International Journal of Drug Policy 25 (2014) 471–479

Contents lists available at ScienceDirect

International Journal of Drug Policy

journal homepage: www.elsevier.com/locate/drugpo

Research paper

The phenomenon of low-frequency heroin injection among street-based urban poor: Drug user strategies and contexts of use

Lynn D. Wenger[a,*], Andrea M. Lopez[a,b,c], Megan Comfort[a,d], Alex H. Kral[a]

[a] Urban Health Program, RTI International, San Francisco Regional Office, 351 California St. Suite 500, San Francisco, CA 94104, USA
[b] Department of Anthropology, University of New Mexico, MSC01-1040, Albuquerque, NM 87131, USA
[c] HIV/AIDS Division, University of California, 995 Potrero Avenue, San Francisco, CA 94110, USA
[d] Center for AIDS Prevention Studies, University of California, San Francisco 50 Beale St., San Francisco, CA 94105, USA

ARTICLE INFO

Article history:
Received 8 October 2013
Received in revised form 30 January 2014
Accepted 25 February 2014

Keywords:
Heroin
Qualitative methods
Injection drug use
Addiction

ABSTRACT

Background: Dominant public health and medical discourse has relied on a pharmacocentric conception of heroin use—that is, the notion that heroin users inject compulsively to stave off physical and psychological withdrawal. Previous research disputes this claim suggesting that other patterns of heroin use, such as occasional, recreational, or controlled use are possible. In our previous cross-sectional epidemiological research, we identified the phenomenon of low frequency heroin injection (low-FHI), among street-based drug users. The goal of the current study was to qualitatively assess and contextualise this phenomenon over time among a sample of street-based low-FHI.
Methods: 29 low-FHI and 25 high frequency heroin injectors (high-FHI) were followed for 2 years, during which they participated in a series of in-depth interviews. Qualitative data were coded using an inductive analysis approach. As similarities and differences between participants were discovered, transcripts were queried for supportive quotations as well as negative cases.
Results: We found the social context among low-FHI and high-FHI to be similar with the exception of their patterns of heroin use. Thus, we focused this analysis on understanding motivations for and management of low-FHI. Two major categories of low-FHI emerged from the data: maintenance and transitioning low-FHI. Maintenance low-FHI sustained low-FHI over time. Some of these heroin users were circumstantial low-FHI, who maintained low-FHI as a result of their social networks or life events, and others maintained low-FHI purposefully. Transitioning low-FHI did not sustain low use throughout the study. We found that heroin use patterns frequently shift over time and these categories help identify factors impacting drug use within particular moments in an individual's life.
Conclusions: Given the various patterns of heroin use that were identified in this study, when working with IDUs, one must assess the specifics of heroin use patterns including drug preferences, desire for substance abuse treatment, as well as basic physical and mental health care needs.

Background

The idea that heroin is so severely addictive that users must inject compulsively to stave off physical and psychological withdrawal is firmly entrenched in the dominant public health and medical discourse. The U.S Department of Health and Human Services Research Report on heroin, asserts: "... heroin abusers' primary purpose in life becomes seeking and using drugs. The drugs literally change [addicts'] brains and their behavior." ("Heroin Abuse and Addiction," [1997] 2005) This paradigm suggests that any heroin use is inevitably compulsive and that users' everyday existence is consumed by the pursuit of heroin, since the physical aspects of addiction overwhelm other life concerns.

There has been some research in the last four decades, that has challenged the focus of heroin use as a pharmacocentric phenomenon (Decorte, 2001). This research suggested that other patterns of heroin use are possible, ranging from occasional or recreational use to purposively controlled patterns of use (Harding & Zinberg, 1977; Zinberg & Jacobson, 1976). Harding surveyed numerous studies and noted that there remains difficulty in defining those potential patterns of heroin use, but that controlled use has been attributed to social norms within specific social networks and individuals' personal motivations related to financial concerns

* Corresponding author at: RTI International, 351 California St., Suite 500, San Francisco, CA 94104, USA. Tel.: +1 415 848 1319; fax: +1 415 848 1330.
E-mail address: lynndee@rti.org (L.D. Wenger).

http://dx.doi.org/10.1016/j.drugpo.2014.02.015
0955-3959/

and physical and mental health (Harding, 1988). More recent research supports these claims of controlled use by proposing a typology of heroin users classifying people as ranging from "controlled occasional user" to "problem addict" (Boeri, 2004) and theorizing that controlled use is not necessarily associated with negative health or social outcomes (Shewan & Dalgarno, 2005). This research provides an alternative to dominant conceptions of heroin use as always compulsive, but the studies largely draw from populations who report stable employment and housing. The results of these previous studies leave questions about the possibility of controlled use of heroin among the street-based urban poor.

Zinberg reports findings about controlled use from a sample in which 77% of participants were classified as "middle to upper class" (Zinberg, 1984); Dean, Saunders, and Bell (2011) draw data from a sample of which approximately 50% of participants were employed as professionals, tradespeople, administrative workers, and manual labourers; Shewan and Delgarno report findings from a population that was nearly 90% housed and 74% employed (Shewan & Dalgarno, 2005); Decorte excluded certain categories of people from the sample, including street drug users and sex workers (Decorte, 2001); and Warburton, Turbull, & Hough, 2005 conducted research using an online survey advertised in magazines and at universities, which would exclude people without access to computers or computer literacy. Despite prior studies regarding controlled use, there remains a dearth of research on patterns of controlled heroin use among street-recruited injection drug users who experience extreme poverty, frequent incarceration, homelessness and marginalisation from social institutions.

Our team found in a previous cross-sectional epidemiological study ($N = 2410$) of street-recruited injection drug users (IDUs) that 15% of heroin users who reported (1) injecting heroin in the past 30 days, (2) having injected drugs for at least 5 years, and (3) not being in methadone treatment (or any other substitution therapy), also reported that they had injected heroin fewer than 10 times in the 30 days prior to the interview (Harris et al., 2012). To further explore this finding, we designated two analytic categories of heroin injectors, *low frequency heroin injector*, or "low-FHI", who injected fewer than 10 times within the previous 30 days and *high frequency heroin injector*, or "high-FHI," who injected at least 30 times in the last 30 days. To address ambiguity, we utilized the numerical cut off for frequency of use put forth by the United States Office of National Drug Control Policy, which defines "hardcore" use as more than 10 days of heroin use per month (Rhodes, Scheiman, Pittayathikhun, Collins, & Tsarfaty, 1995). We found in our epidemiological study that self-reported African American race, men who have sex with men, and injection and non-injection methamphetamine use were independently associated with low frequency injection 30 days prior to the interview (Harris et al., 2012).

The cross-sectional epidemiological data alerted us that, potentially, a phenomenon of low frequency heroin use existed in this population. In order to explore this phenomenon further, we designed a 2-year longitudinal study to examine street-based IDU's heroin use patterns qualitatively. Using a longitudinal study design was of particular importance because we wanted to assess whether it is possible to maintain low-FHI over time and to examine the aspects of their lives that facilitate controlled use.

Methods

We recruited 602 IDUs to participate in an anonymous quantitative screening interview using targeted sampling methods (Bluthenthal & Watters, 1995; Watters & Biernacki, 1989) in San Francisco, California in 2008. Eligibility criteria for the screening interview were: (1) injection of illicit drugs within the past 30 days, verified by checking for signs of recent venipuncture; (2) age 18 years or older; and (3) ability to provide informed consent. Participants were interviewed by a trained interviewer, who read questions and entered responses into a computer-assisted personal interviewing program on a lap-top computer, programmed using Blaise 4.0. (Westat, 2009) Participants were remunerated $15 for completing the screener interview.

During the screening interview, we assessed eligibility for the qualitative study, the topic of this manuscript. We utilized the epidemiological categories of low-FHI and high-FHI as our qualitative sampling frame. Eligibility criteria for low-FHI included (a) having injected heroin (alone or in combination with other drugs) 1–10 times in the past 30 days, (b) having first injected illicit drugs at least 5 years ago, and (c) not having been in methadone or buprenorphine treatment in the past 30 days. Eligibility criteria for high-FHI were the same as for low-FHI, with the exception that participants needed to have injected heroin (alone or in combination with other drugs) at least 30 times in the past 30 days. We were interested in studying established heroin users using at low frequency and not new initiates into injection, therefore, excluded individuals who began injecting fewer than 5 years prior to their screening interview. Additionally, the phenomenon of using drugs occasionally while enrolled in substance abuse treatment has been well documented (Gogineni, Stein, & Friedmann, 2001; Longshore, Hsieh, Danila, & Anglin, 1993; McNeely, Arnsten, & Gourevitch, 2006) and was not of interest in this study, leading us to exclude individuals who reported methadone or buprenorphine treatment in the 30 days prior to their screening interview. Questions related to eligibility criteria were embedded among other questions in the 20 min screening survey including: demographic characteristics, drug use, syringe access and disposal, and HIV risk behaviour. Analysis of the quantitative data has been published elsewhere (Kral et al., 2010; Wenger et al., 2011).

Eligible participants were invited to enrol in a 2-year qualitative cohort study. There were two informed consent processes, one for the screening interview and one for the qualitative study. All procedures for the study were approved by the institutional review board at RTI International. Enrolled participants participated in digitally recorded, in-depth qualitative interviews which included: (1) baseline interviews, (2) change of status interviews, supplementary qualitative interviews conducted when we learned during a monthly check-in interview (see below) that participants' heroin use status had changed from low-FHI to high-FHI, low-FHI to no heroin use, or high-FHI to low-FHI or no heroin use, and (3) follow-up interviews at one and 2-year intervals. Participants were remunerated $25 for participating in each qualitative interview. Interviews were transcribed verbatim by a professional transcription service. After each interview, interviewers wrote brief summaries regarding the participant's life history, drug use history, current living situation, and anything related to heroin use frequency.

Since the majority of participants were homeless or marginally housed and lacked consistent contact information, participants were asked to attend monthly check-in appointments in an effort to maintain high retention in the 2-year study. During those appointments, participants were asked to update their contact information and participate in a 5-min quantitative survey. Though this methodology was initially introduced as a retention effort, we also capitalized on this opportunity to collect critical temporal data regarding participants' drug use over the past 30 days and changes in health, housing, relationship status, hospitalisations, arrests and incarceration (Lopez et al., 2013). Participants were paid $10 for each 30-day check-in. The research team did not analyse these data quantitatively; instead, the data collected at check-in appointments were used to monitor significant life events and became the central tool to develop individualized qualitative guides that were used during the follow-up interviews. Throughout the course of the

study we realized how critical these monthly check-in data were to capture participants' drug use trajectory and to document significant changes in patterns of heroin use in as close to real time as the study design allowed. When changes were reported, participants were asked to take part in a change of status qualitative interview, so the research team could document contextual factors and motivations for any change in patterns of use. This monthly data collection technique allowed us to prepare a detailed timeline of changing heroin use for each participant including when changes occurred, under what conditions, and whether they were maintained over the 2-year data collection period.

Based on the epidemiologically-driven sampling frame described above, 48 of the 602 participants (8% of the sample) met the eligibility criteria for low-FHI. A total of 37 low-FHI participated in the qualitative component of the study and eleven did not. During the course of the qualitative interview it became apparent that eight participants were misclassified during the screening interview, did not meet the eligibility criteria for low-FHI, and thus were excluded from this analysis. Our final sample included 29 participants classified as low-FHI and 25 participants classified as high-FHI. We completed 19 changes of status interviews, 38 one-year follow-up and 38 two-year follow up interviews, resulting in a 70% retention rate.

ATLAS.ti (version 6)(ATLAS.ti, 1993–2013) was used as a qualitative data management tool. Transcripts and summary statements were read and coded for salient themes using an inductive analysis approach (Thomas, 2006). The initial code list was developed from the interview guide and modified throughout the coding process. During the initial coding process, four coders coded seven interviews. Each coded transcript was discussed line by line until the coding team came to an agreement about code definitions and how they should be applied. Over the course of the study all baseline qualitative interviews were entered into ATLAS.ti and coded. As a technique for managing multiple data points, all interview transcripts (baseline, change of status, 1 year and 2 year follow-up) were read across each participant and summarized to create a drug trajectory timeline for the entire course of the study. The summaries were also coded for emergent categories and salient themes. As similarities and differences between participants were discovered, transcripts were queried to search for supportive quotations as well as negative cases. In this way we gained an understanding of drug use patterns over time: the baseline interview provided important background information on participants' drug use trajectories, experiences with drug treatment and incarceration, and engagement with key social networks and institutions; the monthly check-ins allowed us to capture "snapshots" of life events and drug use in succinct periods of time; the change of status interviews allowed for qualitative probing around changes in participants' patterns of heroin use; and finally, the follow-up qualitative interviews provided time for the participants to reflect in-depth about the patterns of use that we had documented over the course of the previous year. These multiple data points allowed examination of participants' heroin use within the context of detailed documentation of life events and the intersecting socio-structural factors which impact patterns of use for street-based drug users.

Results

Throughout the analytical process, we looked for similarities and differences between low-FHI and high-FHI study participants. We expected to find pronounced differences in the socio-structural factors that contributed to participants' frequency of heroin use. However, we found very few differences between the two groups and many similarities. Both sets of participants had a high prevalence of being homeless or marginally housed, of suffering from chronic illness including severe mental health issues, of criminal justice involvement, and of active poly substance use. The one difference that we did find between low-FHI and high-FHI was that low-FHI harboured the belief, and the lived experience, that they could reduce and maintain low frequency heroin use. In contrast, high-FHI expressed that occasional heroin use was an idealized practice, but both physically and practically impossible. We specifically queried all high-FHI about the possibility of using heroin less than 10 times per month and they explained in detail the difficulty of this practice. They cited physical addiction, chronic pain, homelessness, intergenerational drug use and long histories of heroin addiction that prevented them from reaching this ideal state. For example, one participant (age 34, white, male) whose mother and extended family had long histories of heroin addiction and had been living on the streets using heroin daily for the last 10 years explained his perspective on why he could never be low-FHI. He thought it was impossible, and described himself as predisposed to heroin addiction to as a result of being exposed to heroin in utero:

> I think that's great. . . .There's different people in the world, you know. . . I believe. . .due to my mother being, uh, doing heroin throughout my pregnancy, I believe I'm predispositioned for it. (020043k)

Another high-FHI (age 58, African American male), who had a daily heroin habit for 30 years desired to be low-FHI, but did not see it as a possibility. His long history of heroin addiction made it impossible for him to imagine his life in any other way:

> Participant: "See it goes back to the bicycle thing [implying that one does not unlearn how to ride a bike]. Once you've been there it's hard, it's hard not going back."
> Interviewer: "Do you ever see yourself being able to get to that place or having a desire that way?"
> Participant: "I would like to but I've been on the bike too long." *(020087i)*

Since we did not find marked differences between high-FHI and low-FHI, the following analysis is not a comparison between the two sub-groups. This analysis is an in-depth assessment of the factors and strategies that motivate and facilitate low-FHI.

Our interviews with low-FHI revealed that although 20 out of 29 participants maintained low levels of heroin use over the course of the study period, there were important distinctions among individuals regarding motivations for their use. We divided low-FHI individuals into two major analytic categories: "maintenance low-FHI" and "transitioning low-FHI." Maintenance low-FHI sustained their low-FHI status throughout the study period. Through our various qualitative data collection techniques, we were able to parse out the nuances of this maintenance category to reveal that those who maintained low frequency heroin use did so either "circumstantially" (as a result of their social networks or life events) or "purposefully" (that is, they were motivated to maintain low use for particular reasons). The second major category, "transitioning low-FHI," included people who did not maintain low frequency heroin use throughout the 2-year study period. They reported low frequency heroin injection at the time of their baseline interview, but either increased their use over the course of the study to high-FHI, or had been in the process of quitting using heroin at baseline. Importantly, we do not assert that these analytic constructs describe a fixed typology of low frequency heroin use; instead, the categories served as a tool, which allowed us to elucidate the nuances of low frequency heroin use over time that we found in our sample of street-recruited drug users.

Maintenance low-FHI

Over the course of the 2-year study period, we found that the majority of low-FHI were *maintenance low-FHIs* ($n = 20$) who either (1) used heroin circumstantially only when the opportunity presented itself, but did not actively strategize to avoid injecting heroin ($n = 11$), or (2) purposefully intended to remain low-FHI and strategised how to do so in their daily lives ($n = 9$).

Circumstantial low-FHI: contributing factors

Circumstantial low-FHI were individuals who used heroin when the opportunity presented itself and did not maintain active or strategic avoidance of heroin use. Circumstantial low-FHI were poly substance users, with multiple health problems and chaotic lifestyles. Many reported regularly using crack cocaine, methamphetamine, and/or alcohol.

Most of the circumstantial low-FHI did not seek out heroin and stated they did not use it at high frequencies because they preferred other drugs to heroin. Many circumstantial low-FHI explained that they did not particularly desire heroin, but used heroin with others who were using it in times of celebration or in social or sexual situations. One 48-year old Native American man said he used heroin "very infrequently, only in sexual situations." He had a variety of health problems including HIV and Hepatitis C virus and reported having diagnoses of Bi-polar and Multiple Personality Disorders. Throughout the study period he lived alone in a single room occupancy (SRO) hotel and described his daily life as very isolated. He only used heroin to be on the "same page" with the women he occasionally had sexual relations with:

> I shouldn't even be doing it once in a while. But you know, sometimes I get lonely and I want some companionship, I want to connect with somebody, and those girls that come, (laughs) they's pretty strung out. (020520e)

Circumstantial low-FHI also described access to heroin as a reason for occasional use; they resided in locales with a thriving drug economy where heroin was easily available. Even individuals who told us they did not like heroin used it occasionally when it was offered to them.

One circumstantial low-FHI, a 43-year old white man, had been using heroin at low frequency since moving to San Francisco 5 years prior to his baseline interview. He had never been "strung out" on heroin, but smoked crack-cocaine everyday and drank heavily to the point of needing to drink first thing in the morning to stave off "the shakes." He was unstably housed, living alone in a temporary SRO hotel in a San Francisco neighbourhood known for its active illicit drug market. He told us that he did seek out the heroin he occasionally used because it was so readily available to him.

> Participant: "I don't really, I don't chase heroin. I ain't into it. I ain't gonna go buy it. I, I, I would buy it, though, maybe if it's a good deal. I don't hate it, but I don't. . .I'm not into fucking shooting up heroin and. . .I mean, I don't mind it, but I just, I, I don't fucking think about it. . . I am different. I ain't your average Joe."
> Interviewer: "And so why do you use it? Why do you use heroin sometimes?"
> Participant: "Cause a lot of people do and they fucking, they wanna give it to me. 'Cause there's a lot, a lot of people that do heroin. I don't really. . .but I do it. I got no problem with it." (020263a)

During a period of intense depression, this participant spent a lot of time alone in his hotel room and stopped using heroin completely for 12 months. Then, four months prior to his 2-year follow-up interview, he started leaving his room more often, spending time on the streets, interacting with other drug users and re-initiated occasional heroin injection as a form of sociability:

> I live on the street and I know everybody. Anybody and everybody I know does drugs. That's the people I hang around with. And usually its crack or marijuana. You can get marijuana anywhere. But every once in a while you say 'Well, I wanna do some heroin. . .' I've never been addicted to it. I enjoy the buzz but I'm more hyper, though, I'm more up, uppity up. I don't want to nod out. I'm not into that. I'm really not into it. (020263a)

Circumstantial low-FHI did not seek out heroin; they used other preferred drugs (methamphetamine, cocaine or alcohol) more frequently.

Purposeful low-FHI: motivations to maintain low-FHI

In contrast to circumstantial low-FHI, purposeful low-FHI clearly articulated motivations to maintain heroin use at low levels, as well as strategies they used to remain low-FHI over time. All the purposeful maintenance low-FHI in our sample expressed motivations for limiting heroin use that reflected the reality of the lives of indigent street-based drug users. Their existence exemplified an everyday struggle for survival in the context of extreme poverty and frequent criminal justice involvement. Participants often weighed maintaining the cost of expensive heroin habits against keeping even minimally stable housing, maintaining hygiene, staying warm and dry, eating, managing emotional trauma, supporting families, avoiding incarceration, seeking physical safety, or attempting to minimize negative health outcomes of injection drug use.

One man (age 44, African American), who maintained low frequency heroin injection over the entire course of the 2-year study, smoked crack-cocaine and cannabis almost daily in addition to drinking malt liquor. Shortly before enrolling in the study he had become stably housed in an apartment with his girlfriend. His previous experiences of homelessness influenced his current desire to maintain low frequency use. Therefore, he prioritised paying rent over maintaining an injection heroin habit.

> I'm inside. I don't have to go to no soup kitchen line no more, none of that. I always make sure I do my stuff, pay my rent, the refrigerator, I always have something to eat everyday at home. Even though I still dibble and dab, but I look at people as an example how not to be. It's unbearable, I done been there when you get on the bus, you know what I'm sayin', you know you're reeking. Same clothes on for a month where they literally just almost stuck to your body. . .I mean it's unbearable. That's what keeps me goin'. *(020047o)*

This man was one of many who spoke of being tired of supporting a daily heroin habit because the consequences of frequent use were palpable and often included extreme bodily suffering and homelessness. These past experiences of life on the streets served as motivation to attempt to keep heroin use under control. Another participant (age 47, white, male), who had been using heroin since he was 21-years old, had previously used heroin at high frequency. At his baseline interview, he was using heroin only occasionally to help ease the effects of crack smoking and during periods of depression when he had run out of medication. He did not want a life subordinated to heroin use, thus he worked hard to keep his heroin consumption at a minimum.

> I get tired of sleeping in door eaves on cold, rainy nights with not a shirt on my back, you know. So it's. . .a lot of stuff like that,

that I go through makes me kinda, you know, try to keep from going, going that way - but some time I do slip up and drop the ball, you know. But I always try to pick it up again and continue to, ah, you know, not have to do that. Yeah, I mean it's not a fun life I should say. *(020407g)*

Participants also described their attempts to maintain low frequency heroin use because they feared that high levels of use would lead to increased involvement in the local drug economy, which was omnipresent in most of the neighbourhoods in which participants resided. With little to no financial resources, participants feared having to engage in criminal activity in order to support their habit, which had resulted in incarceration in the past. One participant (age 45, Latino, male) started injecting at age 29, had been a high frequency heroin user and had been in and out of prison many times. He had been maintaining low frequency heroin use for approximately 10 years at the time of his baseline interview, but reported daily crack use. His fear of incarceration was a major motivator to keep his heroin use to a minimum.

And I know that's what'll put me right back in the penitentiary real quick. . .I won't make it a year without (going back), once I start on [heroin] and start getting that habit going and forget it, it's on. . . then the other side of me comes out. Thievery. . .whatever it takes. *(020380c)*

This participant's fear of incarceration is a reflection of his vulnerability to the consequences that accompany chronic drug use among the urban poor. This participant also limited heroin consumption in order to manage critical familial relationships in response to a traumatic family event. The death of his ex-wife and his concern about his children had inspired him to reduce his drug use:

Because she died out in the middle—she died out in the doorway, drinking; she's an alcoholic. And you know, and when I sat back in jail I just, I sat there and I thought like, Man. . .my kids. My kids are thinking "Dad, you gonna go off the same way?" No, I can't. No, I'm not going out that way. I'm not going out that way they'll be hurt—my kids as much as they've been hurt already they've been damaged enough. And I love them. *(020380c)*

Others cited the need to minimize the physical discomforts associated with heroin withdrawal in the context of unstable housing or lack of access to resources as motivation for reducing heroin use. Many recounted their experiences with heroin withdrawal and feared the threat of being sick on a daily basis or having to stop using heroin without the help of medication on the streets or in jail.

One participant (age 51, African American, female), who had been injecting heroin intermittently for the last 30 years at high frequency maintained low-FHI over the course of the 2-year study, although she used crack cocaine daily. She was motivated to maintain low heroin use because of her previous experiences of being "strung out."

See, I know what it is to be hooked. . .you know and I don't want that feeling no more. See that's what it is. That's that feeling, that after-feeling. That's tore up. (020504L)

Six months before the study began, this woman had tested HIV positive. Over the entirety of the study, her heroin use fluctuated, but stayed low frequency. She spoke of occasionally increasing her use from the stress of not having disclosed her HIV status to family, friends, and her partner. Nonetheless her recent diagnosis compounded her desire to maintain low-FHI because she could not imagine managing her HIV in conjunction with heroin withdrawal.

Interviewer: "What would it be like for you [to be strung out] right now in your life?"
Participant: "That would be terrible; you know what I'm saying. I mean, really terrible. Because I'm dealing with this disease. And being strung out? That's just like giving up on yourself." *(020504l)*

Participants also used heroin to self-medicate physical and mental health problems, while at the same time maintaining a discourse that heroin is an extremely powerful drug that should be used with caution. One 44-year old white HIV-positive man who had been injecting heroin for 32 years reported keeping his heroin use to a minimum because of what he perceived to be heroin's pharmacological exceptionalism. He had two periods of being strung out in his lifetime. The last was a decade ago, but he reported largely maintaining low frequency injection use—only injecting heroin two to three times a week—since then. He used heroin to relieve depression, social anxiety, insomnia, and to help with his HIV-related neuropathy. At the time of his 2-year follow up interview, he was injecting methamphetamine and taking prescription opiates daily. He attributed his low frequency heroin use to his unique physiology and a profound respect for the power of heroin.

Participant: "Because I had somebody instill very strict guidelines as to using it. It's like I have an immense amount of respect for heroin because it's a killer."
Interviewer: "Is it a fear?"
Participant: "Yeah. Because it's like you never- you can't come back, but you can do more. . .I'm very susceptible to heroin. It takes very little for me to get high. . .but I can do what would kill a normal person of any kind of amphetamine, cocaine, or anything." (020518c)

Participants also feared injection-related health problems such as abscesses or flesh eating bacteria—problems that are amplified by street-based injecting, where users have limited access to clean water, injection and hygiene supplies, and safe spaces to inject. One 44-year old African American man reduced his heroin use from daily to monthly after his experience with a severe injection-related abscess.

Interviewer: "So tell me exactly how you went from using [daily]. . ."
Participant: "Crack and a little weed and a lot of Old English [malt liquor]. A lot more liquor. Because I'd be so scared of having that [abscess], you know what I'm sayin', you get a miss. That's the mark from that abscess, I had a big, I missed, you know, and had some bad dope. And my whole arm was all messed up where they had to cut the abscess out. So that tell me right there all I needed. Be careful." (020047o)

Purposeful low-FHI: management strategies

Purposeful low-FHI described specific strategies to maintain their heroin use at low levels over time. They explained how they limited the number of days they used heroin in a given time period; for example, no more than three days in a row or only once a week on Saturdays. The 44-year old African-American participant quoted above who had maintained his low-FHI status for a decade explained:

> "Yeah, just enough [heroin] to get high knowing in my mind, knowing not to go four days doing this I'll go two or three, but on the third day, I can't. I gotta stop." *(020380c)*

Strategies included never learning to inject oneself to remain dependent on others to inject them; paying rent and other bills as soon as they obtained money to reduce the temptation to buy heroin with surplus cash; substituting other drugs (crack, cannabis, alcohol, methamphetamine) for heroin; and avoiding friendships and environments that involved heroin use.

One participant, a 55-year old African American man, took pride in his ability to control his heroin use throughout most of his drug-using career. He had begun injecting when he was 19-years old and spent several decades limiting his heroin use. He had never felt "strung out" until he was 48-years old when he slowly transitioned back to low-FHI in order to stay involved with his family, something he felt he could not do when he was physically dependent on heroin. He always depended on a specific friend to inject him and he stored his syringes and other injection equipment at that friend's house. He gave his friend heroin in exchange for injecting him.

> Cause I'm scared. I, I mean, everybody say, 'You're gonna have to learn how to do this on yourself.' I run across the drugs so easily and stuff. If I was to start to learn how to do it, then I would be—barefoot in those Port-A-Potties [street corner public bathrooms] and all of that doing it myself. And that's just scary. I don't wanna—you know, I wanna take what I got to where, you know, somebody can do it for me and I can share it with them. And they can watch me to make sure; you know. . .nothing happens to me. (020131g)

When he occasionally felt himself becoming addicted to heroin, he would substitute alcohol or other drugs for heroin.

> Interviewer: "And so do you, do you ever feel any withdrawals when you do that?"
> Participant: "Not per se, not really. . ..I don't think about it. I don't–I – no. No. 'Cause I substitute it, I do something else. I'd take something else real quick, you know, and fight that off. I mix it up with a pill or have a different kind of alcohol drink and smoke some weed. I just throw it all off. Switch it around." (020131g)

Another strategy used by purposeful low-FHI was to actively avoid drug-using friends and social environments that might trigger more frequent use. This was challenging since social networks, housing options, and social services for most participants were located in neighborhoods with active open-air drug scenes. One 54-year old white woman who had multiple chronic health problems and a history of repeated incarceration had been injecting heroin at both high and low frequencies for 9 years prior to her baseline interview. She described the conscious efforts she made to maintain her low-FHI status. She was living in a homeless shelter at the time of her baseline interview and maintained her low levels of heroin use by carefully avoiding associating with other heroin users who might involve her in relationships of reciprocity:

> You know, and, I'm very careful now as far as association; you know, as long as I'm not out there looking for the drugs. . .I'm not out there making friends with somebody that you know, I'm gonna have to give half of my stuff to and that's my buddy from now on. So that's what keeps me okay. *(020633c)*

Others only used heroin when they needed to "take a break" from or "come down" from stimulants such as crack cocaine or methamphetamine, which were their primary drugs of choice. One participant (age 45, Latino male) attempted to manage his crack use by injecting heroin. He deliberately limited his heroin use to twice a week and said this allowed him to reduce the amount of money he spent on crack.

> I use [heroin] just to come off the crack, you know what I'm saying. It's just like I can shoot some heroin now and not have to worry about or even think about having crack on me. . . Today, if I do heroin, I do it because I want to stop doin' crack because heroin to me is more cheaper, because you get the high lasting longer. . .you ain't chasing the god damned pipe. . . (020380c)

Another participant (age 44, white, male) used heroin strategically as a way to create periods of respite from his methamphetamine use and the lifestyle associated with stimulant use:

> Participant: "I use heroin when I just can't hustle anymore. Then I can stop for ten or fifteen hours or something"
> Interviewer: "What does the heroin do for you at this point?"
> Participant: "It's like getting off a treadmill. It's just like 'Phew! Let it stop'." (020518c)

Transitioning low-FHI

In contrast to *maintenance low-FHI*, *transitioning low-FHI* were individuals who, at the time of their baseline interview, reported using heroin 10 or fewer times per month, but over the course of the study either increased their use and transitioned to high-FHI status, or ceased using heroin completely. Although some of these participants reported being consciously motivated to maintain low frequency heroin use at the time of their initial enrolment, this was often an idealized practice that was difficult to achieve and or maintain. Some low-FHI who were transitioning to daily heroin use reported recent experiences with incarceration—that is, they were categorized as low-FHI in the initial epidemiological screener because we interviewed them at a time when they had stopped use involuntarily because of incarceration and were in the process of transitioning back to higher frequency heroin use. In this way, our study design allowed us to critically examine the cross-sectional epidemiological screener data. Our longitudinal qualitative change-of-status interviews allowed us to understand the multiple factors that sometimes intersect at a moment in time to allow for intermittent or occasional periods of low frequency use. Upon his release from jail, a 49-year old Latino man, who started injecting heroin when he was 40-years old, expressed a desire maintain his heroin use at low levels in order to prevent physical dependence. At the time of his baseline interview he considered himself to be medicating physical pain with heroin:

> I got out of jail a couple of weeks ago and I developed this pain and that I gotta get operated on and and then when I think about intense pain, I'm thinking about the heroin, you know, and I get a shot, but I'm being real light about it, you know? I know it's just gonna get heavier later, but I'm being a little bit more wiser in a sense that I don't come up to Mission Street [a heroin trafficking neighborhood] that often, being that I got a number [juridical parole contingency], you know? And when I do shoot some heroin, I keep it like at 10 milligrams, or something like that, you know? (020382e)

Living in environments with multiple open-air drug markets for both heroin and crack, participants frequently described the difficulties of keeping their heroin use at low levels, despite their intentions to do so. The same participant quoted above, was

living in an SRO hotel with his girlfriend. They smoked crack daily together and he began increasing his heroin use in order to control his crack use. Although still explicitly desiring to maintain his use at low levels, he had transitioned to daily use by the time of his 1-year follow-up interview:

> "I've been doing a lot of crack and it's come to a point where I've, I've, I've noticed that the more heroin I use, the less crack I use. And so it seems to be like a less expensive thing to do, even though I've always tried to keep it down to like 10, 15 units [syringe measurement], just so I won't get a crazy habit, but I feel that, it's coming back on again, where I need to use more in order to feel, you know, okay. (020382e)

Other low-FHI whose habits were increasing and feared that addiction was inevitable enrolled in methadone maintenance before their heroin habit increased to a point where it felt "out of control." One transitioning low-FHI, a 66-year old African American man who first used heroin when he was 17-years old, discussed his ongoing struggles to break what he described as the "cycle of addiction, arrest and incarceration." Prior to his baseline interview he had detoxed from methadone maintenance and for the first five months of the study, he drank alcohol heavily and used heroin at low frequency until his social network gave him easy access to inexpensive, good quality heroin. His use subsequently increased and he enrolled in a methadone maintenance treatment program because he felt his use escalating to physical dependence:

> A friend of mine. . .he got out of prison and he had a big old dope bag and bam! [I started using]. . .I was handling it for him, you know what I mean. . .If you are around it you will eventually use. I got on methadone because I knew it was a matter of time. . .I don't want to go through that addiction. Takes the fun out of it. It makes you miserable. *(020483n)*

Virtually all of these transitioning participants, who intended to move from low-FHI to abstinence, or to maintain themselves as low-FHI, expressed hope about the future and described drug use management strategies to reduce heroin use. For some, using heroin at low frequency was simply a first, not necessarily conscious, step in their transition to abstinence. These strategies included keeping themselves occupied with art, music, or volunteer work, seeking employment, engaging with family, exercising, and religious or spiritual practice. One 48-year old white man, who had moved to San Francisco from Montana in the mid-1980s, lived in Golden Gate Park and used heroin mixed with methamphetamine at high frequencies for nearly two decades. He reported slowly increasing his cannabis smoking and decreasing his injection drug use over an 8-year time period. At the time of his baseline interview he was down to using heroin once a week. Three months into the study he had moved indoors, made contact with his estranged family, and stopped using heroin altogether. He recounted the strategic life changes he made prior to his abstinence:

> Well, I was trying to get in contact with my parents, my parents helped me. Even though they didn't have no idea what. . .was wrong with me, I couldn't go out of my way telling them I was strung out on drugs. Going to my parent's house is what helped me, you know, helped me a little bit to get away from heroin and all of that stuff. . .going down there for two weeks, it, it helped quite a bit. I mean I was still going through hot and cold sweats, you know, and tossing and turning, you know. It wasn't very, I wasn't getting much sleep but my parents support is what was helping me, you know, keeping me from freaking out. *(0200023n)*

Like several other transitioning low-FHI, he smoked cannabis to reduce anxiety and cravings experienced during the transition period:

> . . .And the weed helps, you know. The weed helps energize me to where I can get out and do things to keep my mind off the heroin and the crystal meth (020023n)

Although he was living in a neighbourhood with open-air drug markets, he avoided local acquaintances and friends involved in drug activity. He spent most of his time doing volunteer work and looking for a paid job.

Similarly, another participant (age 51, Latino, male), who over the course of the study transitioned from low-FHI to high-FHI and then to abstinence, spoke in detail about his hope for the future, his connection with his family and the strategies that he used to cope with his transition out of heroin use:

> I'm not gonna be living in the area where that's happening. You know what I mean? I'll stay with mom. . .That's my option. I'm gonna go to work. I'm gonna find something. Because, you know, at my mom's house, you know, I keep it totally respectful. I'm out. I go in the mornings; I jog over to the park. I'll go into the basketball court before all the mothers bring their kids. . . So I'll, I'll do my exercise early in the morning. You know and, and it makes me feel good to keep that routine going. *(020382e)*

Discussion

Over the course of this longitudinal study we observed very few differences between low-FHI and high-FHI beyond their patterns of heroin use. For that reason, the analysis did not warrant comparing the two groups. That is, the drug use patterns of both low-FHI and high-FHI intersect with their social marginality, compounded physical and mental health issues, bodily suffering related to being on the streets, social environments which might pose risks, frequent incarceration, and the ubiquity of the drug economy in these neighbourhoods. Therefore, we focus this analysis on describing the phenomenon of low-FHI within this sample. We found that patterns of heroin use among low-FHI fluctuated over time. One group, maintenance low-FHI ($n = 20$), maintained low frequency use over the entire course of the study. Although small in number, these data nonetheless provide a unique contribution to the literature on heroin use specifically because this study examined longitudinal patterns of heroin use among a sample of street-based, unstably housed, impoverished drug users. Thus far, these contextual factors have not been well explicated in the literature on low frequency heroin use.

We use analytic categories (i.e., maintenance and transitioning low-FHI) to make sense of and parse out characteristics of our complex longitudinal dataset. Although we used these categories as an analytic tool, the goal of this paper is neither to assert a typology of heroin use patterns nor to isolate the phenomenon of "low FHIs" into a discrete, bounded category of IDU. We found that intensity of heroin use frequently shifts over time and our categories helped us identify the structural, meso-, and micro-level factors impacting drug use within those patterns at particular moments in an individual's life cycle.

Utilizing these analytic categories as a framework, we found that maintenance low-FHI can be split into two groups: circumstantial and purposeful low-FHI. Circumstantial low-FHI lacked intentionality with respect to maintaining their heroin use at a low frequency and only injected sporadically in certain social situations. In fact, most in this group explained that heroin was not their drug of choice. They often preferred stimulants to opiates. Purposeful

low-FHI described specific motivation and deliberate strategies to remain low-FHI over time.

The final category, transitioning low-FHI, were individuals who were moving from low-FHI to high-FHI or low-FHI to no heroin use. These injectors were originally classified as low-FHI because of the cross-sectional epidemiological screening method, which captured a snapshot in time when they were transitioning through a period of low-FHI.

Circumstantial low-FHI is especially illustrative of the profound structural vulnerability of many street-based heroin injectors in the United States alerting us to the public health need for more tailored basic support services. The statements by the circumstantial low-FHI who expressed disinterest in the pharmacological effects of heroin, occasionally found themselves injecting it simply because sharing heroin was common within their social networks. This contrasts the susceptibility of high-FHI who enjoy the effects of heroin too much to prevent its rapid onset of physical dependence.

Most low-FHI in our sample were poly-substance users. Although only injecting heroin occasionally, they were often injecting methamphetamine, smoking crack cocaine, drinking alcohol, or taking prescription pain relievers. Scrambling to survive at the intersection of poverty, social marginality, and histories of trauma, participants appeared to be self-medicating physical and mental health issues. Using heroin at low frequency did not necessarily signal a less chaotic lifestyle or minimize the risks associated with drug use.

The majority of participants expressed a desire to limit or cease their heroin use. This was clearly articulated when they were passing through difficult moments in their life or reflecting on their drug careers during an interview. Patterns of intensity of heroin use among street-based, indigent drug users are shaped by their specific forms of structural vulnerability scrambling to survive on streets in "risk-environment" neighbourhoods that are the product of political and economic forces and policies (Rhodes et al., 1999).

Although this study gave us the opportunity to examine in-depth the phenomenon of low-FHI, there were several limitations. First, this study only sampled street-based injectors in San Francisco, CA, almost all of whom were impoverished and homeless or unstably housed, consequently its findings on the difficulties of purposefully maintaining low frequency heroin injection may be a result of class-specific sampling bias. Second, the sample is small and not generalisable to all street-based IDUs.

Although this qualitative analysis offers a provocative example of the productivity of cross-methodological dialogue, the fact that such a small sample of low-FHI was identified as eligible to participate in the qualitative study (8%) compared to the original epidemiological study (15%) suggests that our original hypothesis of the prevalence of low-FHI may have been an artifice of the logistics of cross-sectional epidemiological surveys, which are designed to document an individual's practices and status at a moment in time rather than the temporal processes within which behaviours are embedded. Further, once we learned more about the study participants who had qualified as low-FHI in the epidemiological screener, we found that a few of them had been misclassified. The emergence of the category of low-FHI in the original study may have been a reflection of methodological biases such as social desirability, recall bias, and the stigma associated with disclosure of injection of heroin use. It appears to us that there exist less "true" low-FHI than we had expected based upon our original epidemiological study, and that they represent a small minority of heroin users.

Conclusion

There is both methodological and practical public health value to understanding qualitatively the nuances of low-frequency heroin injection. Methodologically, we took the opportunity to further refine the epidemiological-ethnographic cross-methodological dialogue that we have utilized in previous studies (Lopez et al., 2013). Epidemiological methods allowed us to identify the phenomenon of low-FHI while qualitative methods allowed us to document the temporal processes and meaning with respect to participants' ability to manage their heroin habit size while at the same time discovering subtle differences between low-FHIs. Pairing these research methods enriches our understanding of drug use patterns. Furthermore, we learned how acutely aware IDUs are of their habit size and that they often strive to alter the levels of intensity of their drug use. It became apparent that the prioritisation of drug reduction by street-based active users may indeed be a form of intentional harm reduction for some, but not all low-FHI. The differences we found between low-FHI have distinct implications for service provision. It appears important to assess specific patterns of heroin use over time and people's motivations with regard to their frequency of use. Purposeful maintenance low-FHI may not desire or need traditional drug treatment services but instead seek to prioritise support for basic needs, access to financial entitlement programs, and physical/mental health care. Circumstantial maintenance low-FHI may need non-heroin specific treatment options since heroin is not usually their drug of choice. And finally, transitioning low-FHI may benefit from traditional drug treatment options and support services. Given the nuances of patterns of heroin use over time that we identified in this study, when working with low-FHI, it is important to assess their heroin use patterns as well as their use of other drugs, need for substance abuse treatment, as well as their physical and mental health care needs.

Acknowledgements

We would like to thank the RTI International, Urban Health Program staff for their participation in this project; Cindy Changar, Allison Futeral, Jennifer Lorvick, Askia Muhammad, Jeffrey Schonberg and Michele Thorsen. We would also like to thank the individuals who participated in this study, without whom we could not accomplish this work. And finally, we would like to acknowledge the National Institute on Drug Abuse, who funded this project (NIDA R01 DA010164).

Conflicts of interest statement

The authors declare there are no conflicts of interest.

References

Atlas.ti. (1993–2013). *ATLAS.ti Version 6*. Germany: Berlin.

Bluthenthal, R. N., & Watters, J. K. (1995). Multimethod research from targeted sampling to HIV risk environments. *NIDA Research Monograph*, *157*, 212–230.

Boeri, M. W. (2004). Hell, I'm an addict, but i ain't no junkie": An ethnographic analysis of aging heroin users. *Human Organization*, *63*(2), 236–245.

Dean, A. J., Saunders, J. B., & Bell, J. (2011). Heroin use, dependence, and attitudes to treatment in non-treatment-seeking heroin users: A pilot study. *Substance Use & Misuse*, *46*(4), 417–425. http://dx.doi.org/10.3109/10826084.2010.501655

Decorte, T. (2001). Drug users' perceptions of 'controlled' and 'uncontrolled' use. *International Journal of Drug Policy*, *12*, 297–320.

Gogineni, A., Stein, M. D., & Friedmann, P. D. (2001). Social relationships and intravenous drug use among methadone maintenance patients. *Drug and Alcohol Dependence*, *64*(1), 47–53.

Harding, G. (1988). Patterns of heroin use: What do we know? *British Journal of Addiction*, *83*(11), 1247–1254.

Harding, W. M., & Zinberg, N. E. (1977). The effectiveness of the subculture in developing rituals and social sanctions for controlled use. In B. M. DuToit (Ed.), *Drugs, rituals and altered states of consciousness*. Rotterdam: AA Balkems.

Harris, J. L., Lorvick, J., Wenger, L., Wilkins, T., Iguchi, M. Y., Bourgois, P., et al. (2012). Low-frequency heroin injection among out-of-treatment, street-recruited injection drug users. *Journal of Urban Health*, http://dx.doi.org/10.1007/s11524-012-9720-8

Heroin Abuse and Addiction. (2005 [1997]). *NIDA research report*. National Institute on Drug Abuse.

Kral, A. H., Malekinejad, M., Vaudrey, J., Martinez, A. N., Lorvick, J., McFarland, W., et al. (2010). Comparing respondent-driven sampling and targeted sampling

methods of recruiting injection drug users in San Francisco. *Journal of Urban Health*, *87*(5), 839–850. http://dx.doi.org/10.1007/s11524-010-9486-9

Longshore, D., Hsieh, S., Danila, B., & Anglin, M. D. (1993). Methadone maintenance and needle/syringe sharing. *International Journal of Addiction*, *28*(10), 983–996.

Lopez, A. M., Bourgois, P., Wenger, L. D., Lorvick, J., Martinez, A. N., & Kral, A. H. (2013). Interdisciplinary mixed methods research with structurally vulnerable populations: Case studies of injection drug users in San Francisco. *International Journal of Drug Policy*, *24*(2), 101–109. http://dx.doi.org/10.1016/j.drugpo.2012.12.004

McNeely, J., Arnsten, J. H., & Gourevitch, M. N. (2006). Improving access to sterile syringes and safe syringe disposal for injection drug users in methadone maintenance treatment. *Journal of Substance Abuse Treatment*, *31*(1), 51–57. http://dx.doi.org/10.1016/j.jsat.2006.03.009

Rhodes, W., Scheiman, P., Pittayathikhun, T., Collins, L., & Tsarfaty, V. (1995). *What America's users spend on illegal drugs, 1998–1993*. Washington, DC: US Department of Justice, Office of National Drug Control Policy.

Rhodes, T., Stimson, G. V., Crofts, N., Ball, A., Dehne, K., & Khodakevich, L. (1999). Drug injecting, rapid HIV spread, and the 'risk environment': Implications for assessment and response. *AIDS*, *13*(Suppl. A), S259–S269.

Shewan, D., & Dalgarno, P. (2005). Low levels of negative health and social outcomes among non-treatment heroin users in Glasgow (Scotland): Evidence for controlled heroin use? *British Journal of Health Psychology*, *10*, 1–17.

Thomas, D. R. (2006). A general inductive approach for analyzing qualitative evaluation data. *American Journal of Evaluation*, *27*, 237–246.

Warburton, H., Turbull, P. J., & Hough, M. (2005). *Occasional and controlled heroin use: Not a problem?* London: Kings College.

Watters, J. K., & Biernacki, P. (1989). Targeted sampling: Options for the study of hidden populations. *Social Problems*, *36*, 416–430.

Wenger, L. D., Martinez, A. N., Carpenter, L., Geckeler, D., Colfax, G., & Kral, A. H. (2011). Syringe disposal among injection drug users in San Francisco. *American Journal of Public Health*, *101*(3), 484–486. http://dx.doi.org/10.2105/AJPH.2009.179531

Westat. (2009). *Blaise 4.0*. Rockville, MD: Westat.

Zinberg, N. (Ed.). (1984). *Drug, set and setting: The basis for controlled intoxicant use*. New Haven: Yale University Press.

Zinberg, N. E., & Jacobson, R. C. (1976). The natural history of chipping. *American Journal of Psychiatry*, *133*(1), 37–40.