

Overdose response and harm reduction in high-risk housing: A systematic review

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Abstract

This systematic literature review examines overdose response and harm reduction in supportive housing and single-room occupancy (SRO) settings where tenants experience higher risks of harms associated with illegal substance use such as fatal/non-fatal overdoses, solitary use, non-prescribed opioid use, and severe substance use disorder. The review will focus on the role these environments perform in responding to, mitigating, and/or exacerbating these harms among people who use drugs (PWUD). Thirteen studies were selected and reviewed based on their examination of harm reduction interventions and overdose prevention/responses within supportive housing and SROs. These criteria for inclusion allowed for critical analysis of qualitative, quantitative, and mixed-method studies that center on the experiences of PWUD living in supportive housing and SROs.

The major findings of the systematic review reveal the effectiveness of various overdose response and harm reduction interventions in SROs and supportive housing. However, challenges such as stigma, inadequate emotional support for peer responders, and structural barriers limit the effectiveness of these interventions. These findings suggest that centering privacy, mutuality, and community-building is crucial for enhancing the efficacy of overdose response/prevention and harm reduction strategies. The implications of this review highlight the need for research and interventions that address both immediate overdose risks and structural determinants of health, including housing stability and social support networks. Future research should include participatory methods to involve residents in the research process. These implications will inform the design, scope, and evaluation of research by the University of Washington Addictions, Drug & Alcohol Institute within Permanent Supportive Housing.

Introduction

Most overdose deaths in the USA and Canada occur within housing environments (Mack et al., 2017; Gomes et al., 2021). Urban overdose deaths in cities such as Vancouver, Canada, San Francisco, and New York City are disproportionately represented in housing environments that serve people with histories of chronic homelessness, such as supportive housing and single-room occupancy (SRO) settings (Rowe et al., 2019; BC Coroners Service, 2022; Nesoff et al., 2022). In King County, Washington State, overdose deaths have, on average, increased by 54% annually from 2020 to 2023 in locations operated or subsidized by governmental or social service agencies (King County Public Health, 2023). People who use drugs (PWUD) facing socio-economic challenges like unstable housing or homelessness are at a significantly higher risk for fatal and non-fatal overdoses (Knoebel & Kim, 2023; Magwood et al., 2020; Wallace et al., 2018). The risk for fatal overdose is heightened when PWUD use drugs publicly in the streets or use in secret (Kerr et al., 2007; Pauly et al., 2018; Trayner et al., 2020; Wallace et al., 2018). Paradoxically, supportive housing is one strategy proposed to reduce risks of fatal overdoses among PWUD who are unstably housed (Doran et al., 2022; Bardwell et al., 2017). However, systematic reviews and commentary in peer-reviewed journals have revealed that housing environments are often neglected in literature addressing overdose prevention and response efforts, as well as in studies specific to Housing First and supportive housing (Watson et al., 2017; Doran et al., 2022; Fleming et al., 2024a).

There is an urgent need to understand the large-scale legal and policy-based harm reduction factors contributing to overdose risk and responses in housing environments (Bardwell et al., 2017). This literature review will broadly integrate research outcomes focusing on the experiences of PWUD within supportive housing or SROs that employ harm reduction or

overdose response/prevention measures, either as novel interventions or as pre-existing supports. The broad focus of this review is due to the limited availability of literature specific to overdose risk and responses in housing environments.

To the best of the author's (or our) knowledge, there has been only one systematic review on harm reduction outcomes in Housing First: Kerman et al (2021). This current review distinguishes itself by examining studies that use housing status (e.g., people who are housed) as a control variable rather than as an independent variable. Given the scarcity of research on overdose prevention and response in supportive housing, this review synthesizes results across four key questions: 1) How can overdose response/prevention in SROs mitigate risks associated with illegal substance use? 2) How can harm reduction policies in SROs mitigate risks associated with illegal substance use? 3) How can overdose response/prevention in supportive housing mitigate risks associated with illegal substance use? 4) How can harm reduction policies in supportive housing mitigate risks associated with illegal substance use? By exploring these questions, the review aims to provide a comprehensive understanding of the effectiveness of harm reduction and overdose prevention strategies in supportive housing and SROs.

Methods

This systematic review will focus on studies involving tenants in supportive housing and SROs, herein referred to as High-Risk Housing. Tenants in High-Risk Housing are uniquely positioned at the intersections of communities that use drugs and within Housing First, multi-family residential, and marginal housing environments. Housing First is a model that prioritizes providing permanent housing to individuals experiencing homelessness without preconditions such as sobriety or participation in treatment programs (United States Interagency Council on Homelessness, 2016; Goering et al., 2016). Marginal housing is characterized by poor quality

and insecurity, often being the only alternative to homelessness available to people living in poverty in urban cities (Fleming et al., 2024a).

Although most SROs lack subsidies or support services, they mimic many conditions of supportive housing buildings including varied harm reduction policies (Carswell, 2012b). While supportive housing is often defined as integrating housing with supportive services, there is tension in these environments between low-to-high-barrier approaches and social control (Boyd et al., 2016). In contrast, High-Fidelity Housing First models maintain adherence to harm reduction, and are consistently evaluated with a validated assessment tool (Goering et al., 2016). Scattered-site Housing First, situated in locations without on-site services, has been observed as reducing the likelihood of forming substance use networks (Henwood et al., 2014; Somers et al., 2016). Additionally, Verdouw and Habibis (2018) note that the lack of privacy in single-site supportive housing can contribute to challenges for tenants with recovery-oriented goals. The focus of this review on High-Risk housing ensures a clearer analysis of the living conditions relevant to overdose response and harm reduction.

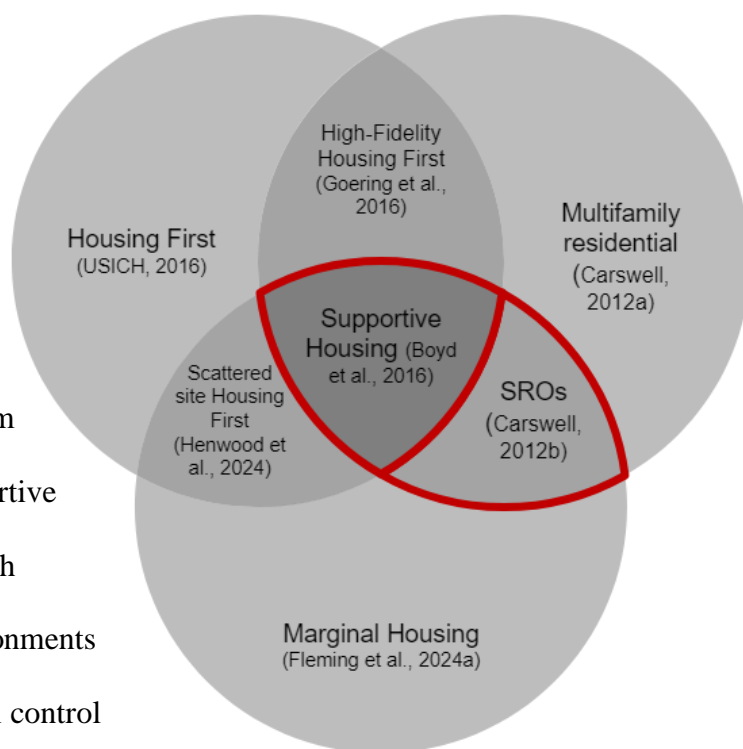


Figure 1. Intersections between Housing First, Marginal Housing, and Multifamily residential.

The outline in red illustrates the High-Risk Housing focus of this systematic review.

The data collection coverage in this review is exhaustive with selection citation. The search strategy employed a consistent set of keywords across the following databases: [1] Proquest Social Services Abstracts, [2] Web of Science Core Collection [3], WorldCat [4], PubMed [5], PsycInfo. Databases were initially searched on May 9, 2024, and the search process

was replicated on May 17, 2024, after the publication of Fleming et al. (2024b) on May 15 in the *International Journal of Drug Policy*. One list of keywords was used for searches of all fields: (“housing first” OR “supportive housing” OR “SRO”) AND (“harm reduction” OR “overdose”). These searches generated 804 records, 221 of which were eliminated as duplicates using Zotero software. Non-English language articles and articles in encyclopedia format were excluded. Articles were screened in Zotero for eligibility review first through housing keyword tags (e.g. “housing,” “home,” “SRO”), and then through drug-related keyword tags (“addiction”, all keywords with “drug”, “harm reduction”, “opiates”, “opioid”, “overdose”, “recovery”, “substance use”, “substance-related disorders”).

Full-text articles were then accessed and assessed as eligible for inclusion via a hierarchical criteria process. Literature/systemic reviews were excluded. Studies in which the entirety of the study population were program staff were excluded as these may miss critical insights from the tenants themselves, who directly experience the interventions and their outcomes (Forchuk et al., 2023). Articles which included populations that are currently experiencing homelessness were excluded to preserve housing status as a control variable. Populations living in shelters and emergency housing were excluded in this stage due to the distinct legal and privacy challenges faced by tenants with lease agreements (Boyd et al., 2016). However, Rhodes et. al (2018) and Harris et al. (2021) are exceptions to this exclusion criteria. Both studies began with a population that was experiencing homelessness and longitudinally implemented analysis of data at several stages throughout the housing process. While housing was used as an intervention, it was not an independent or dependent variable in these studies.

Articles which included populations that did not live in supportive housing or SROs were excluded (e.g. people living in market-rate housing). Articles referring to Permanent Supportive

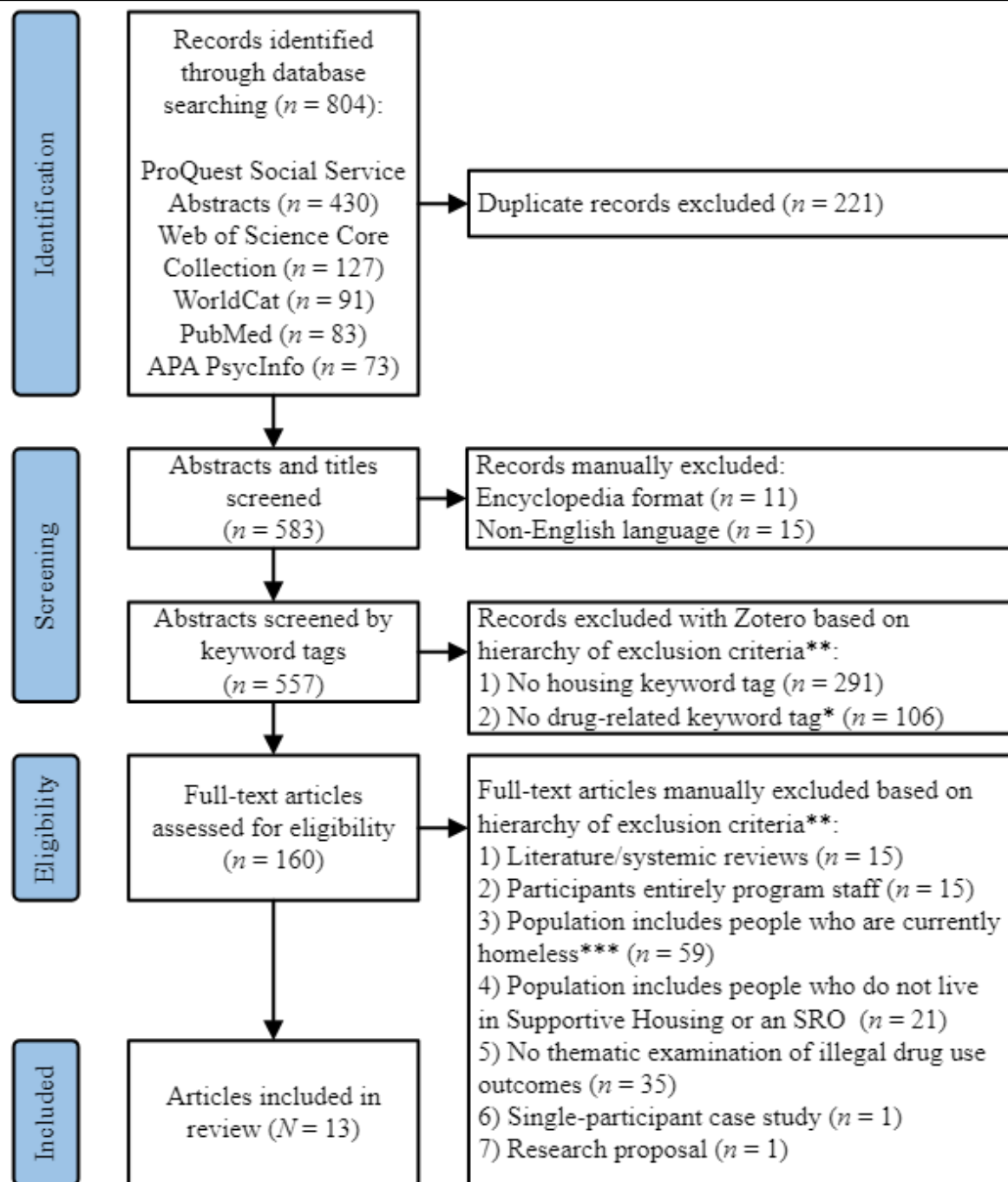
Housing (PSH) were included as an interchangeable term to supportive housing. Articles without thematic examination of illegal drug use outcomes were excluded if they did not examine a risk behavior associated with illegal drug use or examine a harm reduction practice. Hong et. al (2022) was excluded as a single-participant case study. While highly relevant to the research questions of this review, the proposed protocol for a randomized controlled trial (RCT) of overdose prevention practice implementation in PSH by Doran et. al (2023) was excluded.

The qualitative studies in this review primarily use semi-structured cross-sectional interviews, focus groups, community-based research methods, and ethnographic observation as data collection strategies. Quantitative studies in the review included retrospective cohort studies and longitudinal analyses of electronic health records. The populations studied were primarily tenants of SROs and supportive housing programs. Many studies focused specifically on women, including transgender women, living in High-Risk Housing. The populations studied were primarily tenants of SROs and supportive housing programs. Several studies included populations trained in overdose response, had experienced overdoses, or who have been diagnosed with severe opioid use disorder (OUD).

Qualitative concepts in this review include the practicality of overdose response technology, risks related to illegal substance use, domestic violence, sex work, social isolation, environmental risk factors, drug use privacy, socio-spatial housing dynamics, and the impact of harm reduction education and community-building. Quantitative variables include changes in prescribed opioid doses, overdose frequency, engagement with mental health and addiction services, drug use behaviors, and social network influences. Interventions examined include overdose response buttons, naloxone training, peer-led programs, Managed Opioid Programs (MOP), safer supply medications, trauma-sensitive environments, and supervised injection sites.

Results

Figure 2. PRISMA flow diagram outlining the identification, screening, eligibility, and inclusion process for articles in this review.



* Drug-related keyword tags: Addiction, all keywords with “drug”, harm reduction, opiates, opioid, overdose, recovery, substance use, substance-related disorders.

** Hierarchy established to ensure there was no overlap in screening exclusion criteria.

*** Rhodes et. al (2018) and Harris et al. (2021) are exceptions to this exclusion criteria.

Table 1: Reviewed studies concentrating on overdose response/prevention in SROs (n = 6)

Study	Study type	Intervention & Themes/measures	Duration & Location	N	Population	Incentive	Theoretical Models	Results	Limitations
Bardwell et al. (2021)	Cross-sectional semi-structured qualitative interviews	Intervention: <ul style="list-style-type: none">• Overdose response button technology Themes/measures: <ul style="list-style-type: none">• Technology usability.• Domestic violence.• Sex work.• Overdose response.• Drug use context.• Gender-based violence	Duration: <ul style="list-style-type: none">• October 2019 Location: <ul style="list-style-type: none">• 1 supportive SRO building, Vancouver, Canada	14	Tenants in study building, English speaking	\$30 (CAD)	<ul style="list-style-type: none">• Grounded theory approach.• Structural vulnerability.• Feminist theory.	<ul style="list-style-type: none">• Button technology was predominately used for emergencies like sex work-related violence and other tenants' overdoses.• Risk perception is context dependent.• The technology offered real-time harm mitigation but should be paired with additional interventions to address overdose risk.• Minimal barriers existed to using the button technology.	<ul style="list-style-type: none">• Power dynamics may have influenced disclosure of information.• Participants' experiences may not be applicable to tenants in other buildings.• Study sample was exclusively women and does not address how men or people living in mixed gender buildings utilize the button technology
Bardwell et al. (2019)	Cross-sectional semi-structured qualitative interviews, focus groups, ethnographic observation	Intervention: <ul style="list-style-type: none">• Tenant Overdose Response Organizers (TORO) Themes/measures: <ul style="list-style-type: none">• Overdose risk and response knowledge.• Social isolation.• Barriers to program implementation.• Emotional support for tenant organizers.	Duration: <ul style="list-style-type: none">• June 2017-September 2017 Location: <ul style="list-style-type: none">• 10 private SRO buildings, Vancouver, Canada	35	Two English-speaking populations: <ol style="list-style-type: none">1. Completed TORO training (<i>n</i> =10).2. Overdosed in a TORO building and administered Naloxone from another tenant (<i>n</i> =10).	\$30 (CAD)	<ul style="list-style-type: none">• Rhodes' risk environment framework.	<ul style="list-style-type: none">• The TORO program effectively addressed overdoses, engaged isolated tenants, and fostered community development.• Tenant organizers experienced burnout due to insufficient emotional support.• TORO sometimes worsened housing vulnerabilities for participating PWUD.	<ul style="list-style-type: none">• Participant experiences may not reflect those of other SRO tenants living in buildings governed by non-profit organizations.• Study is Vancouver specific.
Collins et al. (2020)	Longitudinal semi-structured qualitative interviews, ethnographic observation, unstructured conversations, extended case method	Intervention: <ul style="list-style-type: none">• N/A Themes/measures: <ul style="list-style-type: none">• Femininity and violence.• Drug use and risk of violence.• Women's physical bodies – perceptions, changes, and gendered ideals.• Drug use privacy.	Duration: <ul style="list-style-type: none">• May 2017-December 2018 Location: <ul style="list-style-type: none">• 10 SRA buildings in Vancouver, Canada	35	Tenants in study buildings, women (including transgender women), English speaking	\$30 (CAD) per interview	<ul style="list-style-type: none">• Intersectional risk environment framework.	<ul style="list-style-type: none">• Using in secluded spaces or without partners, allowed women to regain agency and minimize violence but heightened overdose risk.• Gendered beauty ideals lead to involuntary drug use disclosure for WWUD and impacts social relationships, violence risk, and economic opportunities.	<ul style="list-style-type: none">• No intervention is measured or discussed.• Transgender, two-spirit, and non-binary persons were under-represented.• Drug use disclosure arose organically throughout the course of the study.
Fleming et al. (2024b)	Cross-sectional semi-structured qualitative interviews, community-based research	Intervention: <ul style="list-style-type: none">• Supervised injection sites. Themes/measures: <ul style="list-style-type: none">• Socio-spatial dynamics of solitary drug use.• SRO housing as public space.• Drug use as private behavior.• Using alone as 'safer'.• Negotiating safety when using alone.	Location: <ul style="list-style-type: none">• October 2022, March-September 2023 Duration: <ul style="list-style-type: none">• Vancouver, Canada	30	Reported regular illicit opioid use or were enrolled in a safer supply program to reduce or replace illicit opioid use; and if they currently lived in an SRO in Vancouver Downtown Eastside	\$40 (CAD)	<ul style="list-style-type: none">• Intersectional risk environment framework.• Structural vulnerability.	<ul style="list-style-type: none">• Using drugs alone is a means of resisting the surveillance and control mechanisms that extend from public spaces into SROs.• Supervised injection sites position drug use as a deviant behavior.• Using drugs alone is seen as a safer alternative to facing the immediate social-structural harms prevalent in SROs.	<ul style="list-style-type: none">• Vancouver's Downtown Eastside neighborhood has a higher concentration of health and social services compared to other areas.• PWUD living in privately-operated SROs were underrepresented.• Transgender, non-binary, and Two-Spirit PWUD were underrepresented.• Indigenous participants were overrepresented.

Nowell et al. (2020)	Cross-sectional semi-structured qualitative interviews, ethnographic fieldwork, case study approach	Intervention: <ul style="list-style-type: none">Tenant Overdose Response Organizers (TORO) Themes/measures: <ul style="list-style-type: none">Emotional support.Social integration.Innovation in response to environmental challenges.Harm reduction and tenants' rights integration.	Duration: <ul style="list-style-type: none">May 2017-August 2018 Location: <ul style="list-style-type: none">Vancouver, Canada	15	Three English-speaking populations: <ol style="list-style-type: none">SRO tenants who participated in TORO programming (<i>n</i> = 8)Community organizers (<i>n</i> = 4)Representatives from funding and partner organizations (<i>n</i> = 3).	\$20 (CAD)	<ul style="list-style-type: none">Rhodes risk environment framework.	<ul style="list-style-type: none">Harm reduction education evolved into community spaces.Observed reduction in hallway and bathroom overdoses.State-sanctioned interventions can address immediate needs while building collective action against structural harms.	<ul style="list-style-type: none">None listed by authors.TORO participants may exhibit positive bias towards the program in their responses due to their personal investments.
Olding et al. (2023)	Cross-sectional and cohort semi-structured qualitative interviews, ethnographic fieldwork, participatory observation, rapport building with tenant participants	Interventions: <ul style="list-style-type: none">Tenant Overdose Response Program.Staff and resident overdose identification and response trainings.Wall mounted naloxone. Themes/measures: <ul style="list-style-type: none">Naloxone awareness, access, and understanding.Tenant mutual aid networks, privacy, and autonomy in drug use.Communication and trust between tenants and staff.	Duration: <ul style="list-style-type: none">May 2021-February 2022 Location: <ul style="list-style-type: none">Two SROs in San Francisco, USA	19	Two populations, English or Spanish speaking: <ol style="list-style-type: none">Tenants who were actively involved in social networks of people who use drugs and were already responding to overdoses in their buildings (<i>n</i> =8).Staff sampled to include a range of roles, including property managers, front desk, case managers, and custodial staff (<i>n</i> =11).	For tenants: \$50 (USD) weekly, \$25 USD Visa gift for follow-up interview	<ul style="list-style-type: none">Constructivist grounded theory approach	<ul style="list-style-type: none">The intervention improved naloxone access and understanding, strengthened mutual aid, and enhanced tenant-staff rapport.Psychosocial support like grief counseling and check-ins with specialists was recommended.Challenges included staff turnover.Women used drugs alone to avoid gendered violence.	<ul style="list-style-type: none">Participants may have been inclined during interviews to emphasize the program's positive aspects while minimizing its challenges.This evaluation did not include interviews with tenants who received naloxone or overdose education from specialists.

Table 2: Reviewed study concentrating on harm reduction policies in SROs (n = 1)

Study	Study type	Intervention & Themes/measures	Duration & Location	<i>N</i>	Population	Incentive	Theoretical Models	Results	Limitations
Knight et al. (2013)	Qualitative sub-sample of larger cohort study, purposive sampling, longitudinal semi-structured qualitative interviews, photo-ethnographic observation	Intervention: <ul style="list-style-type: none">Trauma sensitive built environments Themes/measures: <ul style="list-style-type: none">Constructions of urban space.Co-occurring mental health and substance use.Housing policies.Socio-structural organization.Trauma-sensitive housing environments.	Duration: <ul style="list-style-type: none">2007-2009 Location: <ul style="list-style-type: none">SROs in San Francisco, USA	30	Women living in SROs who reported recent physical and/or sexual victimization, unprotected sex, and needle sharing.	\$15 (USD) per interview	<ul style="list-style-type: none">Socio-structural vulnerability.Risk environment framework.Grounded theory methodology.	<ul style="list-style-type: none">The conditions and characteristics of SROs contributed to and/or exacerbated poor mental health.Residents reported preferences towards a “Don’t Ask Don’t Tell” policy approach to drug use in the building.Residents with histories and current vulnerabilities to trauma experienced greater stabilization when SROs were reorganized through physical and managerial changes.In non-trauma-informed SRO environments residents reported on-going fear and anxiety, sleep deprivation and hyper-vigilance.	<ul style="list-style-type: none">None listed by authors.For this review, this study may be limited in its assessment of the efficacy of harm reduction policies in SROs (the study aids in understanding the perceptions of WWUD in SROs around harm reduction policies).

Table 3: Reviewed studies concentrating on overdose response/prevention in supportive housing (n = 2)

Study	Study type	Intervention & Themes/measures	Duration & Location	N	Population	Incentive	Theoretical Models	Results	Limitations
Harris et al. (2021)	Retrospective cohort study, longitudinal quantitative analysis of electronic health records	Intervention: <ul style="list-style-type: none">Managed Opioid Program (MOP), supportive housing Themes/measures: <ul style="list-style-type: none">Housing/program retention.Injectable and oral opioid dose titration.Personal overdose.Connection to behavioral health services.	Duration: <ul style="list-style-type: none">August 2017-August 2018 Location: <ul style="list-style-type: none">Ottawa, Canada	26	People with severe OUD, tried at least one of the first line MOUD treatments, were injecting non-prescribed opioids, experiencing homelessness (at program enrollment), two weeks of retention in MOP.	Unknown		<ul style="list-style-type: none">Housing and MOP retention at 12 months was 77%.Participants’ opioid treatment doses increased in 12 months.Over half had no overdoses and there were no deaths among participants who remained enrolled.45% stopped non-prescribed opioid use, 96% connected to behavioral health services, 73% reconnected with estranged families, and 31% started work or vocational programs.	<ul style="list-style-type: none">Data on participants started on MOP but not retained for 14 days were not systematically collected, risking selection bias and overestimation of the positive impacts of the MOP.Using patient self-report data on non-prescribed opioid and stimulant use may have underestimated ongoing use due to social desirability bias.
Ivsins et al. (2022)	Cross-sectional semi-structured qualitative interviews	Intervention: <ul style="list-style-type: none">Prescribed safer supply medications, on-site supervised consumption, OAT. Themes/measures: <ul style="list-style-type: none">Safety concernsSolitary drug use: social, structural contextsAccess to and use of safe supply medications	Duration: <ul style="list-style-type: none">October 2020-January 2021 Location: <ul style="list-style-type: none">One Permanent Supportive Housing site in Vancouver, Canada	30	Tenants in study building, English speaking, aged 18 years or older	\$30 (CAD)		<ul style="list-style-type: none">Social and structural factors residents to use drugs alone in their rooms instead of the on-site supervised consumption site.Nearly half received safer supply medication on-site, effectively reducing overdose risk and improving quality of life.The study highlights the need to redesign spaces to accommodate privacy, social aspects of drug use, and preferred methods, especially smoking.	<ul style="list-style-type: none">Vancouver's Downtown Eastside neighborhood has a higher concentration of health and social services compared to other areas.Findings may not be representative of people living in other forms of supportive housing.COVID-19 safety measures limited participation in the study to people with access to phones.Involving staff may have affected participant recruitment.

Table 4: Reviewed studies concentrating on harm reduction policies in supportive housing (n = 4)

Study	Study type	Intervention & Themes/measures	Duration & Location	N	Population	Incentive	Theoretical Models	Results	Limitations
Henwood et al. (2012)	Longitudinal minimally structured qualitative interviews, purposive sampling	Intervention: <ul style="list-style-type: none">N/A Themes/measures: <ul style="list-style-type: none">Pivotal moments and people in recovery.Maturation and gradual recovery.Institutionalization.Different approaches to illegal drug use within housing policies.	Duration: <ul style="list-style-type: none">Unknown Location: <ul style="list-style-type: none">Two supportive housing programs in New York City, USA	38	Nominated by program staff as having achieved a measure of success in mental health recovery (including control over substance abuse), 21 years or older, DSM Axis I diagnosis, Global Assessment of Functioning (GAF) score above 65, housing stability, absence of current (but history of) substance use disorder (abuse or dependence), and one or more signs of mental health recovery, English speaking.	\$30 (USD) and \$4.50 MetroCard per interview		<ul style="list-style-type: none">The conditions of SROs contributed to and/or exacerbated chronic substance use and poor mental health.Residents with current vulnerabilities to trauma experienced greater stabilization when SROs underwent physical and managerial changes.In non-trauma-informed SRO environments residents reported on-going fear and anxiety, sleep deprivation and hyper-vigilance.	<ul style="list-style-type: none">None listed by authors.Purposive sampling excludes people who are currently using drugs, and that current drug use is based on self-report.

Nixon and Burns (2022)	Cross-sectional semi-structured qualitative interviews, theoretical sampling, post-collection focus groups as a form of triangulation and member checking	Intervention: <ul style="list-style-type: none">• Harm Reduction Policy Implementation Themes/measures: <ul style="list-style-type: none">• Residents’ sense of respect and belonging.• Residents’ trust of staff and acceptance of help.• Staff’s expression of respect and earning trust from residents.• Staff’s maintenance of trust with residents and individualizing supports.• Harm reduction (choice, dignity, autonomy).	Duration: <ul style="list-style-type: none">• Unknown Location: <ul style="list-style-type: none">• One supportive housing facility in Western 3Canada	15	Two English-speaking populations: <ol style="list-style-type: none">1. Residents who resided at building for at least six months and were able to participate “cognitively and physically.” Full-time and visiting staff working at the building for one year or more.	For tenants: \$25 (CAD)	<ul style="list-style-type: none">• Structural vulnerability,• Rhodes’ Risk Environment Framework.• Constructivist Grounded Theory,	<ul style="list-style-type: none">• Trust between staff and residents was a result of both the policies in place and the supportive physical and social environments, and improved residents’ sense of respect and belonging.• Harm reduction approach reduced barriers to care.• Staff framed risk primarily in terms of potential threats to residents' physical health and housing stability.	<ul style="list-style-type: none">• The small sample size and the predominance of participants of European/settler ancestry.• Some participant reports may have been influenced by the staff’s ongoing employment and residents' prior relationships with a principal investigator.
Pauly et al. (2018)	Cross-sectional semi-structured qualitative interviews, community-based research (CBR), research advisory committees, purposive sampling	Intervention: <ul style="list-style-type: none">• Harm Reduction Policy Implementation Themes/measures: <ul style="list-style-type: none">• Abstinence as a program norm.• Risk environments.• Social integration.• Conflicting harm reduction messages in zero tolerance substance use policies.• “Don’t Ask Don’t Tell” approach.• Open discussion of safer or reduced substance use.	Duration: <ul style="list-style-type: none">• Unknown Location: <ul style="list-style-type: none">• Two supportive housing programs in Western Canada	29	Two English speaking populations: <ol style="list-style-type: none">1. Current residents in study buildings or immediate past residents (<i>n</i> = 16). Current staff (<i>n</i> = 13).	For current and past residents: “Stipends”		<ol style="list-style-type: none">4. Partial implementation of harm reduction practices led to tensions with building policies, and increased overdoses and unsafe use patterns.5. Participants emphasized personal growth beyond abstinence. <ul style="list-style-type: none">• Full implementation of harm reduction is hindered by attitudinal, political, and policy barriers.	<ul style="list-style-type: none">• Not representative of individuals who are actively using substances without intending to stop or reduce their use.
Rhoades et al. (2018)	Longitudinal semi-structured interviews, mixed methodology, social network interviews (SNIs)	Intervention: <ul style="list-style-type: none">• Social Networks and Substance Use in PSH Themes/measures: <ul style="list-style-type: none">• Three-month history of substance abuse treatment.• Incarceration history.• Chronic mental health conditions.• Individual-level substance use and substance use within social networks.• Proximity and characteristics of social network members	Duration: <ul style="list-style-type: none">• August 2014-January 2016 Location: <ul style="list-style-type: none">• Los Angeles, USA	376	Moving into PSH with one of the partner agencies, 39 years old or older, spoke English or Spanish, and were not actively parenting minor children.	Unknown	<ul style="list-style-type: none">• Substance use remained stable in the first year of PSH, with a slight rise in marijuana use and a temporary drop in illicit drug use at six months.• Social networks showed no significant changes in substance use, but there were shifts in the proximity of substance users, with networks increasingly consisting of nearby residents.	<ul style="list-style-type: none">• People younger than 39 and those living with minor children were excluded.• Substance use in this study was measured by self-report.• Medical marijuana was legal in California during the study period.	

Reviewed studies concentrating on overdose response/prevention in SROs (n = 6)

The findings from Bardwell et al. (2021) and Collins et al. (2020) explore the gender dynamics in SROs, where women navigate unique challenges and risks related to drug use and overdose. Bardwell et al. (2021) found that overdose response button technology was primarily used in emergencies, such as sex work-related violence. This study was unique in emphasizing the usability of technology, suggesting it could be a scalable solution with proper support. Collins et al. (2020) explored the interplay of femininity, violence, and drug use, finding that women who used drugs in secluded spaces regained agency but faced increased overdose risks. Fleming et al. (2024b) examined the socio-spatial dynamics of solitary drug use in SROs. While not focused on gender-related dynamics, Fleming et al. (2024b) revealed similar results to Bardwell et al. (2021) and Collins et al. (2020). Using drugs alone was a means to resist surveillance and control but also poses significant overdose risks for tenants. Fleming et al. (2024b) also found that tenants perceived supervised injection sites as positioning drug use as deviant behavior, and using drugs alone was perceived as safer within the immediate social-structural harms prevalent in SROs.

Bardwell et al. (2019) demonstrated the effectiveness of the Tenant Overdose Response Organizers (TORO) program in engaging isolated tenants, though organizers experienced burnout due to insufficient emotional support. Nowell et al. (2020) and Olding et al. (2023) provided additional perspectives on peer-led interventions and staff-resident interactions in SROs. Nowell et al. highlighted the role of harm reduction education in creating community spaces and reducing hallway and bathroom overdoses, while Olding et al. emphasized the importance of naloxone access, mutual aid networks, and psychosocial support. Like Bardwell et al. (2019), both studies emphasized the need for comprehensive support systems to enhance the

effectiveness of harm reduction interventions.

Reviewed study concentrating on harm reduction policies in SROs (n = 1)

Only one study concentrated on harm reduction policies in SROs (research question #2). Knight et al. (2013) examined how the physical and managerial restructuring of SROs in San Francisco influenced the mental health and substance use patterns among women who had experienced recent physical or sexual victimization, unprotected sex, and needle sharing. When SROs environmental conditions were reorganized to be more trauma-sensitive, poor mental health were mitigated, however residents also prioritized structural improvements to their living environments over harm reduction strategy implementation. Residents expressed a preference towards a “Don’t Ask Don’t Tell” or “closed-door” policy approach to illegal substance use. This study is significant in that it emphasizes perspectives from WWUD that interventions around staffing and built environments in SROs may hold more meaning for them comparatively to implementations of harm reduction policies.

Reviewed studies concentrating on overdose response/prevention in supportive housing (n = 2)

The studies on overdose response and prevention in supportive housing to address research question #3 reveal important findings that highlight both the successes and challenges of various interventions. Harris et al. (2021) found that housing and Managed Opioid Program (MOP) retention rates were high, with 77% of participants remaining in the program after 12 months. Participants showed significant improvements, including increased opioid treatment doses and high rates of connection to behavioral health services. Over half of the participants had no overdoses during the study period, and many reconnected with estranged families or started work or vocational programs. This study emphasizes the positive impact of integrated opioid

management and supportive housing on stabilizing participants' lives and reducing overdose risks. Ivsins et al. (2022) highlighted that nearly half of the participants received safer supply medications, which effectively reduced overdose risk and improved quality of life. However, it also noted that social and structural factors often led residents to use drugs alone in their rooms rather than utilizing the on-site supervised consumption facilities. This finding emphasizes the need for redesigning supportive housing spaces to better accommodate privacy and the social aspects of drug use, particularly for those who prefer smoking methods. While Harris et al. (2021) focused on the benefits of managed opioid programs within supportive housing Ivsins et al. (2022) provided insights into the complexities of implementing safer supply programs and the importance of addressing the social contexts of drug use.

Reviewed studies concentrating on harm reduction policies in supportive housing (n = 4)

Overall, studies examining research question #4, harm reduction policies in supportive housing, found these policies require additional efforts to address structural barriers and psychosocial needs of residents. Henwood et al. (2012) revealed that different approaches to drug use within housing policies significantly influenced residents' recovery trajectories. The implementation of harm reduction policies was associated with pivotal moments in recovery, though the study highlighted the complexities of balancing institutional control with individual autonomy. Nixon and Burns (2022) reported the importance of respect and trust between residents and staff, finding that a harm reduction approach that prioritized choice, dignity, and autonomy effectively reduced barriers to care. Pauly et al. (2018) found that partial implementation of harm reduction practices led to tensions with existing building policies, resulting in increased overdose incidents and unsafe use patterns. Participants emphasized the need for personal growth beyond mere abstinence and the study identified attitudinal, political,

and policy barriers that hindered full implementation of harm reduction strategies. Rhoades et al. (2018) found that while individual substance use remained stable over the first year in PSH, the proximity and characteristics of social networks played a crucial role in shaping substance use behaviors, highlighting the need for supportive social environments to address risks experienced by PWUD. Whereas Nixon and Burns and Rhoades et al. focused on the impact of social integration on harm reduction, Pauly et al. and Henwood et al. (2012) emphasized the importance of addressing structural barriers to harm reduction implementation.

Discussion

The systematic review indicates that interventions in High-Risk Housing, such as overdose response training, peer-led initiatives, and safer supply programs, are generally effective in reducing overdose incidents and enhancing social integration among people who use drugs (PWUD). However, challenges such as stigma, insufficient emotional support for peer responders, and structural barriers were recurrent themes that limited the effectiveness of these initiatives (Bardwell et al., 2019; Fleming et al., 2024b; Ivsins et al., 2022; Olding et al., 2023). Policies that prioritize respect, dignity, and autonomy, as seen in the study by Nixon and Burns (2022), effectively reduce barriers to care and foster trust between residents and staff. Safer supply programs effectively reduced overdose risk and improved quality of life for tenants (Harris et al., 2021; Ivsins et al., 2022). Comprehensive support systems that include trauma-sensitive environments and community-building activities are essential for sustaining the benefits of harm reduction and recovery interventions (Bardwell et al., 2019; Henwood et al., 2012; Knight et al., 2013; Nowell et al., 2020; Rhoades et al., 2018). This systematic review demonstrates that the practices of PWUD must be centered when effectively implementing harm reduction interventions and overdose response/prevention strategies in High-Risk Housing.

The reviewed qualitative studies detailed insights into the lived experiences of PWUD, while the quantitative studies offered measurable outcomes that demonstrated the effectiveness of specific interventions. Qualitative studies, such as those by Bardwell et al. (2021) and Collins et al. (2020), utilized grounded theory and thematic analysis to explore the complexities of overdose response and the socio-spatial dynamics of drug use. The participant verification and iterative coding processes used in these studies ensured that the findings were guided in the participants' experiences, providing a reliable basis for understanding the effectiveness and challenges of the interventions. Quantitative studies like Harris et al. (2021) and Rhoades et al. (2018) used statistical analyses to assess housing retention rates, opioid treatment doses, and connections to behavioral health services, providing concrete evidence of the positive impacts of managed opioid programs. However, the relative rigor of the reviewed studies varied, with some relying heavily on qualitative data and participant self-reports, which may introduce biases. Additionally, the effectiveness of interventions differed between several studies, indicating that the methods employed in these studies are not replicable across study populations and housing environments. For example, studies focusing on women and gender-diverse residents highlight unique challenges related to gender-based violence and the need for privacy in drug use (Bardwell et al., 2021; Collins et al., 2020; Knight et al., 2013; Olding et al., 2023). In contrast, studies without a focus on women's experiences emphasized the importance of community engagement and visible support systems in mitigating overdose risks (Bardwell et al., 2019; Nowell et al., 2020).

Several gaps remain in the literature, particularly concerning the long-term outcomes of harm reduction interventions, overdose response/intervention strategies, scalability of interventions across different housing contexts, and the involvement of people living in High-

Risk Housing in the planning and implementation of harm reduction strategies. Doran et al. (2023) may address several of these gaps in the literature by proposing a hybrid type 3 stepped-wedge cluster randomized controlled trial (RCT) of overdose prevention practice implementation in PSH, informed by an advisory committee including people with lived experience of homelessness.

The forthcoming report of the inaugural Washington State PSH Perceptions and Community Health (PerCH) Survey operated by the University of Washington Addictions, Drug & Alcohol Institute may address the gap of assessing PSH resident needs and perceptions of substance use disorder related services across diverse political geographies and PSH models. This systemic review informs the design and evaluation of the next phase of the WA State PSH PerCH survey. The author (SP) will combine the results from the inaugural survey with this systematic review to strengthen the rigor of the PSH PerCH project. Considered changes to the project include the use of semi-structured interviews (vs. quantitative cross-sectional surveys), the integration of focus groups to inform data collection strategy and iterative data analysis, the involvement of peer researchers who are current or former residents of PSH, the establishment of community advisory boards, the integration of participatory observation, and the provision of additional emotional supports for residents participating in community-based research methods.

The systematic review procedures employed in this study had several strengths, including the use of comprehensive search strategies and the inclusion of diverse study designs, which provided a broad understanding of the issue. However, limitations included potential biases in study selection by manual review of full-text articles and variability in intervention implementation across different settings and quantitative/qualitative methods. This review also does not clearly delineate between the contrasting and intersecting challenges between people

who use stimulants and people who use opioids. It does not discuss the prevalence of fentanyl use, COVID-19, or other profound contemporary cultural factors affecting newer research on overdose response/prevention in High-Risk Housing. The heterogeneity of the study populations and housing environments in this review complicates the generalization of findings, especially beyond Vancouver, Canada where most studies were conducted. Additionally, while no studies were specifically described as High-Fidelity Housing First, the focus on this review on High-Risk Housing would warrant exploration of an exclusion strategy to focus the scope of housing studied in future systematic reviews. To strengthen the focus of a future systematic review, especially as more relevant studies are produced that explore overdose response/prevention in supportive housing, it would be beneficial to include a wider range of keywords and ensure a more consistent approach to selecting studies with similar designs.

Conclusion

The findings in this review emphasize the importance of social integration and centering the experiences of PWUD in High-Risk Housing when implementing overdose response/prevention and harm reduction approaches. Key takeaways include the need for sustainable support systems for peer responders, and the necessity of addressing structural determinants which threaten harm reduction policy outcomes for PWUD living in High-Risk Housing. Access to prescribed safer supply medication, alongside greater involvement of PWUD in intervention planning, are proven as successful interventions for reducing incidences of overdoses in High-Risk Housing.

Acronym Glossary

MOUD | Medications for opioid use disorder

MOP | Managed Opioid Program

OAT | Opioid agonist treatment

OUD | Opioid use disorder

PSH | Permanent Supportive Housing

PWUD | People who use drugs

SRA | Single Room Accommodation

SRO | Single-room occupancy (apartments)

TORO | Tenant Overdose Response Organizers

WWUD | Women who use drugs

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