; Staton et al., 2021). Noted factors above related to tolerance, treatment access, and supportive networks likely impact CLS-involved women who have higher rates of overdose during community re-entry than men (Binswanger et al., 2013; Hartung et al., 2023) and higher rates than women in the general population (Waddell et al., 2020). Thus, the criminal legal system provides a critical intervention point for women at high risk for overdose, and the need continues to rise as the number of incarcerated women grows (increasing more than 585% between 1980 and 2022—a rate twice as high as that for men; Budd, 2023). Effective, targeted prevention interventions to reduce overdose risk for CLS-involved women are needed, such as naloxone distribution.

Naloxone is an opioid antagonist that can quickly reverse an opioid overdose (NIDA, 2022). Naloxone distribution should be accompanied by overdose education (OEND), which is an evidence-based public health strategy to reduce the likelihood that individuals die when experiencing opioid overdose (Razaghizad et al., 2021; Walley et al., 2013). Among CLS-involved populations in general, acceptability of naloxone was associated with a history of high-risk drug use (injection practices), history of non-fatal overdose, and perceived risk during community re-entry (Grella et al., 2021). OEND approaches have also been successful for individuals transitioning from carceral settings to the community (Anthony-North et al., 2018; Wenger et al., 2019).

Despite CLS-involved women being at high risk, existing overdose prevention approaches have largely either

focused on men (e.g., Curtis et al., 2018; Horton et al., 2017) or on women's capacity to respond when *witnessing* an overdose (Gicquelais et al., 2019; Wenger et al., 2019), perhaps suggesting women are often likely to be a bystander who administers naloxone to others. Thus, it is critically important that women released from jail be trained and equipped to carry naloxone to help save lives of others in their social networks who may be at high-risk. However, overdose prevention strategies for women most at risk for *experiencing* an overdose are also needed. Given that a return to substance use after release from carceral settings is associated with an exponential increase in overdose fatalities (Gan et al., 2021; Park et al., 2020; Ranapurwala et al., 2018), particularly among women (Binswanger et al., 2013), providing women with OEND at the time of release from jail is imperative.

There have been several challenges associated with OEND implementation in carceral settings, particularly the distribution of naloxone at community re-entry. Previous studies have specifically noted limited support from jail administrators for OEND, limited staffing in jails to do education training and naloxone distribution, high turnover rate of jail staff, and stigma among correctional staff (Grella et al., 2021; Leip & Stinchcomb, 2013; Moore et al., 2022; Oser et al., 2024; Woollett, 2017). With these system-level challenges, it is important for research to continue to strengthen efforts toward implementation of OEND through public health initiatives, particularly with CLS-involved women.

As a result, the Kentucky-based clinical research center of the NIDA-funded Justice Community Opioid Innovation Network (JCOIN, UG150069), under the NIH Helping to End Addiction Long-term (HEAL, Ducharme et al., 2021) initiative, is the only center within this national research cooperative to focus exclusively on women. The study includes a focus on overdose education and naloxone distribution among a high-risk sample of women with the overall aim of increasing utilization of treatment as women with a history of OUD transition from jails to the community (Staton et al., 2021). The purpose of this paper is to: (1) profile the sample of women on drug use patterns, injection drug use, and history of non-fatal overdoses; (2) describe receipt and use of naloxone among women three months post-release from jail; and (3) examine women's overdose experiences during the three month period of community re-entry.

## Methods

### Participants

Data were collected from women who were incarcerated in nine Kentucky jails as part of a larger JCOIN project (see Staton et al., 2021 for detailed overview) between December 2020 and January 2024. Women who endorsed eligibility criteria were invited to participate, including:

(1) met criteria consistent with opioid use disorder (OUD, 2+ on Diagnostic and Statistical Manual [DSM-5] OUD Checklist (American Psychiatric Association, 2013) or a 4+ on the NIDA-modified Alcohol, Smoking and Substance Involvement Screening Test, NIDA, 2009); (2) planned release date within 7–60 days (verified by jail records if available); (3) signed informed consent; and (4) being willing to participate.

During the study recruitment period, 900 women were screened for eligibility, provided with informed consent, and completed baseline data collection for the larger trial. Of that sample, 804 were released from jail, and locating and tracking efforts were initiated to schedule 3-month post-release follow-ups. At the time of data analysis, follow-up interviews had been completed with 703 women (87.3% of those who were released from jail and reached their follow-up timeframe window).

### Measures

To describe the study sample, specific measures included *demographics* reported at study entry (age measured in years, percent non-Hispanic White, percent employed prior to incarceration, percent with high school diploma or GED, percent married or living as married, and percent living in a rural community prior to incarceration). In addition, *OUD screening scores* at study entry (scores on the NM-ASSIST and DSM-5 OUD Checklist) were included to describe severity of opioid use prior to incarceration, as well as *drug use patterns* 90 days prior to entering jail (use of prescription opioids, street opioids such as fentanyl and heroin, and other substances). History of *high-risk* drug use (percent ever injected) and related consequences (percent ever experienced non-fatal overdose) were also assessed at study enrollment.

*Naloxone distribution* was assessed using administrative data recorded by study staff, as well as participant self-report data at the time of the 3-month follow-up. Administrative data was logged in REDCap for each naloxone unit and included: participant ID of the recipient, date of distribution, staff performing distribution, unit bar code scan and lot number, whether the unit was an initial distribution or a refill, how the unit was provided (left in jail property, mailed, or given to participant in-person), and timepoint of unit distribution (pre-release; post-release but pre-follow-up; at 3-, 6-, or 12-month follow-up; or in between waves). The present analyses include initial distributions only and describe the percentage of participants who (1) had a naloxone unit (a packaged kit of two naloxone doses) left in their property at the jail (coded by study staff), or (2) were contacted by study staff after release and requested a naloxone unit be mailed to them (also coded by study staff). At the time of the 3-month follow-up, participants also self-reported whether they had received a naloxone unit at the time

of jail release. Among study participants who reported receiving a unit upon release from jail, additional measures included the percentage reporting (1) that the overdose education training was helpful; (2) using the naloxone unit after release to respond to an overdose event (and on whom); (3) using the naloxone unit (and if not, where it is currently located); and (4) being interested in receiving an additional naloxone unit following completion of their three-month follow-up.

*Overdose experiences after jail release* included self-reported non-fatal overdoses during the three month period following release. If a participant reported that she had experienced an overdose, she was asked additional questions about (1) the number of overdoses, (2) the drugs taken in the four hours prior to overdose, and (3) what happened following the overdose experience(s) (e.g., administered naloxone, received medical attention, visited the emergency department, admitted to the hospital, etc.). In addition, any notifications about fatal overdoses by friends or family during the locating and tracking process (and further verified by vital statistics death certificates) were also included as data if they occurred during the first 90 days after jail release, even if the participant did not complete a three-month follow-up interview.

### Procedures

Participants ( $N=900$ ) were randomly selected based on jail census on the targeted recruitment day and screened to identify moderate to severe symptoms consistent with OUD (see Staton et al., 2024). The screening session (estimated 20 min) was conducted by a trained study data coordinator using the NM-ASSIST including both street opioid (heroin, fentanyl) and prescription opioid misuse and the DSM OUD Checklist and included informed consent. Following study screening and eligibility determination, participants were asked to complete a baseline interview to assess their lifetime and recent opioid use, high-risk behaviors such as injection drug use, history of non-fatal overdose experiences, history of CLS involvement, mental health, and other family/social factors. Interviews took an average of 87.9 min ( $SD=28.8$ , range 30–221 min), and participants were paid \$45 for their time.

Following baseline data collection, participants had the opportunity to watch an overdose response training video as part of JCOIN OEND procedures. JCOIN OEND procedures were modeled after training and distribution practices established through the HEAL initiative Communities that HEAL (CTH) Kentucky hub, which targeted overdose prevention efforts in 16 high-risk Kentucky counties (Knudsen et al., 2023; Oyler et al., 2024). All JCOIN-specific OEND procedures were conducted by research staff. *Overdose education* was provided through

a training video, which had been downloaded on devices used by research staff for data collection (laptop computers and tablets). All study participants consented to review the video, which was a 9-minute overview of opioid overdose prevention, recognition, and response. Of relevance for this JCOIN study, actors in the video were all women. Time was provided after the video for questions and discussion with the research team member.

For *naloxone distribution*, participants had the option of a two-dose naloxone unit being left in their personal property at the jail for pick up upon release from jail, or it could be mailed to their preferred address to access post-release. The packet also included an educational brochure to refresh elements of the training video and use of the naloxone unit. Naloxone units were dispensed under a Standing Order Agreement (SOA) established for JCOIN by the study medical physician and monitor and delivered by research study staff, along with study re-entry kits prepared by research staff (basic toiletries for use during community re-entry).

Following release from jail, research staff attempted to contact participants within the first week of release to ensure they received their unit, and to see if they needed an additional unit shipped to their current living address.

**Table 1** Sample description at prior to jail ( $N=699$ )

	% / Mean (SD; range)
<b>Sociodemographics</b>	
% White	93.0%
Age (years)	37.2 (8.6; 19–62)
% high school diploma/GED	73.7%
% employed	23.6%
% married/living as married	36.6%
% sexual minority	27.2%
% rural	65.1%
<b>Screening scores</b>	
NM-ASSIST Prescription Opioids	28.6 (12.3; 0–39)
NM-ASSIST Street Opioids	26.0 (15.3; 0–39)
DSM-5 OUD Checklist (12 months)	10.4 (1.3; 1–11)
DSM-5 OUD Checklist (30 days)	9.8 (2.6; 0–11)
<b>Substance Use (3 months prior to jail)</b>	
% used methamphetamine/amphetamines	85.3%
% used other opioid use	75.0%
% used heroin	65.8%
% used marijuana	60.9%
% used fentanyl	55.5%
% used gabapentin/neurontin	41.3%
% used benzodiazepines	41.1%
% used alcohol	34.4%
% used nonprescribed buprenorphine (Suboxone®)	34.3%
% used cocaine	26.6%
<b>Lifetime injection and overdose</b>	
% injected drugs (lifetime)	74.4%
% overdosed (lifetime)	54.9%

Naloxone distribution data was entered into REDCap by research staff. Other locating and tracking methods were also utilized to find women for their three-month follow-up interview within a window of two to four months post-release from jail. Interviews were typically scheduled for a day and time convenient for study participants, participants were reminded of the key elements of informed consent for the follow-up, and all data collection took place by phone. Follow-up interviews took an average of 52 min, and participants were compensated for their time.

### Analytic plan

To address study aims, univariate statistics were used to (1) profile the sample on drug use patterns, injection drug use, and history of non-fatal overdoses, (2) describe naloxone receipt and use during the three-month follow-up period, and (3) examine demographic characteristics, drug use patterns, and overdose experiences of those who reported having overdosed in the three-month post-release follow-up period. Due to missing data on key variables, four cases were removed from analyses, resulting in a final sample of  $N=699$ . Additionally, out of the 699 participants with complete data, some women ( $n=162$ ) were interviewed outside of their 3-month follow-up window if they were unable to be located during the two to four-month targeted tracking period but were located at a later wave of follow-up data collection. In these cases, participants were still asked about overdose experiences grounded in the three months post-release timeframe, but naloxone receipt and usage were reported only for the most recent follow-up (i.e., at any time during six- or 12-months post-release). Since naloxone receipt/usage could not be grounded in the three-month post-release timeframe, these cases were excluded from analysis for aims two and three (leaving a final sample of  $n=541$  for those analyses). All analyses were conducted using IBM SPSS Statistics v.28.

## Results

### Sample description

As presented in Table 1, at study enrollment, participants were about 37.2 years old ( $SD=8.6$ ; range 19–62), 93.0% were white, 23.6% were employed either full or part-time before jail, 73.7% had a high school diploma or GED, 36.6% were married or living as married, 27.2% identified as a sexual minority, and 65.1% were living in a rural county prior to incarceration. Participants reported high OUD screening scores on both screening tools with an average of 28.6 on the NM-ASSIST for misuse of prescription opioids ( $SD=12.3$ , range 0–39), 26.0 for street opioids ( $SD=15.3$ , range 0–39), and 10.4 for scores on the DSM-5 OUD checklist in the 12 months before incarceration ( $SD=1.3$ , range 1–11), and 9.8 ( $SD=2.6$ ;

range 0–11) in the 30 days before incarceration. Nearly all women reported high rates of any opioid use in the 3 months prior to entering jail (96.6%)—specifically, 65.8% reported heroin use, 55.5% reported fentanyl use, and 75.0% reported using other types of opioids. Additionally, while screened into the study based on opioid use, 85.3% also reported use of methamphetamine/amphetamines, 60.9% reported using marijuana, 41.1% reported benzodiazepine use, 41.3% reported gabapentin use, 34.3% reported using nonprescribed buprenorphine (Suboxone®), and 26.6% reported using cocaine in the 90 days before entering jail. Most women also reported lifetime drug injection (74.4%), and 54.9% reported a history of non-fatal lifetime overdose.

### OEND & Naloxone use

As shown in Table 2, following the baseline enrollment interview, all study participants (100%) expressed willingness to view the overdose education video, 94.0% of women had a naloxone unit left in their property at the jail, and 4.7% had a naloxone unit mailed to them rather than left in their property (at the participants' request). At the time of their three-month follow-up interview, 70.8% reported that they had received the naloxone unit upon release from jail. Of participants who received a naloxone unit ( $n=383$ ), the majority (97.9%) reported that the education provided during the video training

and in the pamphlet were helpful in remembering how to use the units. Furthermore, 30 women (7.8%) reported using the naloxone unit in the three months post-release, with more than a third of those women reporting the unit was used on themselves (36.7%;  $n=11$ ) or used on a friend (36.7%;  $n=11$ ). Among women who reported not using their naloxone units during the three months post-release ( $n=353$ ), most (84.7%) indicated that they still had the unit, and 6.2% reported giving the unit to someone else. Finally, of women who reported receiving a naloxone unit at their initial release, 4.4% reported that they had requested and received an additional naloxone unit from study personnel at some point prior to their three-month interview. Regardless of whether they reported receiving a naloxone unit at release, almost two-thirds (61.7%) of the full sample ( $N=699$ ) were interested in receiving a naloxone unit after their three-month follow-up interview.

### Overdose experiences three-months post-release

At the time of the three-month follow-up interview, 29 women (4.1%) self-reported that they had experienced a non-fatal overdose at some point following their release from jail, and 20.7% of women who had experienced an overdose reported more than one (average of 1.7 overdoses,  $SD=1.5$ , range 1–6) (see Table 3). The most commonly reported drugs used during the four hours before

**Table 2** OEND and Naloxone use during 3-month Follow-up ( $N=699$ )

<b>Naloxone Use</b>	
% who had a naloxone unit left in their property at baseline (while still in jail)	94.0%
% who requested that a naloxone unit be mailed to them (instead of left in their property)	4.7%
<i>Of those who responded to naloxone questions at 3-month follow-up:</i>	( $N=541$ )
% who received a naloxone unit at their most recent release from jail	70.8%
<i>Of those who received a naloxone unit:</i>	( $N=383$ )
% who found the training/pamphlet helpful in remembering how to use	97.9%
% who had to use the naloxone unit it	7.8%
<i>Who was the unit used on?</i>	( $N=30$ )
Self	36.7%
Friend	36.7%
Family	13.3%
Acquaintance	3.3%
Stranger	6.7%
Unknown	3.3%
% who did not use it	92.2%
<i>Where is the unit now?</i>	( $N=353$ )
Still have it	84.7%
Gave it to someone else	6.2%
Confiscated by treatment center/halfway house	4.2%
Lost it	4.0%
Stolen	0.6%
Other/unsure	0.3%
% who obtained a refill/replacement unit from study staff prior to their 3-month interview	4.4%
% interested in getting a naloxone unit following their 3-month interview	61.7%

**Table 3** Overdose during 3-month follow-up (N = 699)

	% / Mean (SD; range)
% overdosed during the 3-month follow-up	4.1%
<b>Of those who overdosed during the 3-month follow-up:</b>	(N = 29)
# of times overdosed on opioids	1.7 (1.5; 1–6)
Drugs taken in the 4 h prior to overdose	
Heroin	69.0%
Fentanyl	41.4%
Methamphetamine/amphetamines	34.5%
Anti-anxiety meds/benzodiazepines	10.3%
Other opioids	10.3%
Marijuana	3.4%
Powder or crack cocaine	3.4%
Following overdose:	
Administered naloxone	93.1%
Received emergency medical services (EMS)	27.6%
Went to the emergency department	17.2%
Admitted to hospital	13.8%
Referred to substance use treatment from 1st responder/hospital staff	6.9%
Who administered naloxone:	(N = 27)
Friend	44.4%
Spouse/Significant other	29.6%
Paramedic	22.2%
Someone else	11.1%
Police	3.7%
Stranger	3.7%

the overdose included heroin (69.0%), fentanyl (41.4%), and methamphetamine/amphetamines (34.5%). Following the overdose event, most women (93.1%,  $n = 27$ ) reported that naloxone was used, but only 27.6% received emergency medical services, and 17.2% went to the emergency department. Only 6.9% of women who experienced an overdose event were referred to substance use treatment by a medical professionals.

In addition to the non-fatal overdose experiences self-reported by women who completed the three-month follow-up interview, study staff learned that seven additional women who could not be reached for follow-up had fatally overdosed within 90 days following release from jail, as verified by vital statistics death certificates. Study records indicate that research staff left naloxone in the personal jail property of all seven women, consistent with standard study procedures.

**Discussion**

Opioid overdose continues to be a significant public health concern in the U.S. Overdose deaths involving any opioid among women aged 30–64 increased a dramatic 492% between 1999 and 2017 (VanHouten et al., 2019). Among women leaving carceral settings and transitioning

to the community, overdose risk is exacerbated due to a number of biological, environmental, and social factors. While the evidence base on OEND practices has grown in recent years, studies focused on individuals re-entering the community from jails have been limited (Anthony-North et al., 2018; Wenger et al., 2019). Most studies in this area have focused on changes in jail policies and practices to provide education and naloxone (e.g., Oser et al., 2024; Showalter et al., 2021; Wenger et al., 2019). However, overdose experiences and naloxone use following jail release, particularly among women, has been less studied. The purpose of this study was to describe baseline characteristics (high-risk drug use practices, history of non-fatal overdose) of women incarcerated in jail, examine receipt and use of naloxone among women three months post-release from jail, and to examine women’s overdose experiences during the three-month period of community re-entry.

Women in this study were recruited based on meeting screening criteria consistent with OUD. As reported elsewhere (Staton et al., 2024), women scored considerably higher on screening tools including the NM-ASSIST for both prescription opioid misuse and street opioids such as heroin and fentanyl than individuals in the general population (Dawson-Rose et al., 2020; Shuper et al., 2020). Women in the study also reported high scores on the DSM-5 OUD checklist for both the year and 30 days before jail. In addition to high degrees of opioid use severity, study participants reported high rates of other substance use including methamphetamine/amphetamines. This is consistent with a growing literature that suggests that individuals who are incarcerated may report histories of polysubstance use in addition to their opioid use (Bunting et al., 2020; Winkelman et al., 2018), which considerably increases the risk for overdose following release from jail (Compton et al., 2021). Also, more than half of women (54.9%) reported a previous non-fatal overdose experience, which has been well documented as a risk factor for future overdose experiences (Caudarella et al., 2016; Kinner et al., 2012). While OEND efforts need to continue to expand in carceral settings to prepare for community re-entry, attention must also be given to the complexity of past overdose and polysubstance use as markers for increased risk for individuals at community re-entry (Dickson et al., 2024).

OEND efforts in this study suggested that women were receptive to overdose education with all study participants agreeing to watch the training video. The finding that 94% of women had a unit left in personal property and 5% reported having the units mailed to them also demonstrate viable ways of naloxone distribution for this sample. However, at the time of the three-month follow-up, only 71% reported actually receiving the units left in their personal property at the jail. Unfortunately, study

staff could not monitor what happened to units left with jail staff to verify this discrepancy. This is a critical area for future research on OEND in carceral settings and may call for additional resources to distribute naloxone in innovative ways to ensure it is received by individuals as they re-enter the community following incarceration.

Among women in the study who reported receiving naloxone, 30 women (7.8%) reported that the naloxone unit was used three months post-release, with most reporting that the unit was used to revive themselves or a friend. Given that naloxone may not be self-administered by an individual experiencing an overdose, women reporting that units had been used to revive themselves would likely have left the naloxone in an easy-to-discover location, or told other individuals that they lived and/or used drugs with where the unit could be found, as well as provided instructions for its use. These findings strongly support providing overdose education prior to release for re-entering women who may then, in turn, provide education to others who can be prepared to use naloxone units for overdose reversal. Women are typically caregivers and highly value their relationships and support networks (e.g., Covington, 2007), which depending on the prosocial nature of those relationships, may increase or decrease likelihood of being in a situation to educate others on overdose reversal and/or the use of naloxone. Future research should aim to better understand women's role in OEND efforts in the community by leveraging their positionality in larger, and sometimes high-risk, social networks.

These findings suggest that incarcerated women with a history of OUD are at risk for overdose following release, which has been supported elsewhere (Binswanger et al., 2013; Grella et al., 2021; Hartung et al., 2023). Among women in this study who were released from jail and tracked three-months post-release, overdose rates (non-fatal rate of 4.1% among a sample of 699 women, plus an additional seven fatal overdoses among those not reached for follow-up) were higher than other samples of CLS-involved populations (Hartung et al., 2023). Also, approximately one-fifth of women reported multiple overdoses during this time is particularly concerning, as well as high rates of fentanyl and heroin during the four hours leading up to the overdose event, which is consistent with other research (Jalal et al., 2018; Kline et al., 2021). It should be noted that women were asked to self-report which drugs they had taken prior to overdosing (including heroin or fentanyl) which, in the absence of fentanyl test strips, may be difficult to conclusively differentiate. However, research has suggested that individuals who use opioids often use other strategies to detect the presence of fentanyl (e.g., taste, solution appearance, powder color; Ciccarone et al., 2017; Cance et al., 2023). Additionally, while unintentional fentanyl exposure remains

common, individuals may also express a preference for fentanyl over heroin due to the increased potency (McKnight et al., 2023). Thus, while it is a limitation that drug exposure was self-reported, it is possible that women may have either consumed fentanyl intentionally or were able to detect exposure in other ways, consistent with other self-reported substance use patterns. Detection of heroin and fentanyl use in overdose experiences should continue to be a focus of future research.

In addition, while most of the non-fatal overdoses were reportedly reversed with naloxone (93.1%), very few women reported utilization of emergency or other medical services following the overdose event. These findings are also consistent with previous qualitative research suggesting that individuals who overdose may be hesitant to reach out for medical care (Bergstein et al., 2021; Ellis et al., 2020; Koester et al., 2017). Ray et al. (2022) found that EMS response involving overdose was considerably more likely to result in individuals becoming involved with the CLS than incidents that did not involve overdose. Although this hesitancy may be associated with negative or stigmatizing experiences with healthcare providers or fear of CLS repercussions, interaction with medical professionals may provide critical opportunities for referrals and linkages to additional care, including MOUD. Thus, efforts to increase necessary resources for women that not only provide life-saving medical attention but also supportive services for treatment and recovery are critical areas for both future policy and research.

This study has limitations. While a strength of the study design included random selection and screening for criteria consistent with OUD, data were only collected from women in nine jails in Kentucky, which may limit generalizability to other samples of women in community or other carceral settings. In addition, naloxone receipt and distribution were based on self-report, which may be effected by the stressful nature of release from jail and community re-entry. Study measurement also did not include contextual details related to the overdose event, such as who the women might have been using drugs with at the time of the overdose. These details may be important for future research aimed at better understanding overdose experiences and naloxone use among women. In addition, while verified by death records, no additional data are available for the seven women who had a fatal overdose and did not complete the three month follow-up. Future analysis will focus on discerning any potential differences at baseline that may have been associated with fatal overdose experiences. Finally, while this study focused on OEND efforts and response for incarcerated women, it is important to note that overdose risk during re-entry is not unique to women. Men transitioning from carceral settings to the community are also at risk, and future research should example the

unique gender-specific factors that may be associated with OEND uptake and response during re-entry.

## Conclusions

This study makes an important contribution to the literature with findings that signal concerns about the significant need to increase OEND efforts for women released from jail. To date, most OEND studies with samples of individuals re-entering the community from carceral settings have included primarily men (e.g., Curtis et al., 2018; Horton et al., 2017). Incarcerated women often have additional needs associated with their opioid use and subsequent risk for overdose during community re-entry, including mental health issues, histories of interpersonal violence and trauma, low self-worth in relationships, and high-risk social networks that include others who use drugs (SAMHSA, 2009; Staton et al., 2023; Staton et al., 2017). Thus, targeted OEND efforts for women in general are desperately needed, and particularly among women at highest risk during the transition from jail to the community.

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NA.

## Author contributions

M.S. conceptualized and designed the study; M.D. conducted study analysis and assisted with interpretation of the data; M.L. assisted with the study literature review and drafting manuscript sections; M.T. contributed to data acquisition and analysis; P.F. assisted with interpretation of the data and drafting results section; L.F. contributed to the overall review of study findings and finalizing the manuscript draft; J.M.W. contributed to the overall review of study findings and finalizing the manuscript draft. All authors approved the submitted version of the manuscript. All authors agree to be accountable for their own contributions and to ensure that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature.

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## Data availability

The datasets generated and/or analyzed during the current study will be publicly available upon study completion through the JCOIN Data Commons/HEAL Ecosystem, or upon request from the corresponding author.

## Declarations

### Ethics approval and consent to participate

This study was approved by full review of the University of Kentucky Institutional Review Board (Protocol #94958), in accordance with ethical standards established through the Belmont Report. The approved protocol included an informed consent form which was reviewed with study participants prior to initiation of any research activities.

### Competing interests

The authors declare no competing interests.

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