



High levels of interest in access to free safer smoking equipment to reduce injection frequency among people who inject drugs in Seattle, Washington

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HIGHLIGHTS

- Seattle-area people who inject drugs were highly interested in free safer smoking equipment for drug consumption.
- Despite this interest, and high levels of engagement with local syringe services programs, access to free safer smoking equipment was very low.
- Many respondents who were already getting free safer smoking equipment reported they reduced their injection frequency because of this access.
- Distribution of free safer smoking equipment may be a beneficial harm reduction strategy for people who use drugs, including people who inject drugs.

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ABSTRACT

Background: Drug use route transition interventions promote safer consumption by facilitating a switch from injection to safer routes such as smoking or oral consumption.

Methods: We performed a descriptive analysis using data from questions about “free, clean equipment for smoking” heroin, methamphetamine and/or crack from the Seattle 2018 National HIV Behavioral Surveillance survey of people who inject drugs ($N = 555$). We estimated the proportion of respondents with access to free safer smoking equipment, and among these participants, the proportion who reported that this access reduced their injection frequency. Among respondents without access to free safer smoking equipment, we described the proportion who were interested in getting access, and whether they thought this access would reduce their injection frequency.

Results: Among participants who reported prior year heroin ($n = 495$), methamphetamine ($n = 372$), or crack ($n = 88$) injection, 11%, 11% and 12% reported access to free safer smoking equipment, respectively. Of those with access, the proportion that reported that access reduced their injection frequency ranged from 12% to 44%. Among participants without access, 28% who used heroin, 45% who used methamphetamine, and 49% who used crack were interested in access. Of interested participants, a majority reported that they thought this access would reduce their frequency of injection.

Conclusions: Access to free safer smoking equipment was limited. Many participants were interested in getting free safer smoking equipment and reported that this access may reduce their injection frequency. Safer smoking equipment is a harm reduction strategy that should be available to reduce risks from opioid and stimulant injection.

1. Introduction

The United States is experiencing “twin epidemics” in illicit drug use,

characterized by the increasing use of both methamphetamine and opioids independently as well as together (Ellis et al., 2018; Jones et al., 2020; Strickland et al., 2019). Crack cocaine use has declined

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moderately in the previous two decades, but remains a public health concern (SAMHSA, 2021). Methamphetamine, opioid, and crack use are associated with numerous health concerns, including increased mortality, HIV, hepatitis C virus (HCV), and other sexually transmitted infections (STIs) (Ciccarone, 2009; Gonzales et al., 2010; Butler et al., 2017). Methamphetamine and opioid co-use is highly prevalent in Seattle, WA, and is associated with higher overdose risk, unsafe injection practices, and greater frequency of injection than using either substance by itself (Al-Tayyib et al., 2017; Glick et al., 2020, 2018).

Risk for adverse health outcomes from drug use are highest among people who inject drugs (PWID); injection drug use produces a more rapid and potent drug effect (Lankenau et al., 2012) with greater risk for dependence (Novak and Kral, 2011) and overdose (Darke and Hall, 2003). Higher risk injection practices such as sharing and re-using of injection equipment are associated with injection site infections (Jawa et al., 2021), bloodborne infections (Pouget et al., 2012; Ball et al., 2019), and infective endocarditis (Barocas et al., 2021). The public health response to the crises of rising methamphetamine and opioid use and co-use, particularly among PWID, must rapidly adapt and evolve to minimize substance use related harms to a growing and vulnerable population.

Harm reduction is one of the most powerful tools to minimize the negative consequences of drug use among PWID (Des Jarlais, 2017). A specific harm reduction approach to address the higher health risks of injection drug use is “route-transitioning”, or encouraging safer routes of consumption such as smoking, snorting, or rectal insertion (“booty bumping”) (Bridge, 2010). An individual’s choice of route of drug administration is complex and may depend on the route they first used, the routes used in their social groups, the severity of the individual’s drug dependence, type and quality of the drugs available in the local drug supply, safety considerations, stigma, and affordability and availability of equipment for different routes (Strang et al., 1998; Bridge, 2010; Lankenau et al., 2012). Safer smoking equipment for drugs may play an important role in delaying injection drug use and reverse route transitioning for people who inject drugs. Moreover, safer smoking equipment delivered through syringe services programs (SSPs) may engage people who smoke drugs who might not otherwise use SSP-delivered harm reduction services. Safer smoking equipment can be specific for each type of drug used, but generally includes a heat resistant pipe or foil, protective mouthpiece, tamp, screen, and lip protectant, all of which reduce heat-related injuries and infection risk (Rigoni et al., 2018). In addition to reducing direct harm from improvised smoking devices, safer smoking equipment can reduce the sharing of supplies, which in turn is thought to lower risk of respiratory infections, a potential benefit that is particularly salient amid the COVID-19 pandemic (Prangnell et al., 2017; Harris, 2020).

Limited research to date has evaluated the potential role of safer smoking equipment in reducing frequency of injection drug use. Evaluations of safer smoking equipment distribution in Canada and Europe have shown high uptake of safer smoking equipment for crack and heroin (Shannon et al., 2006; Leonard et al., 2008; Pizzey and Hunt, 2008; Stöver and Schäffer, 2014; Prangnell et al., 2017; Dunleavy et al., 2021), and some evidence for decreased injection frequency among people who used the safer smoking equipment (Leonard et al., 2008; Pizzey and Hunt, 2008; Stöver and Schäffer, 2014; Dunleavy et al., 2021). Locally, an SSP led by people who use drugs (PWUD) in Seattle distributed pipes for smoking heroin, and an evaluation of program participants before and after the pipes were introduced showed a decrease in the proportion of people who exclusively injected heroin (Fitzpatrick et al., 2022). Over a third of the people who said they used one of the SSP-distributed heroin pipes reported they reduced their injection frequency because of this access (Fitzpatrick et al., 2022). To our knowledge, no studies have examined the effects of safer smoking equipment for methamphetamine on reducing injection frequency.

Despite the evidence from international studies showing high levels of interest in safer smoking equipment among PWUD (Shannon et al.,

2006; Leonard et al., 2008; Pizzey and Hunt, 2008; Stöver and Schäffer, 2014; Prangnell et al., 2017; Dunleavy et al., 2021), and promising early evidence in support of reducing injection frequency (Leonard et al., 2008; Pizzey and Hunt, 2008; Stöver and Schäffer, 2014; Dunleavy et al., 2021; Fitzpatrick et al., 2022), similar strategies have had limited uptake in SSPs in the United States. The present evaluation used responses to questions from a survey conducted among PWID in Seattle about access to free safer smoking equipment for drug consumption, and whether access could or did reduce injection frequency. Our study location presents a unique opportunity to examine reduction in injection frequency among people who already have access to safer smoking equipment, as the Seattle area is home to one of the few SSPs that distributed safer smoking equipment for methamphetamine and crack during the study period (“Peoples Harm Reduction Alliance,” n.d.). Evaluating Seattle PWID interest in free safer smoking equipment can inform local harm reduction policies and may also guide future harm reduction efforts in similar populations across the country.

2. Methods

2.1. National hiv behavioral surveillance (NHBS)-PWID

The NHBS is an ongoing surveillance project funded through the Centers for Disease Control and Prevention (CDC). Every third year the key population surveyed focuses on PWID (formally referred to as NHBS-IDU). Each NHBS project area may append questions of local interest to the core NHBS survey. For this analysis, we used data from the Seattle area NHBS-PWID survey conducted between June and November 2018.

The NHBS-PWID sampling strategy is described in detail elsewhere (Lansky et al., 2007; Burt et al., 2017). Briefly, participants were recruited using respondent-driven sampling whereby initially eligible “seed” participants were invited to recruit up to five additional participants from their personal networks, who were then able to recruit up to 5 additional participants. To be eligible for the survey, participants had to be 18 years or older, reside in King or Snohomish County, be able to complete the survey in English, and report any injection drug use in the prior 12 months. Researchers conducted the interviews in-person, and the survey included demographic, drug use, healthcare utilization, and health status questions. Participants were provided \$25 for completing the survey and \$25 if they completed the optional HIV test.

2.2. Analytical sample

We examined access to and interest in free heroin, methamphetamine, and crack cocaine smoking equipment among participants who injected each drug at least once in the previous year.

2.3. Measures

The NHBS questionnaire asked all participants to report their sociodemographic characteristics, health status and behavior, and drug use behaviors.

The analyses focused on three survey questions that were asked separately for heroin, methamphetamine, and crack:

- a Are you interested in getting free, clean equipment for smoking [drug]?

Possible answers: (no, yes, already get free clean equipment for smoking [drug], don't know, refuse to answer)

- a Do you inject less often because you have access to free, clean equipment for smoking [drug]?

Possible answers: (no, yes, don't know, refuse to answer)

a If you had access to free, clean equipment for smoking [drug] would you inject less often?

Possible answers: (no, yes, don't know, refuse to answer)

Questions were concerned with current access and interest, and did not specify a time frame. Beyond what drug the safer smoking equipment was intended for, the questions did not specify type of equipment (e.g., a pipe or foil), nor the source of the equipment (e.g., SSPs, peers). Free safer smoking equipment data were all self-reported. Responses to the access questions were mutually exclusive for each drug: a person either had access to free safer smoking equipment, was interested in getting access, or did not already get or want to get access to free safer smoking equipment.

2.4. Statistical analysis: unadjusted

Our analysis was primarily descriptive. We calculated the proportion of NHBS respondents who had access to free safer smoking equipment, and how many of those who had access reported that this access reduced their injection frequency. We examined the proportion of respondents who did not have access to free safer smoking equipment, and among these, the proportion who would have liked access to free safer smoking equipment and who thought it would reduce their injection frequency.

We examined potential differences in characteristics between people who did and did not have access to free smoking equipment for each drug using t-tests for continuous variables and chi-square tests for categorical variables. We compared age, race, gender, and housing status between those with and without access to free safer smoking equipment.

2.5. Statistical analysis: adjustment for respondent-driven sampling

We adjusted our estimates describing interest in and access to free safer smoking equipment, and experienced or expected reduction in injection frequency for respondent-driven sampling (RDS) probabilities using the RDS package in R (<https://cran.r-project.org/web/packages/RDS/RDS.pdf>). We present both unadjusted and adjusted results but use the adjusted results for the discussion of our findings.

2.6. Sensitivity analysis

To understand the relevance of this harm reduction strategy for an emerging drug use pattern in Seattle, WA and internationally, we conducted a sensitivity analysis of access to and interest in free safer smoking equipment among people who used both methamphetamine and heroin. Methamphetamine-heroin co-use was defined as use of both methamphetamine and heroin weekly or more often.

2.7. Ethics

The NHBS survey procedures were determined by the Washington State Institutional Review Board (IRB) to be a public health surveillance activity and did not require IRB approval. The Public Health – Seattle & King County (PHSKC) HIV/STD Program requested this analysis be completed as a public health surveillance activity. Due to its determination as a surveillance activity and the lack of personal identifying data from the NHBS survey, the University of Washington institutional review board approved its exemption from review.

3. Results

3.1. Sample characteristics

The 2018 Seattle area NHBS-PWID sample included 555 local PWID participants, 550 of whom responded to questions about free safer smoking equipment. Information about participant demographics, drug use behavior, and health behavior and health status are presented in Table 1. The majority (52%) of the survey sample was over age 40, and about a third of the respondents were women. Most (61%) of the sample reported they were currently homeless. Most of the sample (83%) had used an SSP in the prior year. Three quarters of the sample reported an injection frequency of more than once per day. Within the sample, 37% of participants co-used methamphetamine and heroin weekly or more often. The main route of drug administration in the past three months was injection at 96%, while smoking/inhalation was also common at 77% of the sample. A small proportion (13%) of the sample reported

Table 1

Characteristics of Seattle area PWID enrolled in the National HIV Behavioral Surveillance survey, 2018.

Characteristics	Sample n	(%)
Age		
18–29	99	(18.0)
30–39	163	(29.6)
40–49	123	(22.4)
50+	165	(30.0)
Gender		
Female	209	(38.0)
Male	336	(61.1)
Transgender	6	(1.1)
Race/Ethnicity*		
American Indian / Native American	123	(22.4)
Asian	14	(2.5)
Black or African American	110	(20.0)
Latino / Hispanic	67	(12.2)
Native Hawaiian / Pacific Islander	25	(4.5)
White	391	(71.1)
Currently homeless	335	(60.9)
Exchanged sex for money or drugs, past 12 months	132	(21.6)
Exchanged sex for other goods or services, past 12 months	55	(10.3)
HIV+, test result	25	(4.8)
HCV+, test result	391	(71.1)
Overdose, past 12 months	143	(26.0)
Shared syringes, past 12 months	157	(28.5)
Any drug injection frequency, past 12 months		
More than once a day	410	(74.5)
Once a day	58	(10.5)
More than once a week	37	(6.7)
Once a week or less	45	(8.2)
Used an SSP, past 12 months	458	(83.3)
Any drug route of consumption, past 3 months*		
Injecting**	529	(96.2)
Inhalation/smoking	426	(77.5)
Snorting	267	(48.5)
Swallowing/eating	240	(43.6)
Plugging/booty bumping	58	(10.5)
Exclusively used by injecting route, past 3 months	69	(12.5)
Drug/s used, past 12 months*		
Heroin	508	(92.4)
Methamphetamine	384	(69.8)
Speedball (heroin and cocaine, together)	255	(46.4)
Goofball (heroin and methamphetamine in same syringe)	306	(55.6)
Crack	92	(16.7)
Cocaine	153	(27.8)
Painkillers	139	(25.3)
Co-used methamphetamine and heroin, past 12 months***	205	(36.9)

* Respondents could select more than one option.

** Injecting included in the vein, in the muscle, or skin popping.

*** Co-use defined as use of both methamphetamine and heroin weekly or more often.

consuming drugs exclusively by injecting.

3.2. Interest and injection frequency reduction results by smoking equipment type

A small proportion of survey respondents reported that they already had access to free safer smoking equipment for heroin (11.2%, 58/495), methamphetamine (10.9%, 31/372), or crack (12%, 8/88) (Table 2). Among people accessing free safer smoking equipment, the proportion who reported that they thought this access reduced their injection frequency was 32.2% (16/58) for heroin, 44.2% (10/31) for methamphetamine, and 12.2% (2/8) for crack. There were no significant differences in respondent age, race, gender, or housing status between respondents who had access to free safer smoking equipment and those who did not (see supplement Table S1.). Among those without access, there was interest in getting access to free safer smoking equipment for heroin (28.2%, 172/437), methamphetamine (44.6%, 210/341), or crack (49.1%, 38/80). Of those interested respondents, many respondents thought access to free safer smoking equipment for heroin (47.9%, 100/172), methamphetamine (71.1%, 152/210), or crack (64.7%, 26/38) would reduce their injection frequency.

3.3. Sensitivity analysis: interest and injection frequency reduction results among people who co-used methamphetamine and heroin

Among people who co-used methamphetamine and heroin (n = 205), access to free safer smoking equipment for smoking heroin (10.1%, 22/205) and for smoking methamphetamine (8.0%, 14/205) was low. Of those with access, the proportion that said that this access reduced their injection frequency was 15.2% (3/22) for heroin and 36.7% (2/14) for methamphetamine. For people who co-used methamphetamine and heroin who did not have access to smoking equipment, interest in equipment for heroin was lower than equipment for methamphetamine (36.4% (92/183) vs. 51.8%, (127/191) respectively). Fewer people who co-used and were interested in free safer smoking equipment for heroin reported that they predicted access would reduce their injection frequency than did people who co-used and were interested in free safer smoking equipment for methamphetamine (45.1% (45/92) vs. 64.4% (90/127)).

4. Discussion

Our evaluation of access to and interest in free safer smoking equipment shows high potential for safer smoking equipment to support harm reduction for PWUD in the Seattle area. While 78% of respondents in our sample reported smoking drugs in the past year and 83% reported using an SSP during that time, less than 12% of the overall sample

reported access to free safer smoking equipment. Interest in access to free safer smoking equipment was high, and many participants reported that access to free safer smoking equipment did or would reduce their injection frequency. This evaluation expands on the limited research to date exploring the role of free safer smoking equipment in reducing drug-related harms, and points to areas for further research and policy change.

In our sample, around one-tenth of respondents had access to free safer smoking equipment for drug consumption, depending on what drug the equipment was intended for. Equipment for smoking methamphetamine had the lowest level of access in our sample, and access was also low for equipment for smoking crack. This highlights a potential area for growth in local harm reduction efforts: smoking is a preferred consumption route both for people who use methamphetamine and/or crack (Cornish and O'Brien, 1996; Rigoni et al., 2019). In a sensitivity analysis, we found particularly low levels of access to free safer smoking equipment among people who regularly used both methamphetamine and heroin. This drug use pattern is on the rise in Seattle and more broadly, and it may be necessary to study accessibility issues with free safer smoking equipment for people who co-use these drugs.

While access to free safer smoking equipment was low in our sample, interest in getting free safer smoking equipment was high, especially for equipment for smoking methamphetamine. The proportion of respondents interested in free safer smoking equipment was comparable to the interest in a Safer Supervised Smoking Facility for crack use in Vancouver, Canada (Shannon et al., 2006). Interest in free safer smoking equipment for heroin consumption was the lowest in our sample at just a third of respondents, which is somewhat lower than the observed interest/uptake in smoking foils for heroin use in Europe (Pizzey and Hunt, 2008; Stöver and Schäffer, 2014; Dunleavy et al., 2021). This result may reflect how the experience of injecting vs. smoking is often much preferred by people who use heroin (Carruthers and Loxley, 2002), and the equipment for smoking it can be readily improvised using store-bought aluminum foil (Cordova et al., 2014). The heroin market in the Western United States, including Seattle, is dominated by black tar heroin from Mexico (Ciccarone, 2009), whereas Western European opioid markets are more likely to have brown heroin from sources in Central Asia (EMCDDA, 2015). The type, quality, and potency of drugs within regional drug markets can influence drug consumption routes (Ciccarone, 2009; Horyniak et al., 2015), and may explain some of the differences observed in our region compared to the European studies.

Ours is one of very few studies to show that access to free safer smoking equipment may reduce injection frequency. Among people in our sample who already had access to smoking equipment, between a quarter and a third of respondents reported that this access reduced their injection frequency, depending on which drug the equipment was for.

Table 2

Access to and interest in free safer smoking equipment, and reduction in injection frequency among Seattle area PWID enrolled in the National HIV Behavioral Surveillance survey, 2018, by equipment type.

	Smoking Equipment for:											
	Heroin				Methamphetamine				Crack			
	N = 495				N = 372				N = 88			
	Unadjusted		RDS Adjusted		Unadjusted		RDS Adjusted		Unadjusted		RDS Adjusted	
n	%	%	95% CI	n	%	%	95% CI	n	%	%	95% CI	
Already getting	58	11.7	11.2	(5.9 - 16.4)	31	8.3	10.9	(3.5 - 18.2)	8	9.1	12	(0.60 - 18.0)
Reduced injection frequency	16	27.6	32.2	(5.7 - 58.8)	10	32.3	44.2	(11.9 - 76.6)	2	25	12.2	(-24.0 - 48.3)
Did not reduce injection frequency	42	72.4	67.8	(41.2 - 94.3)	21	67.7	55.8	(23.5 - 88.1)	6	75	87.9	(51.7 - 124.0)
Interested in getting	172	34.7	28.2	(21.8 - 34.7)	210	56.5	44.6	(35.6 - 53.6)	38	43.2	49.1	(31.0 - 67.2)
Will reduce injection frequency	100	58.1	47.9	(34.6 - 61.1)	152	72.4	71.1	(61.7 - 80.5)	26	68.4	64.7	(37.6 - 91.8)
Will not reduce injection frequency	72	41.9	49.4	(36.0 - 62.8)	58	27.6	28.1	(18.9 - 37.3)	12	31.6	35.1	(8.0 - 62.2)
Not getting or interested in	256	51.7	60.5	(52.9 - 68.0)	130	34.9	44.5	(34.9 - 54.1)	42	47.7	39	(21.7 - 56.2)

Sample size for each safer smoking equipment type is determined by whether respondents injected that drug more than once in the prior 12 months.

*Missing responses among people who inject heroin: 9, methamphetamine: 1, crack: 1.

Among people who were interested in getting free safer smoking equipment, a majority said they would reduce their injection frequency. No studies to date describe the impact of free safer smoking equipment on the frequency of methamphetamine injection among people who use methamphetamine. For smoking crack, the self-reported reduction in injection frequency in our evaluation is similar to observations from a safer smoking equipment pilot study in Canada (Leonard et al., 2008). For heroin, our findings are similar to other studies that describe PWUD using safer smoking equipment when they otherwise would have injected (Pizzey and Hunt, 2008; Stöver and Schäffer, 2014; Dunleavy et al., 2021; Fitzpatrick et al., 2022).

The proportion of respondents with current access to free safer smoking equipment who reported they reduced their injection frequency was overall lower than the proportion interested in free safer smoking equipment who said they would reduce their injection frequency if they had access. This gap between an individual's willingness to change and observed change may reflect unseen barriers that we may need to address to provide more effective support for people trying to modify their drug consumption. Further study is needed to understand the barriers and facilitators for PWUD who are interested in changing their drug consumption route, and how best to support them longitudinally.

These promising findings emphasize the need to address policy barriers to distribution of safer smoking equipment. The federal Controlled Substances Act, Title II of the Comprehensive Drug Abuse Prevention and Control Act of 1970 makes it illegal to possess or distribute equipment to consume drugs with, including safer smoking equipment. Individual states may maintain their own laws distinct from or even in contrast with the federal law, but in most cases safer smoking equipment is not protected in state law (Fernández-Viña et al., 2020; Singer and Heimowitz, 2022). In Washington State, it has been legal to possess drug paraphernalia for a number of years, and state legislature passed a bill in 2021 making it legal to distribute drug paraphernalia so long as it is not used for drug manufacture (SB 5476, 2021).

4.1. Limitations

The cross-sectional design of our study is not able to capture temporal data about the effect of access to free safer smoking equipment on subsequent drug consumption routes and frequency. Our data rely on a binary *yes* or *no* reduction in injection frequency; future research may enhance our understanding by assessing injection frequency outcomes quantitatively. We did not ask about free safer smoking equipment *utilization*, only whether respondents were "getting" equipment, and it is possible that they had access without using it. We did not examine the potential harms of smoking, which would be valuable to study in future work. We used non-specific terms for safer smoking equipment, and so future research should assess more directly and specifically what combinations of safer smoking equipment are of most interest to local PWUD.

Our evaluation does not capture the potential interest in safer smoking equipment for people who only consume drugs by smoking or other non-injection routes. Among non-injecting PWUD, safer smoking equipment has the potential to delay or prevent transition to injection drug use (Collins et al., 2005), prevent injuries to the lips and mouth caused by the heat and fly-back seen with makeshift smoking devices (Porter and Bonilla, 1993; Collins et al., 2005; Imtiaz et al., 2020), and reduce pipe sharing and injury from pipe degradation due to heavy use and reuse (Leonard et al., 2008; Ivsins et al., 2011; Ti et al., 2012). Minimizing the sharing of smoking equipment has become even more important due to the COVID-19 pandemic (Harris, 2020). Expanding to study non-injecting PWUD may also capture more people who use crack, which is more commonly inhaled. We did not have data on fentanyl use in our sample and were unable to assess the importance of safer smoking equipment for this drug, which is rapidly emerging as a drug of public health concern (Jannetto et al., 2019) and which is increasingly

consumed by smoking (Kral et al., 2021; Kingston et al., 2022).

4.2. Conclusions

In the wake of increasing opioid, methamphetamine, and opioid-methamphetamine co-use across the country, it is imperative that we expand national and local public health harm reduction efforts. Our evaluation among Seattle area PWID describes low levels of access to free safer smoking equipment, high interest in getting free safer smoking equipment, and sizeable experienced or anticipated reductions in injection frequency because of access to smoking equipment. Our findings suggest that provision of free safer smoking equipment may be a valuable tool for the local PWUD community and has a strong potential to reduce drug-related harms. Policy barriers to evidence-based harm reduction must be addressed.

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Contributions

Each author contributed in many ways to this manuscript. The original idea for the evaluation was from Thea Oliphant-Wells. Sara Glick, Thea Oliphant-Wells, Courtney Moreno, Vanessa McMahan, Jake Ketchum, and Thomas Fitzpatrick shared responsibility for the evaluation design, survey instrumentation, data collection, review, and approval of the manuscript. Sara Glick and Molly Reid developed the analysis plan, and Molly Reid was responsible for conducting and interpreting the statistical analysis, preparation, review, and approval of the manuscript.

Declaration of Competing Interest

The author and all co-authors declare that they have no conflict of interest.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.dadr.2023.100163.

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