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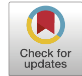
Impact of safe consumption facilities on individual and community outcomes: A scoping review of the past decade of research ☆



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ABSTRACT

Globally, the rate of injection drug use has increased, leading to a rise in injection-related injuries, infections, disease transmission, and death. Safe consumption facilities (SCFs) were developed with the aim of reducing injection-related disease transmission and death. There is a rapidly growing body of literature related the individual and community level outcomes associated with SCFs that warrants a comprehensive review. Thus, this scoping review examined the impact and effectiveness of SCFs related to: (1) individual outcomes for people who inject drugs; (2) community outcomes associated with SCFs; and (3) the cost-effectiveness of SCFs. The search strategy, developed by the lead author and a social work librarian, followed the PRISMA scoping review extension guidelines. We searched eight databases for peer-reviewed qualitative and quantitative articles published in English over the past decade, returning a total of 1255 articles. After screening, we extracted data from 24 articles. Findings indicate that SCFs were associated with reducing drug use related infection and disease transmission, enhancing access to addiction and other health services, reducing the risk of non-fatal overdoses, and were not associated with a significant increase in drug use, an increased rate of drug-related crime. Both qualitative and quantitative research support SCFs as a cost-effective approach to harm reduction for people who inject drugs with positive community outcomes as well. This review discusses the current state of the evidence and provides recommendations for future research directions.

1. Introduction

Globally, there are nearly 15.6 million people (aged 15–64) who inject drugs (PWID), with an estimated 2.6 million PWID in North America (Degenhardt et al., 2017). Canada and the United States (US) have both seen significant increases in the rate of injection drug use, as well as a rise in the rate of infections and fatal overdose related to injection drug use (Jacka et al., 2020; Levitt et al., 2020). The risk of fatal overdose significantly increases when people inject drugs alone, and may be prevented with timely intervention (i.e. administration of naloxone, an overdose prevention medication) (Colledge et al., 2019). There is also an increased risk of disease transmission (e.g. HIV, hepatitis) and serious infections associated with injecting drugs, which are often related to using unsterile equipment, injecting in unhygienic settings, or rushed injections (Colledge et al., 2019). The increase in injection drug use and the risks associated with using alone, in unhygienic or unsupervised settings necessitate the need for services that support safe injection practices among PWID.

Safe consumption facilities (SCFs) are locations where PWID are able to self-administer pre-obtained drugs in hygienic conditions under the supervision of qualified staff. These facilities were developed using a harm reduction framework, and were aimed at reducing the number of fatal overdoses and the transmission of disease among PWID (Potier et al., al.,2014). SCFs can be implemented as a stand-alone service, as well as an embedded or integrated service with others service providers (e.g. hospitals, homeless shelters) (Potier et al., 2014). In these facilities, PWID can inject pre-obtained drugs under supervision, have access to sterile injection equipment, and safe syringe disposal receptacles, and may include drug testing and needle exchange programs (British Columbia Centre on Substance Use [BCCSU], 2017; Potier et al., 2014). Of note, there are many terms used to refer to SCFs, including safe injection sites, overdose prevention sites, drug consumption rooms, and supervised consumption rooms, to name a few. For the purpose of this review, this program will be referred to as safe consumption facilities (SCFs).

The first SCF became operational in 1986 in Bern, Switzerland, in response to the high rates of fatal overdose and other drug-related harms

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associated with injecting drugs in rushed, dangerous, unsupervised, or unhygienic settings (Beletsky et al., 2018). To date, there are more than 100 SCFs across 11 different countries (Beletsky et al., 2018). In Canada, the first SCF was introduced in the mid-1990s and was unsanctioned, with the first sanctioned SCF opening in late 2003 (Beletsky et al., 2018; Kerr et al., 2017). The opening of the first sanctioned SCF was guided by Health Canada guidelines and paralleled with a rigorous evaluation of the transmission of infectious diseases, rate of overdose, successful referral treatment programs, rate of public disorder, and cost-effectiveness (Kerr et al., 2017; Potier et al., 2014). As of 2011, the Supreme Court of Canada ruled in Canada (AG) v PHS Community Services Society, 2011 SCC 44, [2011] 3 SCR 134 that SCFs were exempt from federal prosecution (Young, 2011). However, there are some publicly expressed concerns that funding would be better spent on other addiction treatments, and that SCFs may actually lead to greater drug use (Barry et al., 2019). In the United States, where SCFs have not been sanctioned, only 29% of adults support the legalization (Barry et al., 2019), yet there are current efforts underway in major US cities (e.g. California Assembly Bill 186, 2018) advocating for them.

As the number of SCFs increase, it is important to consider the evidence regarding the effectiveness of these centres to support PWID, the impact of SCFs in the community, and the cost-effectiveness of this harm reduction approach. There is a significant body of literature examining SCFs, related to the characteristics of clients using SCFs, public and professional opinions on SCFs, and theoretical papers recommending SCFs for PWID (Barry et al., 2019; Belackova et al., 2019; Caulkins et al., 2019; Kerr et al., 2017; Potier et al., 2014). Additionally, there is a growing body of literature examining the individual and community outcomes associated with SCFs, as well as cost-benefit analyses related to SCFs (Belackova et al., 2019; Potier et al., 2014). There have been some prior reviews published on the effectiveness of SCFs, including two reviews conducted over 7 years ago (McNeil and Small, 2014; Potier et al., 2014), and a more recent review focused on quantitative studies only (Kennedy et al., 2017), as well as a review of substance use interventions effectiveness reviews (Magwood et al., 2020). Of note, Magwood et al. (2020) is an umbrella review that includes the three prior reviews mentioned (e.g. Kennedy et al., 2017; McNeil and Small, 2014; Potier et al., 2014).

Each of these reviews have merit and provide valuable information regarding the effectiveness of SCFs. However, there are some important gaps this review will fill. This review will focus on both qualitative and quantitative research evidence generated over the past decade, building upon the last comprehensive review by Potier et al. (2014) that included both qualitative and quantitative research studies. The more recent review by Kennedy et al. (2017) focuses solely on quantitative studies. Our review will also focus on studies published over the past decade, and will reflect the current body of knowledge without being redundant with prior reviews. With each of these reviews, the methods and results were presented in highly technical language that may be less accessible to practitioners, agency directors, and laypersons. We will not provide a statistical critique of the methods, but will provide a review of the current state of the evidence and identify areas for growth. Finally, the intention of this article is to marry the scientific rigor of a systematic search with an accessible presentation of results related to: (1) individual outcomes for PWID; (2) community outcomes associated with SCFs; and 3) the cost-effectiveness of SCFs. Of note, this scoping review was initially completed for local service providers to help determine the utility of safe injection site as an embedded service within their agency.

2. Methods

2.1. Overview and search strategy

A scoping review of the literature was conducted to provide a landscape of the empirical findings associated with the effectiveness of SCFs, with a focus on individual and community level outcomes. A scoping review was the most appropriate method, as it provides a framework in which to synthesize evidence on the effectiveness of SCFs intended to help the reader develop an understanding of the relevant concepts and key outcomes (Tricco et al., 2018). This approach uses a systematic process to search and select relevant literature and then presents a synthesis of findings for knowledge users. The search strategy protocol was developed prior to the review by the lead author and a social work librarian following the PRISMA-ScR extension guidelines (Tricco et al., 2018). No protocol was published in advance of this review due to the short turn around for the original funder, a local agency seeking support in navigating the evidence related to SCFs. The PRISMA-ScR guidelines indicate that protocols should "ideally" be registered to ensure transparency and reduce duplication of work, but are not required (Tricco et al., 2018). The literature search utilized eight databases hosted through three platforms: (1) EBSCO; (2) ProQuest, and (3) Ovid, using a combination of keywords, phrases, Boolean logic, proximity searching, and abstract/title searching (See Table 1). The databases, limiters, and an example Medline (EBSCO) search strategy are included in Table 2. The search was conducted by the social work librarian in December 2020, screening occurred by the lead author and third author in December 2020 and January 2021, and final data extraction took place in January and February 2021.

2.2. Study inclusion and exclusion

Inclusion criteria covered studies and knowledge syntheses (e.g. literature and systematic reviews) published between 2010 and 2020 that were in English, peer-reviewed, held the desired search terms in the title and/or the abstract of the study, and focused specifically on the individual and community-based outcomes associated with SCFs, as well as the inclusion of cost-benefit analyses. We chose to focus on the past decade of evidence as a way of building upon the previous literature without being redundant with reviews of early findings (McNeil and Small, 2014; Potier et al., 2014). There was no limiter for geographical location or research methodology. Exclusion criteria included gray-literature, studies that did not specifically focus on outcomes associated with SCFs (e.g. opinions of SCFs, recommendations for using SCFs, characteristics of SCFs clients). gray literature sources often report findings from other peer-reviewed published articles, thus we wanted to focus on the original sources of the evidence and reduced redundancy. Of note, search terms "harm reduction," "overdose prevention," and "needle exchange" were not included. Instead, the search strategy used neutral terms to ensure the reviewed literature was inclusive of all outcomes related to SCFs.

The initial search resulted in 1255 articles across the eight databases. Search results were uploaded to Covidence (2019), a systematic review software, and 719 duplicates were removed resulting in 536 articles left for screening. Using the exclusion and inclusion criteria, two reviewers screened the remaining article titles and abstracts independently, with any disagreements resolved by the lead author. After abstract and title screening, 478 articles were excluded, with the majority of articles focused on the characteristics of SCFs clients or conclusions that recommendations for the use of SCFs, but did not examine outcomes associated SCFs. We conducted full-text screening for the remaining 58 articles, resulting in an additional 30 articles that were excluded due to a lack of focus on either individual or community-level outcomes. Additionally, we found 4 systematic reviews which were summarized in the results to provide a comparison with the reviewed articles. Finally, the remaining 24 articles were examined and data extracted was related to outcomes associated with SCFs. See Fig. 1 for PRISMA article selection flowchart.

2.3. Data collection, extraction, and synthesis

The 24 full-text articles were screened by two researchers. We extracted data related to the article characteristics, including: the study objective, SCF type, year of data collection, population and location,

Table 1
Search terms for safe injection facilities.

Example of Medline (EBSCO) Search Strategy
Limiters: Date of Publication: 20100101-20201231; English Language; Scholarly (Peer Reviewed) Journals **Search modes:** Boolean/Phrase **Search Terms:** AB ((("safe-injection" OR "safe-injecting" OR "safe injection" OR "safe injecting" OR "safer-injection" OR "safer-injecting" OR "safer injection" OR "safer injecting" OR "safe drug injection" OR "safe drug injecting" OR "safer drug injection" OR "safer drug injecting" OR "safe consumption" OR "safer consumption" OR "safe drug consumption" OR "safer drug consumption" OR "supervised consumption" OR "supervised drug consumption" OR "supervised injection" OR "supervised injecting" OR "supervised drug injection" OR "supervised drug injecting" OR "medically supervised" OR "safe drug" OR "drug consumption") N1 (site* OR service* OR facilit* OR center* OR center* OR program* OR room* OR space*)) OR ("fix room*" OR "consumption room*" OR "shooting galler*" OR "wet facility*" OR "wet house facility*" OR "wet house")) OR TI ((("safe-injection" OR "safe-injecting" OR "safe injection" OR "safe injecting" OR "safer-injection" OR "safer-injecting" OR "safer injection" OR "safer injecting" OR "safe drug injection" OR "safe drug injecting" OR "safer drug injection" OR "safer drug injecting" OR "safe consumption" OR "safer consumption" OR "safe drug consumption" OR "safer drug consumption" OR "supervised consumption" OR "supervised drug consumption" OR "supervised injection" OR "supervised injecting" OR "supervised drug injection" OR "supervised drug injecting" OR "medically supervised" OR "safe drug" OR "drug consumption") N1 (site* OR service* OR facilit* OR center* OR center* OR program* OR room* OR space*)) OR ("fix room*" OR "consumption room*" OR "shooting galler*" OR "wet facility*" OR "wet house facility*" OR "wet house"))

Table 2
Databases, search limiters used/available, and search results.

Database Limiters	Medline (EBSCO)	APA PsycINFO (EBSCO)	Social Work Abstracts (EBSCO)	Social Service Abstracts (ProQuest)	CINAHL (EBSCO)	EMBASE (Ovid)	EBM Reviews (Ovid)	JBI EBP (Ovid)
Date: 2010–2020	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Language: English	Yes	Yes	No	Yes	Yes	Yes	Yes	No
Peer-reviewed	Yes	Yes	Yes	Yes	Yes	No	No	No
Articles Returned	322	212	2	11	273	425	7	3

Note: Search completed on December 16, 2020; screening occurred in January 2021; Analysis February 2021; APA = American Psychological Association; CINAHL = Cumulative Index of Nursing and Allied Health Literature; EMBASE = Excerpta Medical Database; EBM = Evidence-Based Medicine; JBI EBP = Joanna Briggs Institute of Evidence Based Practice.

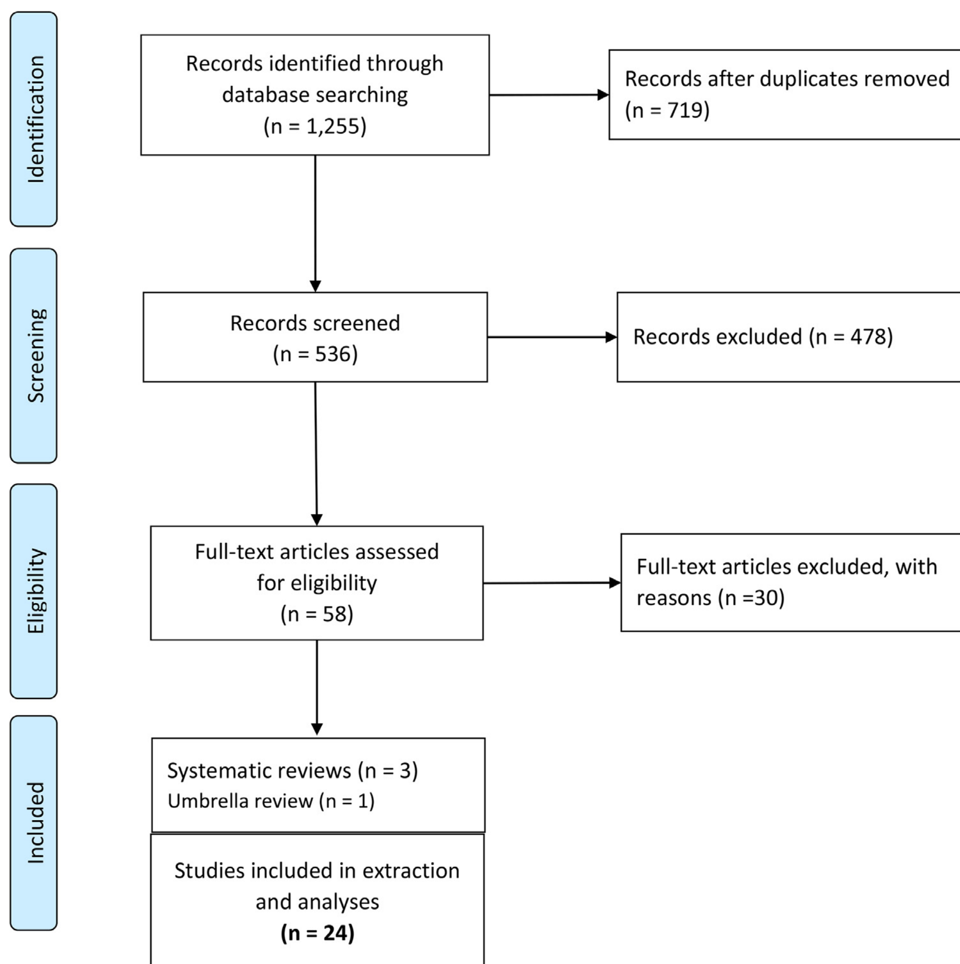

Fig. 1. PRISMA scoping review extension article selection flow chart.

and research method and analysis type (See Table 3). The quantitative research methods and analytic approaches were discussed based on their ability to meet the standards of causality between the use or presence of SCFs and the identified outcome. The key elements of causality, include: (1) temporal order, (2) empirical association, and (3) nonspurious relationship (e.g. including control variables). First, we identified the presence of pre-test/post-test or longitudinal research design (temporal order). Second, we determined whether the analyses were descriptive or inferential. Descriptive analyses describe and summarize the data, whereas inferential analyses are used to test hypotheses and determine statistical significance between predictor and outcome (e.g. empirical associations). Finally, we considered the presence of control variables that may be influencing the relationship between the outcome and predictor (e.g. nonspurious relationship). The need to assess causality was not apply to qualitative research, however, the inclusion of qualitative findings helps to provide contextual nuance and provide important insights as to the impact of SCFs. In doing so, this scoping review provides a comprehensive overview of the current landscape of research examining the effectiveness and efficacy of SCFs.

We then extracted data related to individual outcomes, including injection-related infections, disease transmission, non-fatal and fatal overdose, death, and other outcomes (See Table 4). We also extracted data related to community outcomes, including use in public spaces, public syringe disposal, use of other public services (e.g. ambulance), and criminal activity, as well as cost-benefit analysis (See Table 5). The researchers extracted data from the first few articles and compared the degree of agreement between researchers. Once all articles were screened and data extracted the results were discussed among the research team.

3. Results

3.1. Description of the articles

In total, there were 24 articles reviewed, 13 articles of which were from Canada, with 11 from Vancouver (Andresen and Boyd, 2010; DeBeck et al., 2011; Irvine et al., 2019; Jozaghi and Andresen, 2013; Jozaghi et al., 2013; Kennedy, et al., 2019a, 2019b; Kennedy et al., 2020; Marshall et al., 2011; Pinkerton, 2010; Small et al., 2012), 1 from Ottawa (Kerman et al., 2020), and 1 from Toronto (Scheim et al., 2020). Three articles were from the United States (Davidson et al., 2018; León et al., 2018; Olding et al., 2020), 2 from Australia (Rance and Fraser, 2011; Salmon et al., 2010), and 6 from Europe (Bergamo et al., 2019; Espelt et al., 2017; Folch, et al., 2018; Kinnard et al., 2014; Madah-Amiri et al., 2019; Scherbaum et al., 2010). The articles in this review included data collected from as early as 1998 (Salmon et al., 2010)) up until March 2020 (Scheim et al., 2020). Among the 24 articles, there were a variety of research methods and analytic approaches, including cross-sectional methods, ethnographic fieldwork, and longitudinal observational analysis. There were 14 articles that used quantitative methods, including 4 using cross-sectional studies with descriptive analyses (Folch et al., 2018; Kinnard et al., 2014; Scheim et al., 2020; Scherbaum et al., 2010), 4 using cross-sectional studies with inferential analytic approaches (e.g. logistic regression, Bayesian hierarchical models) (Irvine et al., 2019; Kennedy, et al., 2019a; Kennedy et al., 2020; Madah-Amiri et al., 2019), and 6 using longitudinal analyses (e.g. pre-test/post-test) (DeBeck et al., 2011; Espelt et al., 2017; Kennedy, et al., 2019b; León et al., 2018; Marshall et al., 2011; Salmon et al., 2010). Finally, there were 7 articles using qualitative methods, including 5 using qualitative interviews (Davidson et al., 2018; Jozaghi and Andresen, 2013; Kerman et al., 2020; Olding et al., 2020; Small et al., 2012) and 3 using recorded data or ethnographic fieldwork (Bergamo et al., 2019; Rance and Fraser, 2011; Small et al., 2012). Some articles used both interview and ethnographic methods.

To ensure the comprehensiveness and parsimony of this review, we compared our search results to prior reviews. Potier et al. (2014) included a total of 75 articles, with 56 articles published prior to our review cut off date of 2010. Ten articles in Potier et al. (2014) that were published between 2010 and 2014 did not meet our inclusion criteria (e.g. focused on characteristics of SCF attendees). The remaining 9 were included in our review. McNeil and Small (2014) had a total of 29 qualitative articles, of which 20 were published prior to 2010, 8 did not examine outcomes associated with SCFs (e.g. focused on access to SCFs, operating policies, and reasons for attending, and the remaining 1 article was included in our review. Finally, Kennedy et al. (2017) included a total of 47 articles, of which 13 were new articles that were not included in Potier et al. (2014). Of the 24 articles in this review, 9 were in a prior review and 15 were new articles that had not been included in any prior review of the literature. Among newly reviewed articles, 1 was from 2011 (Rance and Fraser, 2011) and the remaining were published after 2017, with 6 qualitative and 9 quantitative studies.

In total, 20 articles included at least one individual-level outcome and 11 included at least one community-level outcome, with 3 cost-benefit/effectiveness analyses (Andresen and Boyd, 2010; Pinkerton, 2010; Jozaghi et al., 2013). Among articles examining individual outcomes, 9 focused on injection-related infection and disease transmission, 7 on drug use and treatment access behaviors, 6 on non-fatal overdose, 8 on death, and 6 on other outcomes (e.g. general wellbeing, condom use). Among articles with community-outcomes, 7 focused on drug use in public spaces or public intoxication, 7 on public disposal of syringes and other drug paraphernalia, and 3 on criminal activity. Finally, the three cost-benefit analyses focused on cost savings related to a reduction in disease transmission, loss of life, and cost of other services

3.2. Individual-related outcomes

3.2.1. Infection/disease transmission

SCF use was associated with a reduction of HIV/HCV transmission, injection-related injuries, and injection-related risk behaviors (Andresen and Boyd, 2010; Davidson et al., 2018; Jozaghi and Andresen, 2013; Jozaghi et al., 2013; Pinkerton, 2010). SCF attenders reported that the sites not only provided a safe and clean place to inject, but they also learned safer injection practices from SCF staff (Davidson et al., 2018; Small et al., 2012). SCF attenders also reported that they were less likely to rush the injection, increasing the chances of using safer injection methods and reducing the chances of injury and infection (Davidson et al., 2018). One study (Scherbaum et al., 2010) found that SCF use was not associated with a difference in skin abscesses at 3-month follow up. However, it should be noted that this rate was very low at baseline and at 3-months follow-up. Relatedly, the three cost-effectiveness studies identified were focused on costs associated with disease transmission (Andresen and Boyd, 2010; Pinkerton, 2010; Jozaghi et al., 2013).

3.2.2. Drug use and treatment access behaviors

Overall, we found similar findings to prior systematic reviews, showing SCF use was associated with reduced chance of rushed injection and shared needles, increased uptake in addiction and other treatment services, and no change in relapse rate, as well as one study that found no association between SCF use and addiction treatment uptake. Three articles (Kinnard et al., 2014; Pinkerton, 2010) found that SCFs were associated with a reduction in needle sharing, with one article finding no differences in risky injection practices at baseline with those at the 3-month follow-up (Scherbaum et al., 2010). We also found that SCF use was associated with an increased chance of accessing detox and addiction treatments (DeBeck et al., 2011; Folch et al., 2018), as well as other healthcare services (Jozaghi and Andresen, 2013; Kerman et al., 2020). These studies included findings using cross-sectional observational, longitudinal/prospective, and qualitative methods. DeBeck et al. (2011) found more than half of SCF attenders accessed addiction treatment and Folch et al. (2018) found frequent SCF attenders were 2 times more likely to access addiction services than less frequent attenders. Finally,

Table 3
Article description information for the past decade of research in chronological order.

Article Citation	Study Objective	Term Used	Dates of data collection	Population & Location	Method & Analysis	Causality
Andresen and Boyd (2010)	To conduct a cost-effectiveness and cost-benefit analysis of SCFs related to HIV-infections and death-related costs	Supervised Injection Facility (SIF)	2008	Secondary cost-benefit analysis of InSite data in Vancouver, BC	Mathematical modeling before and after SCF policy implementation; Cost-benefit analysis	TO – Pre-post NS – Included covariates EA – Inferential statistics used
Pinkerton (2010)	To determine whether SCFs and syringe exchange programs were cost saving due to averted HIV-related medical care costs	Supervised Injection Facility (SIF)	2004–2006	Secondary cost-benefit analysis of InSite data in Vancouver, BC	Mathematical model-based analysis of HIV-related medical care costs; Cost-benefit analysis	NS – Included covariates EA – Inferential statistics used
Salmon et al. (2010)	To examine if SCFs were effective in easing the burden on ambulance services attending to opioid-related overdoses in the community	Supervised Injecting Facility (SIF)	May 1998–2006	*N* = 20,409 ambulance attended opioid-related overdoses in a 'red light' district of Sydney, AUS	Ecological study before (36 months) and after (60 months) opening a SCF; Stepped analysis using Poisson regressions accounting for distance from SCF	TO – Pre-post NS – Included comparison area EA – Inferential statistics used
Scherbaum et al. (2010)	To examine associations of attending an unsanctioned DCF with drug-associated at-risk behavior and referral to the health care treatment system	Drug Consumption Facility (DCF)	November 2002-December 2003	*N* = 129 DCF attenders in Essen, Germany	Longitudinal observational analysis with follow ups at 1-, 3-, and 6-months; Wilcoxon tests to examine individual changes	TO – Longitudinal
DeBeck et al. (2011)	To examine factors associated with drug use cessation and treatment entry among SCFs attendees	Safe Injection Facility (SIF)	December 2003-June 2006	*N* = 902 randomly selected SCF attendees from the InSite SCF in Vancouver, BC	Longitudinal cohort study with 24-month follow-up; Multivariate Cox regression analysis with a priori confounding factors.	TO – Pre-post NS – Included covariates EA – Inferential statistics used
Marshall et al. (2011)	To examine overdose morality rates before and after SCF opening	Supervised Injection Facility (SIF)	2001–2003, 2003–2005	Population-based mortality rates before (2001–2003) and after (2000–2005) opening the InSite SCF in Vancouver, BC	Longitudinal cohort study of mortality rates pre/post-SCF opening comparing 500 m site radius to the rest of the city; Wilcoxon signed-rank test and ArcGIS analysis	TO – Pre-post NS – Included comparison area EA – Inferential statistics used
Rance and Fraser (2011) [N]	To examine the relationships created between staff and clients within SCFs, and examine how SCF impact perceptions of stigma	Supervised Injecting Facility (SIF)	May 2001–2005	*N* = 391,170 comments in 9 comment books from 9778 SCF attenders in Sydney, AUS	Qualitative social approach to highlight social dimensions of SIFs using SCF client comment books; Thematic analysis	–
Small et al. (2012)	To explore the motivations for injecting among PWID within a local SCF and how the supervised setting interacts with their situated risk perceptions	Supervised Injecting Facility (SIF)	2005–2006	*N* = 50 randomly selected SCF attenders drawn from the Scientific Evaluation of Supervised Injecting Cohort in Vancouver, BC	Qualitative in-depth interviews and ethnographic fieldwork; Thematic analysis on reasons for use and perceptions of risk mediation	–
Jozaghi and Andresen (2013)	To explore the status of PWID who reside in areas with and without access to SCFs	Safe Injection Facility (SIF)	2011	*N* = 16 PWID near SCF in Vancouver, BC; *N* = 9 PWID in Surrey, BC and *N* = 6 PWID in Victoria, BC without SCFs	Qualitative semi-structured interviews; Thematic analysis related to experiences to the SCF access, use on the outside of the SCF, and desire for SCF in the community	–
Jozaghi et al. (2013)	To conduct a cost-benefits and -effectiveness analysis related to HIV and HCV infections among SIS attendees	Safe Injection Facility (SIF)	2012	Secondary cost-benefit analysis related of HIV and Hepatitis C infection related costs in Montreal, Canada	Mathematical model-based analysis of HIV and Hepatitis C infections prevented as a result of a new SIF location; Cost-benefit analysis	NS – Included covariates EA – Inferential statistics used
Kinnard et al. (2014)	To assess whether the use of SCF services were associated with changes in injecting behavior and syringe disposal practices	Supervised Injection Facilities (SIF)	February-August 2013	*N* = 41 PWID using a standalone SCFs in Copenhagen, Denmark	Quantitative survey using descriptive statistical analysis	TO – Retrospective self-report
McNeil and Small (2014)SR	To conduct a systematic review and meta-synthesis of qualitative studies reporting PWID's experiences with three types of safer environment interventions	Supervised Injection Facility (SIF)	1997–2012	*N* = 29 qualitative articles about PWID attendance of SCFs in multiple locations	Systematic review and meta-synthesis of qualitative literature prior to 2014	–
Potier et al. (2014) SR	To systematically collect and synthesize the currently available evidence regarding SIS-induced benefits and harm	Supervised Injection Services (SIS)	January 2014	*N* = 75 articles from multiple locations	Systematic review of the literature following PRISMA guidelines prior to 2014	–
Espelt et al. (2017) [N]	To estimate the effect of two SCF services and police interventions for PWID on discarded syringes in public spaces	Safe Consumption Facility (SCF)	2004–2014	Number of discarded syringes collected from public spaces in six districts (1 with a newly opened SCF) in Barcelona, Spain	Quantitative descriptive analyses and interrupted time-series analysis; Quasi-Poisson regression models for over-dispersed count data	TO – Time-series NS – Included covariates EA – Inferential statistics used

(*continued on next page*)

Table 3 (*continued*)

Article Citation	Study Objective	Term Used	Dates of data collection	Population & Location	Method & Analysis	Causality
Kennedy et al. (2017) [SR]	To systematically reviewed the literature investigating the health and community impacts of SCFs	Supervised Consumption Facilities (SCF)	2003–2007	*N* = 47 articles between 2003 and 2017 in multiple locations	Systematic review of the literature following PRISMA guidelines	–
Davidson et al. (2018) [N]	To examine the positive and negative impacts SCFs from the perspective of SCF attenders	Safe Injection Facility (SIF)	June-August 2016	*N* = 23 SCFs attenders, staff, and volunteers at an unsanctioned facility in California, US	Qualitative interviews and ethnographic field work; Thematic analysis using grounded theory approach	–
Folch et al. (2018) [N]	To examine the impact of frequently attending DCR on injecting in public, infectious risk, accessing addiction services, and non-fatal overdoses	Drug Consumption Rooms (DCR)	2014–2015	*N* = 510 frequent DCR attenders in Catalonia, Spain	Cross-sectional bio-behavioral study; Multivariate logistic regression analyses with controls	NS – Included covariates EA – Inferential statistics used
León et al. (2018) [N]	To examine the impact of the opening of the SPOT program on measures of injection drug-related public order in the neighborhood near the facility	Supervised Injection Facility (SIF)	April 2016	Observational data and staff accounts from SIF in Boston, MA	Quantitative before (10 weeks) and after (12 weeks) opening SCF; Poisson log-linear regression models with controls	TO – Time-series NS – Included confounding EA – Inferential statistics used
Bergamo et al. (2019) [N]	To provide information about a 10-year unsanctioned drug user-run SCF experience	Safe Injection Facility (SIF)	2007–2017	SCF staff and site records from unsanctioned SCF in Stanzetta, Italy	Qualitative narrative reports collected longitudinally; Descriptive statistics for quantitative data	–
Irvine et al. (2019) [N]	To measure the combined impact of large-scale opioid overdose interventions in BC on the number of avoided deaths	Supervised Consumption Sites (SCS)	2012–2017	Secondary analysis of all overdose events 2012–2017 in Vancouver, BC	Mathematical modeling; Rate-based Bayesian hierarchical Markov model with controls	TO – Longitudinal NS – Included confounding EA – Inferential statistics used
Kennedy, Hayashi et al. (2019) [N]	To examined the relationship between frequent SCF use and all-cause mortality among PWID	Safe Injection Facility (SIF)	December 2006 – June 2017	*N* = 811 PWID attending SCFs from 2 cohorts in Vancouver, BC	Two prospective cohort studies; Multivariable extended Cox regression analyses	TO – Prospective NS – Included confounding EA – Inferential statistics used
Kennedy, Klassen et al. (2019) [N]	To longitudinally characterize discontinuation of use of a supervised injection facility	Supervised Injection Facility (SIF)	December 2005–2016	*N* = 1336 PWID from 2 cohorts in Vancouver, BC	Two community-recruited prospective cohort studies with 50- month follow up using Cox survival analyses	TO – Prospective NS – Included confounding EA – Inferential statistics used
Madah-Amiri et al. (2019) [N]	To describe the patterns, severity, and outcomes of opioid overdoses and the role a SCF may have had on overdoses	Safe Injection Facilities (SIF)	2014–2015	*N* = 1054 out of 48,825 ambulance calls that included an overdose event in Olso, Norway	Ambulance call notes coded for location, overdose event, transport to hospital; Logistic regression analyses with control variables	NS – Included confounding EA – Inferential statistics used
Kennedy et al. (2020) [N]	To examine the gender specific relationship between SCF use and exposure to violence among people who inject drugs (PWID) in a Canadian setting	Safe Injection Facility (SIF)	December 2005–2016	*N* = 1930 PWID followed for 4 years in Vancouver, BC	Secondary data from two prospective cohort studies (VIDUS & ACCESS) using multivariate generalized estimating equations with control variables	TO – Prospective NS – Included confounding EA – Inferential statistics used
Kerman et al. (2020) [N]	To explore service users' experiences with SCSs and how their service use affected their social determinates of health	Supervised Consumption Sites (SCS)	March-August 2019	*N* = 21 SCS attendees in Ottawa, ON	Qualitative in-depth interviews and focus groups with thematic coding and member checking	–
Magwood et al. (2020) [UR]	To review the effectiveness of specific harm reduction and pharmacological interventions among homeless or vulnerably housed individuals with SUDs	Supervised Consumption Sites (SCS)	August 2019	*N* = 30 articles, with 3 focused on SCSs in multiple locations	Umbrella review of prior systematic reviews using AMSTAR II guidelines	–
Olding et al. (2020) [N]	To examine the response to overdose in the Molson overdose prevention site.	Overdose prevention Site (OPS)	August 2018–2019	*N* = 91 mainly homeless SCF attenders, *N* = 5 interviews with OPS staff, and 200 h ethnographic observation in Portland, OR	Qualitative interviews and ethnographic observation; Thematic analyzed interviews and field notes	–
Scheim et al. (2020) [N]	To examined associations between SCS use and non-fatal overdose among PWID	Supervised Consumption Services (SCS)	November 2018-March 2020	*N* = 701 PWID in Toronto, Ontario, ON	Cross-sectional retrospective baseline survey data; Modified Poisson regression with control variables	NS – Included confounding EA – Inferential statistics used

[SR] denotes systematic reviews and are included to provide a timeline of the SCFs literature (highlighted gray). [UR] denotes umbrella review of prior systematic reviews. [N] indicates a new article not in prior reviews. TO = Temporal Order; NA = Non-Spurious relationship EA = Empirical Association.

Table 4
Individual outcomes associated with SCFs.

Article Citation	Infection/Disease transmission	Drug use and treatment access	Non-fatal Overdose (OD)	Death	Other Outcomes
Andresen and Boyd (2010)	Prevention of 35 (Range: 30–41) new HIV cases annually			Prevention of 1.08 overdose and 1.79 HIV deaths annually	
Pinkerton (2010)	Closing the InSite SCF would result in an increase of HIV infections (179.3 to 262.8, annually), resulting in an estimated prevention of 83.5 new HIV infections per year				
Scherbaum et al. (2010)	No reported differences in abscesses due to injection from baseline to 3-month follow up ($p = 0.3$).	At 6-month follow up, only 7% still attended DCF, with 37% engaged in addiction treatment, 17% incarcerated, 20% status unclear			
DeBeck et al. (2011)		23.1% had at least 6-month cessation of drug injections (95% CI: [16.2–29.9%]) 57.2% cumulative incidence of addiction treatment entry, with a significant association between regular SIF attendance and initiation of addiction treatment (AHR = 1.33; 95% CI: 1.04–1.72)			
Marshall et al. (2011)				35% decrease in OD death within 500 m of SCFs, (253.8 to 165.1 deaths per 100,000 person-years) as compared to a 9.3% decrease in other parts of the city ($p = 0.048$)	
Rance and Fraser (2011)				Comments suggest SCFs were “a large part of the reason I'm still alive”	Reduced stigma and shame associated with substance use, increased self-worth, and provided a supportive sense of community for PWID
Small et al. (2012)	Space enables more hygienic injection behaviors, reducing injection-related health risks		Participants reported using SCFs to reduce chances of fatal overdose “I prefer the Insite because there's staff […] I've had overdoses in the past, and I know there's nurses there in case I overdose…”		
Jozaghi and Andresen (2013)	Associated with reduction in HIV/HCV risk behavior	Increased access hygienic injection locations Increased access to nursing and other primary health services		SCFs save lives “people used to die here from overdose almost every day”	Reduced risk of street-based violence and drug-related arrests; Increased a sense of belonging and support
Jozaghi et al. (2013)	Predicted prevention of 11 cases of HIV and 64 cases of Hepatitis C annually				
Kinnard et al. (2014)		75.6% self-reported reduction in high-risk injection behaviors after the SCF was opened 66% reported no change in injections; 12% reported a decrease; 5% reported an increase after the SCF was opened			
Davidson et al. (2018)	Reduction in injection related injuries and infections related to access to safe injection spaces “I haven't had any abscesses in a while since using this place. I used to have abscesses a lot.”		Out of 4623 injecting events for ~120 PWID between 2014 and 2017, only 6 overdoses occurred. All six were successfully revived by staff using naloxone.		Better able to “enjoy the high” because injections were not rushed Feeling physically and mental safer at SCFs “creating a non-predatory, socially supportive environment”

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Table 4 (*continued*)

Article Citation	Infection/Disease transmission	Drug use and treatment access	Non-fatal Overdose (OD)	Death	Other Outcomes
Folch et al. (2018)		Frequent SCF attenders were 2x as likely to access addiction services than less frequent attenders (AOR = 2.12; 95% CI: 1.18–3.81) Frequent SCF attenders were 61% less likely to share needles (AOR = 0.39; 95% CI: 0·20–0·78)	No difference in non-fatal overdoses between low, medium, high SCF attenders (AOR = 0.81; 95% CI: 0.45–1.47)		
Bergamo et al. (2019)	"Better and less harmful injection practices have increased because the drug use takes place in a protected setting"		Among 65,614 client interactions, 38 cases of naloxone reversed overdoses onsite	No overdose deaths recorded in 10 years of operation	
Irvine et al. (2019)				Estimated 3650 total deaths were averted by all interventions (95% CRI = 3490–3910); Estimated 390 deaths prevented at SCFs (95% CRI = 290–550), accounting for 13% of potential deaths averted or 1.3 deaths prevented per month per site (95% CRI = 0.9–1.7, Regional range = 0.06–2.5). No overdose deaths at any SCS over the study period	
Kennedy, Hayashi, et al. (2019)				Frequent SCF use was inversely associated with risk of all-causes of mortality (AHR = 0.46, 95% CI 0.26–0.80, $p = 0.006$) compared to less than weekly/no SCF use	
Kennedy, Klassen, et al. (2019)		77% PWID had stopped using SCFs at 50-month follow up, with 58% co-occurring with injection drug use cessation 2282 SCF use cessation events that occurred during periods of injection cessation at 6-month follow up (incidence density of 36.5 events per 100 person-years [95% CI=35.0, 38.0])			
Kennedy et al. (2020)					Exclusive SCF use associated with 36% decreased risk of experiencing violence among men. (AOR = 0.64, 95% CI = 0.46–0.89, $p = 0.009$) Exclusive SCF use was not significant factor associated with experiencing violence for women ($p = 0.914$)
Kerman et al. (2020)	Safer injection practices: "I'm not rushed. It allows me to make better decisions about my usage."	Health service access and use: Nearly half of participants reported accessing health services that they were not using prior to visiting SCSs			Social Connectedness and community: "It's one of the places that keeps me connected to the world" Emotional support and stress reduction: "It's like a little oasis."
Olding et al. (2020)			770 reversed overdoses on-site (Total 128,944 visits over 2 years)	No overdose deaths on site over 2 years	Nearly 400 peer workers received overdose prevention training
Scheim et al. (2020)			No difference in non-fatal overdose rates between frequent SCF attenders and those with less frequent/no SCF use (Prevalence Rate = 0.94; 95% CI 0.75–1.17)		

Notes. 95%CI = 95% Confidence interval; 95% CRI = Credible Interval (Bayesian statistics); AHR = Adjusted hazard ratios; AOR = Adjusted Odds Ratios; p = significance level; PWID = People who inject drugs; SCF = Safe Consumption Facility.

Table 5
Community and cost-benefit outcomes associated with SCFs.

Article Citation	Pubic Use	Public Needle Disposal	Other Services Used	Criminal activity	Cost-Benefit
Andresen and Boyd (2010)					Cost-benefit ratio: 5.12; Societal benefit of $6 million per year after program costs
Pinkerton (2010)					Reduction in lifetime HIV-related medical cares costs totaling $17.6 million
Salmon et al. (2010)			68% reduction in monthly ambulance calls related to overdose in SCF area after SCF opened ($\chi^2 = 9.62$, $p = 0.002$) 80% reduction in overdose-related ambulance calls in SCF area during operating hours ($\chi^2 = 81.23$, $p < 0.001$)		
Small et al. (2012)	Reported a reduction of using in public spaces to inject drugs: "I'm using Insite because it's the way to do it properly. That's the reason I use Insite. Because it's not the alley."			Provided refuge from 'everyday risk', including encounters with police, street violence, and theft of drugs: "Because it's off the street and I know that the police are not going to interrupt me in the middle of my injection and take my drugs away."	
Jozaghi et al. (2013)	Decrease in public injection "Today you rarely see people fixing outside, especially in and around InSite"	Reducing public syringe disposal	Reducing use of other medical resources		
Jozaghi et al. (2013)					Estimated annual cost saving of $686,000 related to reduction in HIV infections and $800,000 related to reduction in Hepatitis C infections for each SCF Net average benefit-cost ratio of 1.21:1 for both HIV and Hepatitis C
Kinnard et al. (2014)	56.1% reported fewer outdoor injections after the SCF was opened	95.8% reported changing from not always safely disposing of syringes to always safely doing so after the SCF was opened			
Espelt et al. (2017)		Overall decrease of public needle disposal (13,900 in 2004 to 1655 in 2014) following police intervention and opening of SCFs Initial increase in discarded syringe pick up after SCF opening (RR = 2.72; 95% CI: 1.57–4.71), followed by stabilization (RR = 0.97; 95% CI: 0.91–1.03)			
Davidson et al. (2018)	Reduced injections in public spaces (e.g. parks, bathrooms)	More responsible needle disposal reported			
Folch et al. (2018)	Frequent SCF attendance linked with a 73%;ower risk of injecting in public (AOR = 0.27, 95% CI: 0.12–0.62)	Frequent SCF attenders were nearly 6x more likely to properly dispose of syringes (AOR = 5.77; 95% CI: 3.41–9.77)			

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Table 5 (*continued*)

Article Citation	Pubic Use	Public Needle Disposal	Other Services Used	Criminal activity	Cost-Benefit
León et al. (2018)	28% decrease in over-sedated individuals in public after SCF opened ($\beta = -0.32$, $p = 0.045$)	No difference in public discarded syringes or injection materials (r = 0.53, p = .07) No difference in observed public substance exchange ($\beta = -0.74$, $p = 0.83$)			
Bergamo et al. (2019)	Reported reduction of drug use visible in public spaces	Nearly 86,000 syringes disposed of at the SCF		1 incident of the SCF being burgled resulting in police activity at SCF	
Madah-Amiri et al. (2019)			86% overdose related calls from an SCF did not require transport to hospital, as compared to only 53% from public spaces ($p < 0.001$) Ambulance attended overdose when SCFs were closed had a 40% higher risk of transport to hospital (OR = 1.40, 95% CI 1.04–1.89, $p = 0.03$) Ambulance attended overdose in public locations had a 66% higher risk of transport to hospital (AOR = 1.66, 95% CI 1.17–2.35, $p = 0.005$)		
Kerman et al. (2020)				Homeless clients reported SCSs protected them from criminalization by offering a safe place to use drugs without fear of arrest 1 participant expressed concern getting to SCS, which was located in a "bad" neighborhood	

Notes. 95%CI = 95% Confidence interval; β = Standardized regression coefficient; RR = Relative Risk; AOR = Adjusted Odds Ratios; OR = Adjusted Odds Ratios; p = significance level; r = correlation coefficient; SCF = Safe Consumption Facility.

three articles examined the impact of SCFs on drug use prevalence. Using an observational approach with a small sample of SCF attenders, Kinnard et al. (2014) found 66% had no changes in their injection rates, 12% reported a decrease, and 5% reported an increase. Finally, DeBeck et al. (2011) reported that 23.1% of SCF attenders had stopped attending SCFs as a result of sustained cessation of drug injection and Kennedy et al. (2019b) found that among the 77% of those who stopped using SCFs, 58% were no longer injecting drugs. These studies had sample sizes ranging from 21 to 1336 and included both qualitative approaches (e.g. Kerman et al. 2020) and prospective research designs with inferential statistical methods controlling for confounding variables Kennedy et al. 2019b).

3.2.3. *Non-fatal overdose*

From this search we found 6 articles with differing findings related to the prevalence of non-fatal overdoses occurring among SCF attenders. Scheim et al. (2020) and Folch et al. (2018) found no difference in non-fatal overdose rates among frequent SCF attenders compared to less frequent SCF attenders, which were contrary to reviews by Potier et al. (2014) and Kennedy et al. (2017) that reported SCFs were associated with a reduced frequency of overdose. However, we also found that overdoses among PWID using in SCFs are less frequent when compared to PWID using in public locations and that overdoses occurring in SCFs were also less likely to need ambulance transport to hospital as compared to those in public spaces (Madah-Amiri et al., 2019). Additionally, among qualitative reports, participants reported using SCFs to help reduce their risk of overdose (Small et al., 2012) and SCF records reported that they were able to reverse overdoses onsite (Bergamo et al., 2019).

3.2.4. *Drug-related death*

We found 8 articles that examined death among SCF attenders related to injection drug use Among the quantitative articles, we found SCFs were associated with the prevention of overdose ranging from nearly three overdose deaths and HIV related deaths per year (Andresen and Boyd, 2010) to an estimated 1.3 overdose deaths averted per month per site (Irvine et al., 2019). Among SCF attenders, more frequent attendance was associated with a 54% decrease in predicted mortality compared to less frequent attenders (Kennedy, et al., 2019a). In one study, overdose deaths were examined before and after the opening of a SCF, with a comparison between deaths within 500 m of the new site and the rest of the city (Marshall et al., 2011). This study found a significant decrease in overdose deaths within 500 m of the newly opened SCF, resulting in 1 overdose death prevented per 1137 clients, whereas there were no differences in the rest of the city (Marshall et al., 2011). Important to note, there were other community factors that may have added to the reduction of overdose death, including increased police support in the city, highlighting the importance of community outreach in the

establishment of SCFs. Among all the articles reviewed, there were no deaths reported at any SCFs. Furthermore, qualitative reports showed that many SCF attenders perceived the sites as life saving, with one client reporting in a SCF comment book that the facility was "*a large part of the reason I'm still alive*." (Rance and Fraser, 2011). A systematic review by Magwood et al. (2020) found three review articles reporting no overdose deaths at any site, with an estimated 4 to 1 reduction in injection-related overdose deaths per month.

3.2.5. Other outcomes

Finally, we found 6 additional outcomes associated with SCF use. First, we found one study that found SCFs were associated with safer sex practices with regular partners among attenders (Kennedy et al., 2017). We also found three articles where SCFs were associated with safety from violence (Davidson et al., 2018; Kennedy et al., 2020; McNeil and Small, 2014), with one reporting a decrease in experiences of street violence for men, but not for women (Kennedy et al., 2020). Second, one qualitative article found that SCF attenders reported they were better able to enjoy the high because they did not feel rushed or worried about being caught (Davidson et al., 2018). Davidson et al. (2018) also reported that SCF attenders felt physically and mentally safer, and another article reported that the treatment received at SCFs helped reduce stigma, increase feelings of self worth, and provide attenders with a supportive community (Rance and Fraser, 2011). The reduction of stigma and shame, and increased feelings of worth may help facilitate future treatment. Rance and Fraser (2011) also found that SCFs offered a place where PWID had their humanity returned to them, which led to improved mental wellbeing and was attributed to an increased sense of self worth. Example comments for SCF attenders in this study included: "*Nice to be treated like a human being in here*" and "*If you treat people like humans they behave like humans*." Of note, many of these other outcomes, particularly those related to a sense of belonging and community, were only addressed in qualitative studies. No quantitative studies examined the degree to which access to SCFs impacted other outcomes related to mental health and social wellbeing. Lastly, Olding et al. (2020) reported that SCFs were used to facilitate overdose prevention training of nearly 400 peer workers.

3.3. Community-related outcomes

3.3.1. Public use and intoxication

We found 7 articles that examined outcomes associated with public use of injectable drugs, along with two systematic reviews reporting SCFs were associated with a reduction in public disorder and public injection (Kennedy et al., 2017; Potier et al., 2014). The articles found included 4 qualitative and 3 quantitative studies, with only one using a longitudinal approach (e.g. pre-/post-test design). Among the qualitative findings, SCF attenders reported a decrease in injecting in public spaces, including parks and public bathrooms (Bergamo et al., 2019; Davidson et al., 2018; Jozaghi and Andresen, 2013; Small et al., 2012). Among observational quantitative studies, SCFs were associated with a 56–61% decrease in public injections (Espelt et al., 2017; Kinnard et al., 2014). Finally, one study examined the rate of over-sedated individuals in public in the months directly preceding and following the opening of a SCF using Poisson log-linear regression models with controls, finding a 28% decrease in over-sedated individuals in public spaces ($\beta = -0.32$, $p = 0.045$; León et al., 2018).

3.3.2. Public disposal of drug paraphernalia

Seven articles examined outcomes associated specifically with the disposal of syringes and needles used for drug injection. Three qualitative articles found that SCF attenders reported engaging more often in proper syringe disposal since accessing SCF services (Davidson et al., 2018; Jozaghi and Andresen, 2013), with one SCF site recording nearly 86,000 properly disposed syringes (Bergamo et al., 2019). Furthermore, two observational quantitative studies found SCF attenders were 6 times more likely to properly dispose of syringes (Folch et al., 2018) and 95.8% of SCF attenders reported changing from not always safely disposing of syringes to always safely disposing of syringes since accessing SCFs (Kinnard et al., 2014). Finally, one report found no difference in publicly discarded syringes using a pre-/post-SCF opening design (León et al., 2018.) Of note, in this study, the rate of publicly discarded materials was very low at baseline, suggesting prior interventions may support this outcome.

3.3.3. Public service use

We also found three articles that examined the impact of SCFs on the use of other public services (e.g. ambulance services). A systematic review found that SCFs were associated with increased use of health, social, and education services (Kennedy et al., 2017), whereas a qualitative article not included in Kennedy et al. (2017) reported a reduction in the use of medical resources (Jozaghi and Andresen, 2013). Additionally, two articles found that SCFs were associated with a reduction in ambulance services related to overdose. One ecological study analyzed over 20,000 ambulance calls for overdoses, finding a 67% reduction in the average monthly calls after opening an SCF using a pre/post-test design (Salmon et al., 2010). Additionally, ambulance calls to SCFs for overdoses were less likely to require transport to the hospital, with 86% of calls not requiring transport (Madah-Amiri et al., 2019).

3.3.4. Criminal activity

In total, 5 articles addressed criminal activity in SCF areas. A recent prospective study of nearly 2000 PWID found that attenders reported SCFs kept them safe from criminalization, but that SCFs that were in high crime neighborhoods were hard to access (Kennedy et al., 2020). Additionally, SCFs attenders reported that SCFs provided a refuge from everyday risk (Small et al., 2012), with only 1 reported incidence of an SCF needing police support after being burgled (Bergamo et al., 2019). Two earlier systematic reviews also found no additional police activity or increased drug-related crime in areas with SCFs (Kennedy et al., 2017; Potier et al., 2014). These findings suggest that SCFs do not increase crime in the surrounding area, however, additional research is needed.

3.3.5. Cost-Benefit analysis

Finally, this review includes three primary cost-benefit analyses (Andresen and Boyd, 2010; Jozaghi et al. 2013; Pinkerton, 2010), with one systematic review including cost-benefit findings (Kennedy et al., 2017). Pinkerton (2010) found that SCF prevention of HIV-related infections (reduction of up to 83 new infections per year) were associated with a saving of $17.6 million in future HIV-related healthcare cost savings. Additionally, Andresen and Boyd (2010) found a societal benefit of $6 million per year after considering program costs, leading to an average cost-benefit ratio of 1:5.12. This means that every $1 dollar spent to operate a SCF leads to a savings of $5.12 associated with public health costs related to new HIV cases and deaths. Finally, Jozaghi et al. (2013) also reported cost-benefit with regards to the reduction of HIV and Hepatitis C-related costs. All three cost-benefit analyses were focused on injection-related overdose death and disease transmission, which reflects the initial goal SCFs were to aimed at addressing (Potier et al., 2014).

4. Discussion

4.1. Summary of findings

There have been a few other systematic reviews of SCFs, but they are more than 5 years old (Potier et al., 2014; McNeil and Small, 2014), do not focus on a wide range of effectiveness outcomes (Caulkins et al., 2019; Magwood et al., 2020), or are limited only to quantitative studies (Kennedy et al., 2017). Overall, this review found a wide variety of articles published over the past 10 years examining the individual and community-level outcomes associated with SCFs, including 15 new

articles that had not been included in prior reviews. We found that the evidence stemmed from a variety of methods, ranging from ethnographic and interview-based qualitative reports to observational quantitative methods to inferential, longitudinal approaches that approximate causal evidence. Our analysis of the literature builds on these prior reviews in support of the effectiveness of SCFs related to individual and community-level outcomes, and also provides directions for future areas to explore.

Our review found at the individual-level that SCFs were efficacious in reducing drug use related infection and disease transmission, enhancing access to addiction and other health services, and reducing the risk of non-fatal overdoses, and were not associated with a significant increase in drug use. These findings challenge the notion that SCFs may perpetuate substance use and lead to increased use among PWID. With regard to non-fatal overdose, the evidence over the past ten years have been largely been qualitative and would benefit from the use of quantitative methods that help to approximate causality. For example, the use of a propensity score modeling may help to determine the effectiveness of SCFs for individual-level outcomes based on observational or cross-sectional data (Hullsiek and Louis, 2002). Future studies may also want to consider the use of comparison groups or cities to examine the different factors influencing the effectiveness of SCFs. Additionally, we found emerging evidence that SCFs provide PWID with a sense of community that may support their overall wellbeing, thereby increasing their chances of accessing addiction treatment services. However, this evidence came qualitative studies (Rance and Fraser, 2011; Jozaghi and Andresen, 2013; Davidson et al., 2018; Kerman et al., 2020), and provides a future direction for research examining the impact of SCFs. Future quantitative studies may want to include a validated measure of wellbeing and sense of belonging. In particular, longitudinal studies should examine the degree to which a sense of belonging and having a supportive community may play a role in injection cessation and help-seeking behaviors for SCF attenders. At the community level, the evidence shows that SCFs were not associated with an increased rate of drug-related crime, and were linked to a decrease use of other costly public services (e.g. ambulance transport to hospital following an overdose). However, this evidence is still growing and requires additional research that accounts for other cofounding relationships using a longitudinal, inferential research design. Furthermore, we found that SCFs were associated with a reduction in public disorder, including less public disposal of syringes and use in public spaces. Future research should consider the gathering information from multiple sources (e.g. community members, service providers, police services) to examine the impact of SCFs on the public. Finally, there appear to be significant cost-benefits associated with SCFs, yet all of these studies have focused on the benefits related to the reduction of infectious disease transmission and injection-related death. Future studies should consider additional benefits related to the families of SCF attenders and reduction in community costs associated with decrease in public disorder.

4.2. Study limitations

This review built upon prior reviews and utilized a comprehensive search process. However, there is a possibility that we missed articles that were not indexed in the databases or using the terms included in the searched. However, we used a broad range of search terms to ensure that we returned a wide variety of articles related to outcomes associated with SCFs. Additionally, we limited our search to articles published between 2010 and 2020, with the intention of garnering recent and relevant findings. There is a possibility we missed relevant articles from prior to 2010 that were not included in earlier systematic reviews (Potier et al., 2014; McNeil and Small, Kennedy et al., 2017). Lastly, the scoping review did not systematically critique the research design or statistical approach utilized. Instead, the goal of this scoping review was to provide an overview of the past decade of research on SCF effectiveness and provide recommendation for future research directions. Based on this, we believe this systematic search and scoping review presents a comprehensive picture of the current state of the evidence regarding individual and community level outcomes associated with SCFs.

5. Conclusion

While the growing body of evidence is strong, it could be strengthened with the inclusion of randomized controlled trials (RCTs) evaluating the impact of SCFs on various individual outcomes, or the use of multilevel propensity matching methods for community-level outcomes. However, due to the nature of SCFs, randomized and multilevel methods provide ethical and practical challenges. Additionally, future studies should consider the inclusion of an equivalent comparison group to ensure the outcomes are associated with SCFs. Furthermore, there appears to be two different types of investigations emerging within the quantitative and qualitative research approaches. The quantitative studies mainly focused on the prevention of disease transmission, overdose, and reducing the public impact of injection drug use, whereas qualitative studies identified the role of SCFs in building a sense of community and self-worth. Future studies and reviews should consider how these bodies of knowledge can be integrated to provide a more robust and comprehensive understanding as to the effectiveness of SCFs. The evidence, while still growing, demonstrates that SCFs play a role in mitigating overdose-related harms and unsafe drug use behaviors, and in some cases facilitate the uptake of addiction and other health services among PWID. In sum, the evidence supports SCFs as a promising harm reduction approach for PWID, with important potential for positive community outcomes. However, there may be additional outcome that have yet to be full explored in the research, including a sense of belonging and individual wellbeing among SCF attendees.

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Ethics

This review did not require ethics approval.

Declaration of Competing Interest

The authors report no conflicts of interests.

CRediT authorship contribution statement

Sarah J. Dow-Fleisner: Conceptualization, Methodology, Data curation, Formal analysis, Writing – review & editing, Supervision, Funding acquisition. **Arielle Lomness:** Methodology, Data curation, Visualization, Writing – original draft. **Lucía Woolgar:** Visualization, Data curation, Resources.

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