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Emergence of Methadone as a Street Drug in St. Petersburg, Russia

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Abstract

Background—The syndemic of opioid addiction, HIV, hepatitis, tuberculosis, imprisonment, and overdose in Russia has been worsened by the illegality of opioid substitution therapy. As part of on-going serial studies, we sought to explore the influence of opioid availability on aspects of the syndemic as it has affected the city of St. Petersburg.

Methods—We employed a sequential approach in which quantitative data collection and statistical analysis were followed by a qualitative phase. Quantitative data were obtained from a respondent-driven sample (RDS) of people who inject drugs (PWID) obtained in 2012–13. Individuals recruited by RDS were tested for antibodies to HIV and interviewed about drug use and injection practices, sociodemographics, health status, and access to medical care. Subsequently, we collected in-depth qualitative data on methadone use, knowledge, and market availability from PWID recruited at nine different locations within St. Petersburg.

Results—Analysis of interview data from the sample revealed the percentage of PWID injecting methadone in the 30 days prior to interview increased from 3.6% in 2010 to 53.3% in 2012–13. Injection of only methadone, as compared to injecting only heroin or both drugs, was associated with less frequent injection and reduced HIV-related injected risk, especially a lower rate of injecting with a previously used syringe. In-depth questioning of methadone injectors corroborated the finding from serial quantitative surveys of PWID that methadone's black market availability is a recent phenomenon. Spatial analysis revealed widespread methadone availability but no concentration in any specific districts of the city.

Conclusion—Despite the prohibition of substitution therapy and demonization of methadone, the drug has emerged to rival heroin as the most commonly available opioid in St. Petersburg. Ironically, its use is associated with reduced injection-related HIV risk even when its use is illegal.

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Keywords

Russia; methadone; heroin; black markets; HIV risk

Introduction

The fall of the Soviet Union witnessed the appearance of a market for illicit drugs in Russia, including heroin. Whether it was locally made in small batches from poppies or opium gum or imported from Afghanistan or Central Asia, it was almost always injected (Paoli, 2002). Within a few years, a syndemic emerged that added HIV/AIDS, hepatitis C virus (HCV), tuberculosis, imprisonment, and overdose mortality to the negative consequences of opioid abuse. The emergence of HIV infection among people who inject drugs (PWID) was first noted in Kaliningrad in late 1995 and by the end of the decade had spread to many major Russian cities, especially those on trade routes with Central Asia and those with stronger economies (Mashkilleyson & Leinikki, 1999; Rhodes et al., 2003). After registering 1,500 cases almost exclusively among people who PWID in 1996, the number of new diagnoses grew to nearly 60,000 in 2000 and more than 87,000 in 2001 before the first wave of diagnoses receded (Goliusov et al., 2008). However, in the last few years, the number of new diagnoses has again increased to 65,000 in 2011 and more than 75,000 in each of the next two years (Pokrovsky, Ladnaya, & Buravtsova, 2013). While the percentage of new cases attributed to injection drug use has been declining, it is unclear if attributions of risk are accurate. At a minimum, half of the new diagnoses were among those injecting drugs.

We have been following the growing epidemic in St. Petersburg since 2000, recruiting and testing PWID at approximately two-year intervals, with the latest round of data collection occurring between November 2012 and June 2013. During this HIV prevalence among PWID has increased from 11% in 2000, 30% in 2002, 44% in 2007, and in the last two rounds of data collection been around 60% (Abdala et al., 2003; Cepeda et al., 2014; Eritsyan et al., 2013; L M Niccolai et al., 2010; Shaboltas et al., 2006). HCV infection was 78% in 2000 and has exceeded 94% in the three subsequent rounds when HCV tested was included in the study (Abdala et al., 2003; R. Heimer, Eritsyan, Barbour, & Levina, 2014; Paintsil et al., 2009).

Among the major reasons for the high rates of HIV and HCV infection in St. Petersburg, as in many other Russian cities, are the federal public health policies and legal regulations that have disparaged and underfunded harm reduction efforts and kept opioid substitution therapy illegal despite the growing international recognition of its key role in treating opioid abuse disorders (Burrows & Sarang, 2004; Butler, 2003). Russian officials, including those in charge of the country's drug control efforts, have been especially dismissive of methadone (Torban, Heimer, Ilyuk, & Krupitsky, 2011). Methadone has been proven effective for the treatment of opioid addiction and was included in the WHO list of essential medications in 2005 (Blix & Grönbladh, 1991; Caplehorn, Dalton, Cluff, & Petrenas, 1994; Farrell, 1995; Herget, 2005; NIH Consensus Statement, 1997; Wells, Calsyn, Clark, Saxon, & Jackson, 1996). Nevertheless, Russian officials have routinely raised objections to the use of substitution therapy and to methadone in particular. In a 2005 memorandum, "Say No to

Methadone Programs in the Russian Federation”, signed by senior officials in Russian medicine and government, the official position was stated as:

The introduction of a patient with drug addiction into a methadone program is not treatment. It only provides for the replacement of one drug with another. The resulting drug addiction (methadone addiction) is more severe than that caused by heroin, with severe social and medical complications for the patient and for society in general. Not only do methadone programs fail to effectively treat drug addiction, but they also do not solve the problem of the spread of HIV. The lobbying conducted on behalf of methadone programs is connected only with financial interests of methadone producers.

(Krasnov, Ivanets, Dmitrieva, Kononets, & Tiganov, 2007)

This remains the official policy. Another leading argument against substitution therapy, voiced by the Federal Drug Control Service of the Russian Federation, is that the substitution therapy will lead to a black market for methadone in the country. Its press service has regularly published selected materials supporting this point:

“Now cases of smuggling of the substitution therapy on the borders of Denmark, Germany, Finland, France, the United Kingdom, Sweden and Estonia are documented. Cases demonstrate “the important role in this played unscrupulous medical professionals and patients.” From this, one can understand why the law enforcement agencies in many countries oppose the introduction or spread of drug substitution programs that clearly worsen the drug situation.

(Anonymous, 2012)

These complementary rationales for disregarding the overwhelming international medical evidence about the effectiveness of substitution have continued to keep opioid addiction treatment in the Russian Federation all but completely ineffective, even in the eyes of the country’s drug treatment professionals who estimate treatment failure using acceptable practices at 95% (Torban et al., 2011).

Thus, those with addictive disorders continue either to go untreated or avail themselves of inferior treatment options and often relapse. We have been studying PWIDs in St. Petersburg, and have data from five samples assembled between 2000 and 2013. In the most recent sample, any lifetime use of substance abuse treatment services was reported by 71.8% of current PWID but only 11.2% had chosen this option in the past year (Calabrese et al., 2015). These studies also included questions to obtain data on the type, route of administration, and frequency of drugs used. Until the most recent study, heroin was consistently the drug used most frequently, even during a period of heroin shortage brought about by events in Afghanistan (Abdala et al., 2003; Eritsyian et al., 2013; L M Niccolai et al., 2010; Shaboltas et al., 2006). In none of these earlier studies was any drug other than heroin used most often by more than 10% of PWID surveyed. Any injection of any opioid other than heroin had never been reported by more than one in seven PWID. In the 2010 survey of 411 PWID only two PWID reported methadone use. Data from the most recent study, however, found that illicit methadone was challenging heroin as the most commonly

used injectable drug in our PWID sample. Herein we report the results from using a sequential approach in which we first observed the extent of methadone and heroin use in the most recent sample surveyed that was followed by a targeted qualitative study of current methadone users to explore the emergence and spread of methadone and to investigate users' attitudes about methadone versus heroin injection.

Methods

Study sample

For the quantitative data, we employed respondent driven sampling (RDS), a form of chain referral sampling with a dual incentive approach, in seven of St. Petersburg's 18 districts between November 2012 and June 2013. Districts were chosen to represent a mix of central, more distal and residential, and outlying districts. Eligibility requirements for participating in the study included recent injection as evidenced by the presence of injection stigmata, at least 18 years of age, willingness to be tested for HIV and complete a socio-behavioral questionnaire, willingness and competence to provide informed consent, and willingness to refer other IDUs to the study. One or two eligible individuals were identified as seeds and enrolled in the study in each district with the assistance of local HIV prevention outreach workers. Seeds were supplied with four coupons with which they could recruit other eligible individuals. Recruited participants were in turn given four coupons to recruit additional participants. Each participant was paid the equivalent of US\$20 for completing the survey and US\$10 for each study participant successfully recruited, up to four. Ethical approval was obtained and renewed annually by the institutional review boards at Yale University and NGO Stellit.

Quantitative Data Collection for the 2012–2013 Study

The questionnaire contains seven major sections: (1) RDS recruitment and network data, (2) sociodemographics and health, (3) contact with systems including drug treatment, harm reduction, HIV/AIDS care, other medical and social services, and prison, (4) Past and current alcohol and drug use, (5) injection-related and sexual HIV risk behaviors, (6) HIV, hepatitis, tuberculosis, and overdose knowledge and attitudes, and (7) experienced and internalized stigma associated with drug use and being HIV-positive. The questionnaire was administered face-to-face by trained research staff from NGO Stellit once coupon-bearing individuals were deemed eligible and provided informed consent. Survey answers were recorded by research staff, and surveys were generally completed in 60–90 minutes, with longer interviews needed from those aware of being HIV-positive.

Quantitative Data Collection for Earlier Studies

The data on the use of illicit methadone by participants will be contrasted with data collected from prior study of samples of PWID conducted in St. Petersburg. Much of this work has already been described in papers published in the peer reviewed biomedical literature. Data on drug currently injected come from studies conducted in 2002–03 (R Heimer, Barbour, Shaboltas, Hoffman, & Kozlov, 2008; Shaboltas et al., 2006), 2006–08 (L M Niccolai et al., 2010; L. M. Niccolai et al., 2011), and 2010 (Eritsyanyan et al., 2013). Data on lifetime history of different injected drugs are available only from the study conducted in 2006–08.

Quantitative Data Analysis

Quantitative data from answers to the questionnaire administered to participants in 2012–13 were analyzed through standard descriptive, bivariate, and multivariate analyses.

Multivariate analysis was performed using the **R** software and the **Rcommander** 2015 version 2.1-7 add-on package for logistic regression (Fox, 2005). Stepwise backward model selection available through the **step** command was applied to select the most parsimonious multivariate model based on Akaike's Information Criterion (AIC) (Akaike, 1974).

Spatial data, using the nearest intersection of participants' primary residence, were obtained as part of sociodemographic data collection. Locations were geocoded and mapped and clustering of individuals based on current drug use (any and most frequent) was assessed using Moran *I*, a standard measure of spatial autocorrelation that estimates the strength of correlation between observations as a function of the distance separating them (Moran, 1950). We employed CRIMESTAT III software in this study that assigns a *p* value to the calculated Moran's *I* value permitting inference as to the degree and significance of spatial clustering compared with an expected random value (Levine, 2004).

Qualitative Data Collection and Analysis

Outreach workers ("Christian Interchurch Diaconia Assistance Charitable Foundation" and "Humanitarian Action Foundation"), and NGO Stellit researchers conducted the semi-structured interviews with the target population between April and August 2014. Interviews were held on the HIV prevention services buses (*n*=12), in detoxification ward of a narcology clinic (*n*=1), at the place, convenient to the informants (café, *n*=2). Participants were eligible if they met the following criteria: at least 18 years old, injected methadone at least once in the past month. Participation was voluntary and confidential.

The interview guide consisted of questions designed to capture the emergence of methadone use in Saint Petersburg, how PWID initiated their methadone drug use, their feelings and experiences regarding this shift in the drug use. All questions emerged from the quantitative data analysis. The interview guide was prepared in English and reviewed by experts in qualitative health research at Yale University and NGO Stellit who were familiar with the study population. Six major topics were covered: (1) when did you first inject methadone; (2) how did you learn of its availability; (3) How do you obtain it and at what price, (4) what did you know before started injecting it and what have you learned since; (5) why are you using it; and (6) do you know where the methadone is coming from? Questions were translated into Russian by a native speaker and then translated back into English to ensure no loss of original meaning. The first five interviews were used to pilot the topic guide to ensure that the informants understood all questions. Follow-up probes were added to yield more data about changes in the mechanism of purchasing drug. Three of these were included in the final sample since no changes were made to the topic guide after the second pilot interview. Interviews lasted approximately 30 minutes. All were audio recorded and transcribed by native Russian speakers. Transcripts were read while re-listening to audio files and revised if there were any inconsistencies.

All transcripts were analyzed in Russian language without translation into English by two native Russian speakers (AL and OSL). A preliminary codebook, based on the six topic guide questions, was used to organize the data. Sub-codes were added when the two coders agreed on the need. Descriptive thematic analysis was conducted primarily by one coder (AL) using ATLAS.ti qualitative data analysis software (ATLAS.ti Scientific Software Development GmbH, Berlin, Germany) and the second coder reviewed a subset of the coded interviews.

Results

Emergence of Methadone Injection among PWID in St. Petersburg

Our studies of injection drug use in St. Petersburg and elsewhere in Russia have identified that heroin has generally been the most commonly injected drug. In some cities, including St. Petersburg, heroin has routinely been available as a commercial product originating in Afghanistan or the Central Asian Republics. In smaller, less prosperous cities heroin has been more commonly available via small-scale homemade production starting from poppies or opium gum often referred to by the Russian word for black, “chornye.”

Data on current injection drug use were categorized according to injection of heroin, methadone, or both within the 30 days prior to interview. Of the 811 study participants, 379 reported only heroin, 145 reported only methadone, and 287 reported both (Table 1). In total, 407 participants (50.2%) reported any use of methadone. Only two (0.5%) reported methadone use by means other than by injection although these two participants reported injecting it as well. A total of 650 participants (80.1%) reported ever having injected methadone, and for 217 (26.8%) it was the drug injected most often.

The data from the survey conducted in 2012–13 stood in sharp contrast to the use of methadone reported in prior studies. In the 2010 survey on injection drug use, only 15 of 411 participants (3.6%) reported injecting methadone in the 30 days prior to interview and only 2 reported injection of any opioid other than commercial heroin or methadone. In an earlier study, conducted between 2006 and 2008, 211 of 581 (36.3%) active injectors reported ever injecting any opioid other than commercial heroin and only 41 (7.1%) reported injecting any opioid other than heroin in the 30 days prior to interview. In the earliest study for which we have data on the kinds of drug injected in the 30 days prior to interview, 166 of 885 participants (18.8%) reported injecting an opioid other than commercial heroin, but this was mostly “chornye,” the homemade heroin locally manufactured from poppy pods or opium gum as distinct from heroin commercially trafficked into St. Petersburg. Only 8 participants (<1%) reported injecting any other form of opioid.

Description of the Quantitative Sample from 2012–13

The association of sociodemographic variables with the three categories of drugs currently injected is presented in Table 1. Significant differences between those injecting only methadone and other study participants include older age and a greater likelihood of living with others (especially compared to living on one’s own). Those injecting only heroin were

more likely to report not being a native of St. Petersburg, having financial difficulties, and having never been incarcerated.

The association of injection practices and HIV risk with the drug use categories is presented in Table 2. Those injecting only methadone report fewer days of injection in the past month, fewer injections on the day last injecting, a lower frequency of last injection with a used syringe, a lower rate of sharing their used syringe with others, a lower rate of filling their syringe from someone else's syringes, and a higher frequency of obtaining their syringes from an exchange program (especially compared to from a pharmacy).

The only factor among those covering health status and health services use associated with injection of only methadone was a 20% lower rate of experiencing anxiety or depression (Table 3).

Multivariate modeling reduced the number of factors associated with injected only methadone, especially those factors related to injection behaviors. Significant factors now included only being a native of St. Petersburg, last injection was with a used syringe, fewer days injecting in the past month, fewer times injecting on the last day injected, and being widowed or divorced (Table 4). The other factors significant in bivariate analysis are absent from the model because of the strong correlation of use of methadone with reductions in risky injection practices.

Locations of participants were mapped according to three categories of drug use (Figure 1). Distribution of individual participants in each group was broadly distributed. There was no significant clustering of individuals in either the heroin only or methadone only group.

Qualitative Data

All interviews were held during April–August 2014. Among 15 people interviewed, 8 were female. Individuals were recruited from 9 different locations the city, including sites in two central, three eastern, two southern, and two outlying districts (Figure 1). Participants' ages ranged from 28 to 43 (median was 34). All but one female participant had been injecting for ten years and more. Although most of participants said that their drug of choice was heroin, when interviewed participants were injecting mainly methadone, nine were still using heroin occasionally, and six were injecting only methadone.

For the most of the participants initiation of methadone use occurred in the between 2008 and 2012. One participant (male) was first introduced to methadone in 2006. Some people reported that heroin had either disappeared or was supplied very irregularly to their neighborhood. Moreover, the quality of drugs available appeared to become worse, a situation that continued in less severe form.

As time came when heroin was missing...many folks made a switch. First...to a yellow color drug, then everyone switched to methadone. (F2, female, 35 y.o.)

Heroin is in such a short supply now, that many people have switched to methadone. Because of the bad quality they mix heroin and methadone with those drops [tropicamide, an antimuscarinic agent¹]. (F4, female, 28 y.o.)

All informants were introduced to methadone by their friends and co-injectors.

Where was no heroin and friend of mine, who was buying it all the time, told me: “there is no heroin.” He gave me the methadone, and I started buying it. (M12, male, 33 y.o.)

When methadone first appeared, most people knew little if anything about it, but individuals were often compelled to try it because they had no alternative. Those more knowledgeable related that methadone had effects lasting several times longer than heroin, prevented heroin withdrawal, and was somehow used for treatment of the drug abuse.

I knew that it was “holding” up to three days, that it stronger than heroin. That you can deal with heroin withdrawal on it (M7, male, 35 y.o.)

I knew it was a medicine for drug abuse withdrawal, and it became a drug itself. (M11, male, 32 y.o.)

After this forced switch, many drug users have continued to use methadone. For some, the less frequent injection was cost-effective or easier to manage.

No one wanted to come back to heroin, because it’s cheaper to buy methadone than heroin – half the price. (F2, female, 35 y.o.)

Methadone is more powerful, you shoot it once a day, some guys shoot it every other day. As for heroin, it’s necessary to shoot it several times a day. (F1, female, 35 y.o.)

Last time I was using it for the weekend outside the city...not to go for drug to the city every day. (M13, male, 35 y.o.)

The duration of the effect reported was 1–4 days depending on the users’ perception of the quality of the drug. However, some respondents reported using both drugs, a decision often influenced by what was available.

Yes, [I have often had to use both] because both were in short supply. (F3, female, 35 y.o.)

A major feature of methadone use is that the drug is reported to work better than heroin at making its users feel normal, as opposed to high.

To feel good...you know...normal. It is not necessary to feel high, just normal. To prevent withdrawal. Not to get high. (F8, female, 32 y.o.)

I am taking methadone to hook off the heroin. Not to get high I need it (M15, male, 38 y.o.)

But illicit methadone injection is not without negative effects, both real and imagined.

Yes, it effects differently now...I do not like it, but I have no choice...I am feeling bad of these injections. (M7, male, 35 y.o.)

¹Spagnolo PA¹, Badiani A, Nencini P. Polydrug abuse by intravenous use of heroin and tropicamide-containing eyedrops. *Clin Neuropharmacol*. 2013, 36:100-1

Your head starts aching, your blood pressure raises. This is not heroin, indeed (M12, male, 33 y.o.)

It holds out longer, the withdrawal is similar, it's absolutely different, and I'm not comfortable with this. (F2, female, 35 y.o.)

It's scary to use it more, people are starting to decay from the inside, these ulcers from methadone. It frightens me... (M14, male, 30 y.o.)

Methadone is purchased in several forms including powder, pressed powder ("stones"), or crystals ("sea salt"). Several participants mentioned that they mixed methadone with legal drops – tropicamide or nasal drops ("Naphtizine") to strengthen the effect of the drug. This appeared common practice in Saint Petersburg.

The most prominent shift of the last years was in the mechanism of purchasing drugs. While the "traditional" mechanism – buying the drug in direct contact with a "dealer" still exists, the most common way to purchase the drugs (all types of) is to do it via instant messaging or the Internet. An electronic contact is made, money is transferred through an electronic wallet, and the drug is picked up at a "stash" with no physical contact between buyer and seller. Several participants mentioned that this method appeared at the same time as methadone's spread.

[I learned about methadone] from my contacts. One day I got an SMS over my telephone, and in the street one day I saw Mema oH [methadone] stenciled on the pavement and a telephone number. (M5, male, 43 y.o.)

Well...Now the sms are coming to the cellular – buy a shashlik [traditional grilled meat but slang for drug] with a phone number where to send money. In 2–3 minutes you receive the call. (M12, male, 33 y.o.)

[I] can add money to a particular account...through Yandex. It means, I cannot see the guy, and he cannot see me, only the voice over telephone. (F3, female, 35 y.o.)

Stashes are often on the windows ledges, near vehicle sheds, and in other public areas. If somebody orders a relatively large amount of the drug, normally it will be spread between several locations. Sometimes the process purchase-pay-call-pick up lasts longer than expected.

...Sometimes you can hold on the telephone for 24 – hours. You can spend all day waiting. (F9, female, 35 y.o.)

Few informants had any idea about where the methadone had come from, but several believed it had been manufactured domestically, not far from the city.

Because the quality leaves much to be desired. I think it's being produced somewhere in the nearest place. (F4, female, 28 y.o.)

In one conversation with the chief of the city's Antidrug Committee in April 2014, he talked about the bust in a rural area in adjacent Leningrad Oblast of an illicit methadone lab built into a camper, but he had no awareness of "Breaking Bad" as a fictional model for this practice.

Discussion

This mixed methods study documents several features of the changing drug market in St. Petersburg. The quantitative data demonstrate the emergence of methadone as a common drug of abuse within a two-year period -- between studies conducted in 2010 and 2012 -- as a rapid development, especially since heroin had dominated the market for more than a dozen years. The qualitative data reveal how PWID learned about and adapted to this market transition.

It seems ironic that efforts to prevent therapeutic use of methadone in Russia have not prevented its emergence of an illicit drug. However, in contrast to oral administration for opioid substitution therapy, the illicit methadone is overwhelmingly administered by injection. However, the data on injection risk practices comparing those who were injecting only methadone to those injecting either only heroin or both heroin and methadone do suggest that even illicit injection of methadone is accompanied by some harm reduction. Methadone injection occurred on fewer days, fewer times on day when it was injected, fewer injections each month with previously used syringes, less distributive syringe sharing, and lower rates of sharing of drugs in liquid form. In addition, the mechanism described for the purchase of methadone also reduced the risk environment by divorcing direct contact between user and supplier. This limits the opportunities for the police to harass users as part of their efforts to extract information about the supply chain. However, this method of contact does not appear to be unique to illicit sales of methadone; it appears to be the dominant sales methods for all illicit street drugs in St. Petersburg.

Most of the individuals who participated in our study were long-term drug injectors whose need for opioids overrode initial reluctance. However, PWID were unwilling to consider altering their mode of administration, persisting with injection even though, empirically speaking, the oral bioavailability of methadone renders it suitable, in places where opioid substitution is legal, for replacement of injection with ingestion.

More generally, the findings reveal that drug markets will adapt to changing conditions that are beyond the control of the authorities. The official position of antidrug officials and narcologists at the federal level has all but unanimously condemned methadone as a nefarious poison whose entry into Russia must be prevented at all costs. Having failed to control the epidemic of opioid addiction and co-occurring epidemics of HIV, HCV, and opioid overdose, it is unlikely that they will reconsider providing methadone as a medication in the manner commonly used in much the rest of world. It seems unfortunate that while drug users can demonstrate how readily adaptable they are to changing market forces and how these changes can actually reduce injection risk behaviors, those in government who are responsible for public health and safety are so inflexible.

This study has several limitations. First and foremost, report of methadone consumption is solely by self-report without any confirmatory toxicology. However, the reports by PWID in quantitative and qualitative interviews are consistent with use of a long-acting opioid. Reports of users are supported by informal drug police reporting of seizures of methadone production facilities in close proximity to St. Petersburg. While some form of confirmatory

testing, either initiated by researchers or collected from police reports, might add an additional layer of validity, the practical barriers to this are steep. Members of research teams should be unwilling to risk violations of drug laws and obtaining police reports are often impossible in places without traditional freedom of information policies. For the time being, off-the-record corroboration from drug control officials of the presence of illicit methadone on the streets of St. Petersburg will have to suffice. A second limitation concerns the extent to which the sample represents the population of PWID in St. Petersburg. To increase the probability that the sample is at least geographically representative, data collection began with selection of seeds in neighborhoods in the central part of the city, in more outlying residential districts connected to the center by the metro system, and in more distal neighborhoods beyond the reach of the metro system. The lack of spatial clustering for variables about types of drugs being injected suggests that substantive differences in drug use are not the result of spatial segregation. A third limitation is the inability to determine if reductions in injection risk behaviors associated with injection of only methadone has made any impact on HIV incidence. More research will be needed to see if the availability and use of illicit methadone have HIV prevention impacts in any way similar that seen among PWID who enter and are retained in opioid substitution treatment (MacArthur et al., 2012; Metzger et al., 1993; Sorensen & Copeland, 2000). A fourth limitation is the use of a topic guide that focused on six questions concerning methadone's initial appearance, its current availability, knowledge about methadone effects and safety, and reasons for its use. This, our qualitative data collection may have neglected other aspects of the experience of transitioning from heroin to methadone. A final limitation is that the limited number of qualitative interviews may have resulted in an inability to find opinion that diverge from the dominant opinions expressed in the quotations provided in the Results section.

Despite these limitations, the findings make three features of drug markets abundantly clear. First, negative societal and governmental attitudes about individual drugs have little influence on illicit markets. Second, individuals can adapt quickly to changes in the types of drugs available on black markets and in the mode of their distribution. Third, methadone, even when not administered orally and as part of medically supervised substitution treatment efforts, may, as a consequence of its long duration of action, reduce the harms associated with injection of short-acting opioid. In sum, these three features demonstrate the weakness of a supply reduction response to the problems of opioid abuse and addiction.

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HIGHLIGHTS

- Methadone has emerged as an injectable drug of abuse in St. Petersburg, Russia
- This has occurred despite the nation's prohibition on substitution therapy, demonstrating the weakness of supply reduction responses to opioid abuse.
- Methadone, even when not associated with substitution therapy, was associated with reduced injection frequency and HIV risk.
- Methadone appears to be locally synthesized, not diverted from medical sources.

Figure 1.

Map of St. Petersburg showing approximate residential locations of individuals who injected only methadone (blue dots), only heroin (yellow dots), or both drugs (green dots) in the 30 days prior to being interviewed. The red crosses represent the sites at which qualitative interviews of methadone injectors were conducted.

Table 1

Sociodemographics of PWID (N=811) in St. Petersburg Who Injected Only Heroin, Only Methadone or Both in the 30 days prior interview. Factors with statistically significant associations are presented in bold font.

	Heroin Only	Methadone Only	Heroin and Methadone	
Number	379	145	287	
<i>Age¹</i>				<i>F</i>
<i>Mean ± s.d.</i>	31.7 ± 3.8	32.9 ± 4.9	31.5 ± 4.9	3.569
<i>Median, (25th, 75th percentile)</i>	32 (29,34)	32 (30,36)	30 (28,34)	
<i>Women¹</i>	84 (22%)	38 (26%)	58 (20%)	1.133
<i>Native of St. Petersburg¹</i>	297 (78%)	130 (90%)	249 (87%)	6.761
<i>Have Basic Medical Insurance¹</i>	314 (83%)	120 (87%)	220 (77%)	2.830
<i>Substance Abuse Treatment, Ever¹</i>	273 (72%)	99 (68%)	210 (73%)	0.581
<i>Incarcerated, Ever¹</i>	111 (29%)	59 (41%)	104 (36%)	3.993
				<i>X²</i>
<i>Education²</i>				<i>p</i>
9th grade or lower	26 (7%)	9 (6%)	25 (9%)	11.494
Secondary education	125 (33%)	44 (30%)	74 (26%)	0.3203
Vocational education	184 (49%)	70 (48%)	161 (56%)	
Higher education	44 (12%)	22 (15%)	27 (9%)	
<i>Marital Status²</i>				26.677
				0.0029
<i>Legal or living as married</i>	139 (37%)	42 (29%)	75 (26%)	
<i>Never married</i>	185 (49%)	63 (43%)	148 (52%)	
<i>Divorced or widowed</i>	55 (14%)	41 (28%)	62 (22%)	

	Heroin Only	Methadone Only	Heroin and Methadone	
Number	379	145	287	
<i>Living Arrangements²</i>				<i>F</i> 43.573 <i>p</i> >0.0001
<i>On your own</i>	251 (66%)	71 (49%)	187 (66%)	
<i>With parents, relatives or friends</i>	112 (29%)	69 (47%)	93 (32%)	
<i>Homeless</i>	9 (2%)	2 (1.3%)	2 (<1%)	
<i>Institutionalized</i>	7 (1.8%)	3 (2%)	2 (<1%)	
<i>Personal Finances²</i>				<i>F</i> 17.90 <i>p</i> 0.006
<i>Coping</i>	90(24%)	53(37%)	99(37%)	
<i>Difficult</i>	235(62%)	72(50%)	160(56%)	
<i>Very Difficult</i>	52(14%)	20(14%)	27(9%)	

¹ For bivariate analysis of the dichotomous factors associated with the three groups of drug users, ANOVA statistical tests were applied. F- and p-values are reported.

² For bivariate analysis of the factors with more than two categories associated with the three groups of drug users, χ^2 statistical tests were applied. χ^2 - and p-values are reported.

Table 2

Injection Practices and Associated Risks of PWID (N=811) in St. Petersburg Who Injected Only Heroin, Only Methadone or Both in the 30 days prior interview. Factors with statistically significant associations are presented in bold font.

	Heroin Only	Methadone Only	Heroin and Methadone	F	p
<i>Days Injected, in the past month¹</i>	20.4	12.5	21.3	70	<0.0001
<i>Times injected, last day injecting¹</i>	1.7	1.1	1.8	40.04	<0.0001
<i>Injected with used syringe, # in last month¹</i>	3.1	1.1	2.6	13.49	<0.0001
<i>Distributive syringe sharing, # in last month¹</i>	3.0	1.2	2.5	12	<0.0001
<i>Filled syringe from another's syringe, # in last month¹</i>	4.1	1.6	2.3	16.34	<0.0001
Police confiscation of syringes, last 6 months ¹	110 (29%)	27 (19%)	75 (26%)	2.95	0.0590
Witnessed an overdose, last year (#) ¹	2.0	1.7	2.1	0.791	0.454
Aware of overdose deaths, last year (#) ¹	1 (.85)	1 (1.02)	<1 (.75)	1.367	0.256
Experienced an overdose, past year (%) ¹	58 (15%)	19 (13%)	55 (19%)	1.545	0.214
Main Syringe Source ²					
Pharmacy	302 (79.7%)	96 (66.2%)	217 (75.6%)	10.405	0.006
Syringe Program or Outreach Worker	44 (11.6%)	31 (21.4%)	44 (15.3%)	8.1488	0.01
Other	6 (1.6%)	9 (6.2%)	15 (5.2%)	9.203	0.017
No Answer	27 (7.1%)	9 (6.2%)	11 (3.8%)		

¹ For bivariate analysis of the dichotomous factors associated with the three groups of drug users. ANOVA statistical tests were applied. F- and p-values are reported.

² For bivariate analysis of the factors with more than two categories associated with the three groups of drug users. χ^2 statistical tests were applied. χ^2 - and p-values are reported.

Table 3

Health Status and Health Service Use.

	Heroin Only	Methadone Only	Heroin and Methadone	F	p
HIV Positive	211 (55.7%)	84 (57.9%)	157 (54.7.0%)	0.203	0.816
Aware of Being HIV Positive	176 (46.4%)	69 (47.6%)	138 (48.1%)	0.142	0.868
Received a TB Diagnosis	29 (7.7%)	6 (2.1%)	19 (6.6%)	1.018	0.362
Received a Hepatitis B Virus Diagnosis	189 (49.9%)	64 (44.1%)	157 (54.7%)	2.222	0.109
Received a Hepatitis C Virus Diagnosis	328 (86.5%)	119 (82.1%)	238 (82.9%)	1.199	0.302
Limited Mobility	82 (21.6%)	27 (18.6%)	65 (22.6%)	0.469	0.626
Experiencing Pain	148 (39.1%)	45 (31.0%)	113 (39.4%)	1.69	0.185
Experiencing Somatic Health Problems	183 (48.3%)	63 (43.4%)	144 (50.2%)	0.877	0.416
<i>Experiencing Anxiety or Depression</i>	288 (76.0%)	88 (60.7%)	213 (74.2%)	6.537	0.00153
Seen a Physician, past year	209 (55.1%)	86 (59.3%)	165 (57.5%)	0.423	0.655
Seen a Mental Health Practitioner, past year	42 (11.1%)	13 (9.0%)	35 (12.2%)	0.508	0.602
Received Substance Abuse Treatment, past year	30 (7.9%)	11 (7.6%)	25 (8.7%)	0.113	0.893

Generalized Logistic Modeling of Variables Associated with of PWID (N=811) in St. Petersburg Who Injected Only Methadone in the Past 30 days.

Table 4

	Estimate	Std. Error	z value	Pr(> z)
(Intercept)	1.20797	0.46328	2.607	0.00912
Native of St. Petersburg	0.63536	0.32522	1.954	0.05074
Last injection with a used syringe	-0.49636	0.22691	-2.187	0.02871
Days Injected, past month	-0.07186	0.01633	-4.401	1.08e-05
Times injected, last day injecting	-1.53581	0.32481	-4.728	2.26e-06
Widowed or divorced	0.64141	0.24760	2.590	0.00958

Akaike Information Criterion = 590.04