

MASLIHAT HIV Prevention Intervention Reduced Sexually Transmitted Infections Among Male Tajik Migrants Who Inject Drugs in Moscow

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Abstract

Objectives: Tajik male labour migrants who inject drugs while working in Moscow are at high risk of acquiring HIV and sexually transmitted infections (STIs) that compromise their health and potentially that of their sexual partners. In a cluster-randomized controlled trial, the “Migrants’ Approached Self-Learning Intervention in HIV/AIDS for Tajiks” (MASLIHAT) reduced intervention participants’ sexual risk behaviour including condomless sex, condomless sex with female sex workers (CS/FSW), and multiple sexual partners. This analysis investigates if the observed change in sexual risk behaviors due to the intervention translated into lower incidence of STIs among participants over 12-month follow-up.

Methods: The MASLIHAT intervention was tested in a cluster-randomized controlled trial with sites assigned to either the MASLIHAT intervention or comparison health education training (TANSIHAT). Participants and network members (n=420) were interviewed at baseline and 3-month intervals for one year to assess HIV/STI sex and drug risk behaviour. Focusing solely on STIs in our current analysis, we conducted mixed effects robust Poisson regression analyses to test for differences between conditions in self-reported STIs during 12 months of follow-up, and to test the contribution of sexual risk behaviours to STI acquisition. Structural equation modelling investigated sexual behaviours as possibly mediating the observed differences in STI acquisition between the two conditions.

Results: Participants in the MASLIHAT condition were significantly less likely to report an STI during follow-up (IRR=0.27, 95% CI 0.13-0.58). Of the 3 sexual risk behaviours of interest, only CS/FSW was significantly associated with STI acquisition (IRR=3.30, 95% CI 1.57-3.93). Adjusting for CS/FSW, the effect of MASLIHAT intervention participation was reduced (IRR=0.37, 95% CI 0.17-0.84), signalling possible mediation. Structural equation modelling indicated that the intervention’s effect on STI incidence was mediated by reductions among MASLIHAT participants in CS/FSW.

Conclusions: The MASLIHAT peer-education intervention reduced the incidence of STIs among Tajik labour migrants through reduced CS/FSW.

Introduction

Sexually transmitted Infectious diseases (STIs) have become a rapidly growing public health problem worldwide. The World Health Organization (WHO) estimates that globally more than a million curable new STD infections occur each day.¹ When left untreated, STIs can lead to serious long-term health outcomes that include neurologic manifestations, adverse pregnancy complications, infertility, heart disease, arthritis, and certain cancers.² STIs also are known to facilitate HIV acquisition by causing a sore or a break in the skin that makes it easier for the virus to enter the body³ and to increase the infectiousness of people living with HIV by increasing the viral concentration in the genital tract.⁴ Global estimates of STIs among people who inject drugs are unknown, but considerable evidence indicates that they are at high risk for STIs.⁵ Frequently used in HIV research as a marker for HIV risk, STIs themselves represent a critical problem that deserves separate and greater attention than they currently receive.⁴

This analysis addresses STI's underrepresentation in the scientific literature by investigating whether a successful HIV risk-reduction intervention for Tajik labor migrants in Moscow who inject drugs reduced their incidence of STIs over a one year period. Almost one million Tajik citizens work outside the country each year with Russia the major host destination.⁶ As a temporary labor force, Tajik migrants perform many of Moscow's most difficult, dangerous, and dirty jobs in construction and other heavy labor industries while living at a bare, subsistence level.⁷ As true among migrants globally, these factors contribute to many of these migrant males engaging in risky sex without a condom, with multiple partners, and with female sex workers (FSWs) in Moscow.^{8,9} Moscow sex workers have a high prevalence of HIV exceeding 3% as well as other STIs.^{10,11}

To address the need for HIV/STI prevention for this population, we developed and tested the Migrants' Approached Self-Learning Intervention in HIV/AIDS for Tajiks (MASLIHAT), an intervention model for reducing risky sex, drug, and alcohol, behavior among male Tajik labor migrants who inject drugs while living in Moscow.¹² MASLIHAT is a network-based, peer educator training intervention developed as a socio-cultural adaptation of the Self-Help in Eliminating Life-Threatening Diseases (SHIELD) model.¹³ In a cluster-randomized parallel group-controlled trial, the MASLIHAT intervention demonstrated significant effects in reducing risky sex and injection drug behavior among both peer educator participants (PEs) and their network members with whom they regularly interact.^{14,15}

For our current analysis, we turn our attention from our prior research interest in assessing the intervention's reductions in HIV/STI sexual risk behavior to answering a critical intervention outcome question, "Did MASLIHAT's observed reduction in sexual risk behavior lower the incidence of STIs among this population of Tajik migrants in Moscow?" To this end, we conducted additional data analyses using the parent data set to test the intervention's impact on STIs during one-year of follow-up. We also investigated specific sexual risk behaviors' possible mediation effects on STI outcome.

Methods

Study procedures were reviewed and approved by the Institutional Review Boards of the University of Illinois Chicago, PRISMA Research Center in Tajikistan, and the Moscow Nongovernment Organization "Bridge to the future." All participants provided written informed consent.

Recruitment and Site Assignment

From October 2021 to April 2022, 140 male Tajik migrant workers were recruited from 12 sites in Moscow and trained as peer educators (PEs). Sites were pair-matched and randomly assigned to either the MASLIHAT intervention or the TANSIHAT comparison condition. To participate as a PE assigned to either condition, prospective participants needed to be a male Tajik migrant aged 18 or older, a current or former person who injects drugs (PWID), give informed consent, intend to reside in Moscow for the next 12 months to participate in their assigned intervention and follow-up data collection, and willing to recruit two male PWID to participate as IDU network members (NMs) for baseline and follow-up interviewing. Network members (n=280) had to meet the same eligibility criteria as PEs but also: 1) have injected drugs at least once in the last 30 days; and 2) be someone whom the PE sees at least once a week to permit him to share intervention information and encourage possible normative and behavioral change within their shared social networks. A total of 420 male migrant PWIDs participated in the study, 210 in each group. Participants received the equivalent of \$20.00 in Russian Rubles for their time and transportation costs in participating in intervention sessions (PEs only) and for being interviewed at baseline and follow-up (both PEs and NMs).

Intervention sessions

MASLIHAT is a small-group, interactive intervention that relies on peer networks to reduce drug, alcohol, and sexual risk behaviors among temporary migrant workers who inject drugs. Migrants in the host country who inject or have previously injected drugs are trained as PEs to promote positive HIV risk-reduction norms and behavioral change through role modeling and by sharing what they learned during MASLIHAT training sessions with their at-risk NMs. The intervention includes five HIV knowledge and skill-building sessions that involve goal setting, role playing, demonstrations, homework, and group discussions. These sessions teach participants techniques for personal HIV and STI risk reduction along with the communication and outreach skills needed to encourage others at risk to also adopt them. As migrants often confront special challenges based on social marginalization and economic disadvantage as a population within the host country.¹⁶⁻²³ MASLIHAT sessions also address lifestyle, health, and safety issues. The TANSIHAT program echoes MASLIHAT in style and time commitment over 5 sessions without any content related to HIV or STI sexual risk behavior.

Baseline and follow-up interviews, Participant retention

After giving informed consent, baseline interviews with PEs and NMs were conducted at the PRISMA office in Moscow or a private location of the participant's choosing. Following the interview, participants in both conditions were referred to the Moscow HIV Prevention Center to be tested for HIV and hepatitis C virus (HCV). To maintain participant confidentiality, anonymized test results were reported to study staff with only a group number to identify the recruitment site. Follow-up interviews were conducted with PEs and NMs in both groups at 3-month intervals. Over 90% of participants completed all interview waves. Thirty-seven participants (8.8%) were lost to follow-up at 9 (n=18) or 12 months (n=19). Loss to follow-up was similar across treatment arms and participant type.

Measures

The structured baseline questionnaire collected information on sociodemographic characteristics, migration characteristics, community involvement, sex and drug-related risk behavior, PWID network membership, HIV-related knowledge and attitudes, and psychosocial measures including depression, loneliness, and stigma experience.

Sexually transmitted infections. At each follow-up participants were asked if they had been diagnosed in the past three months with gonorrhea, syphilis, chlamydia, or any other STI. Responses were coded as yes or no to indicate a STI diagnosed in the past three months.

Sexual risk behavior. Sexual risk behavior in the past three months was assessed with questions about condom use and number and type of female sex partners. Participants were asked as to how many women with whom they had sexual intercourse in the past 30 days, and how many of these partners were sex workers. Responses were used to create binary measures of multiple female partners and any female sex worker partner in the past 30 days. Condom use was assessed by asking participants, “How often did you use a condom when having sexual intercourse?” for each of three partner categories: regular female partner in Russia, Moscow FSW, and casual sexual partners not engaged in selling sex. Response categories were “never,” “sometimes,” “often,” or “always.” Responses were coded to create binary measures of any condomless sex (i.e. did not always use condoms vs. always used condoms or no sexual activity) and condomless sex with FSWs in the past 3 months.

Analysis

Using follow-up data, we conducted modified mixed effects Poisson regression models predicting any STI, with random intercepts for participant and network cluster, to obtain relative risk estimates for the effects of treatment arm and sexual risk behaviors. Analyses were conducted using Stata (version 16). Initially, time was included as three dummy variables for 6, 9, and 12-month vs. 3-month follow-up, and we tested the interaction of condition and time. Non-significant effects ($p > .10$) were not included in subsequent models. In separate models, we added multiple partners, sex with FSWs, any condomless sex (CS), and condomless sex with female sex workers (CS/FSW) to assess the effect of treatment arm when adjusted for these behaviors. We repeated the analyses using logistic regression to obtain marginal probabilities.

We employed structural equation models using Mplus (version 8.10) to compute the indirect effects of treatment arm via sexual risk behaviors (see Figure 1). We estimated a mediation model for each risk behavior found to be associated with a STI in regression analyses.

Results

Table 1 reports the demographic characteristics of the sample. All five major regions of Tajikistan are represented in the sample. HIV prevalence was 6.8%, among participants who agreed to testing (n=413), and no new infections were detected at 12-month follow-up. When asked at baseline if they had ever been diagnosed with an STI, 41% of the total sample reported yes, 49% reported no, and 10% declined to answer. There were no significant differences in STI rates between treatment conditions at baseline (IRR=0.98, p=0.92). In the following 12 months, 6.7% (n=14) of MASLIHAT participants and network members and 19.0% (n=40) of TANSIHAT comparison group reported an STI diagnosis (ARR=0.12).

Table 1. Characteristics of MASLIHAT trial participants (N=420)

	Mean (SD)	
Age	30.02 (6.20)	
Education	N	%
Primary	16	3.8
Secondary	240	57.1
College or Technical	105	25
University (but no degree)	14	3.3
University Degree	45	10.7
Employment		
Construction	230	55
Loading in Bazaar	87	20.8
Selling in Bazaar	56	13.4
Food Service in Bazaar	19	4.6
Other	26	6.2
Marital Status		
Not Married	176	42.1
Married	52	12.4
Divorced	190	45.5

Regression models

Results of the mixed effects Poisson models testing the effects of treatment arm and sexual risk behavior on STI are shown in Table 2. Participant type, time, and time x arm effects were not significant and so were not included in the models. Participants in the MASLIHAT condition were significantly less likely to report an STI during follow-up. The marginal probability of STI in the past 3 months over the 12-month follow-up period was 0.03 (95% CI 0.01 – 0.04) in the MASLIHAT condition, and 0.08 (95% CI 0.05 – 0.11) in the TANSIHAT condition. CS/FSW was the only sexual risk behavior significantly associated with STI during follow-up. The effect of treatment arm was reduced by more than 30% when CS/FSW was added to the model. The prevalence of CS/FSW was extremely low in the MASLIHAT condition, with only two participants reporting this behavior during follow-up, therefore it was not possible to estimate regression models with CS/FSW as an outcome.

Table 2. Effects of treatment arm and sexual risk behaviors on STI during 12-month follow-up, modified mixed effects Poisson regressions (N=420, nobs=1610)

	RR (95% CI)	p-value
MASLIHAT vs. TANSIHAT, unadjusted	0.27 (0.13, 0.58)	0.001
Adjusted models†		
Any condomless sex	1.19 (0.67, 2.13)	0.546
MASLIHAT vs. TANSIHAT	0.29 (0.14, 0.61)	0.001
Sex w/ multiple partners	1.41 (0.73, 2.74)	0.308
MASLIHAT vs. TANSIHAT	0.30 (0.14, 0.65)	0.002
Any sex with sex workers	1.53 (0.83, 2.82)	0.173
MASLIHAT vs. TANSIHAT	0.29 (0.13, 0.64)	0.002
Number of sex worker partners	1.22 (0.85, 1.74)	0.282
MASLIHAT vs. TANSIHAT	0.30 (0.13, 0.65)	0.003
Condomless sex with sex workers	3.30 (1.57, 6.93)	0.002
MASLIHAT vs. TANSIHAT	0.37 (0.17, 0.84)	0.017

† Each sexual risk behavior entered together with treatment arm

Structural Equation Models

In the estimation of the SEM for CS/FSW we encountered a non-positive definite residual covariance matrix. The problem was resolved by dropping CS/FSW-12 from the model. Structural model standardized estimates are shown in Table 3. The model Chi-square (Chi2[24]=31.89, $p=0.13$) and fit indices (RMSEA=0.028, 90% CI 0 - .051; CFI=0.99, TLI=0.986) indicated good fit. The full model results are available in Supplemental File 1. The results indicate that the MASLIHAT intervention had a significant impact on CS/FSW at follow-up, which in turn significantly reduced the likelihood of STI. The direct effect of intervention arm on STI was not significant indicating complete mediation.

Table 3. Structural equation model standardized estimates testing effect of intervention arm on sexually transmitted infection via condomless sex with female sex workers

Path	Standardized (STD) Estimates			
	Estimate	S.E.	Est./S.E.	P-Value
DIRECT EFFECTS				
STI-FU on CS/FSW-FU	0.493	0.144	3.413	0.001
CS/FSW-FU on CS/FSW-Baseline	1.294	0.167	7.763	< .0001
CS/FSW-FU on Arm	-1.434	0.158	-9.091	< .0001
STI-FU on Arm	0.118	0.305	0.388	0.698
INDIRECT & TOTAL EFFECTS				
STI-FU on Arm via CS/FSW-FU	-0.707	0.253	-2.791	0.005
Total Effect	-0.589	0.197	-2.983	0.003

STI: Sexually transmitted infection; CS/FSW: Condomless sex with female sex workers; FU: Follow-up; Arm: MASLIHAT vs. TANSIHAT

Discussion

The MASLIHAT intervention for HIV prevention is a network-based peer education intervention, tailored for Tajik migrants who inject drugs while working in Russia. In previous analyses of this cluster-randomized controlled trial, we found significant reductions in self-reported sexual risk behaviors associated with the intervention including sexual activity with female sex workers and condomless sex.¹⁴ These positive results raised the question, “Would such significant reductions in sexual risk behavior reduce the incidence of STIs over time among MASLIHAT participants? Our findings indicate that the reported changes in sexual activity,

specifically engaging in condomless sex with sex workers, did reduce overall STI incidence among both MASLIHAT PEs and NMs during one year of follow-up.

Our data are not of sufficient breadth to allow us to investigate why MASLIHAT participants' overall reductions in condomless sex and sex with multiple partners failed to translate into fewer STIs over the 12-month period. One possible explanation is that STI prevalence among Moscow's FSWs is exceedingly high and much greater than among its female general population.¹⁰ Consequently, commercial sex likely carries greater risk for an STI than sex with a regular or casual partner. Given unequal STI rates among types of sexual partners, possibly MASLIHAT's effect in reducing STI incidence at the partnering level is more likely to be statistically detectable with commercial sex partners than with partners of lesser STI risk.

Our study's sample is composed entirely of Tajik males who inject drugs while in Moscow. Yet in recent years, an increasing number of Tajik women have migrated to Russia alone or with their husbands. According to the Committee on Women and Family Affairs under the Government of Tajikistan, the number of female migrants increased from 71,988 in 2021 to 121,162 in 2022 alone despite the effects of the war in Ukraine that negatively impacted labor migration.²⁴ How many Tajik migrant women in Moscow inject drugs is unknown, but a small number of females inject drugs while living in Tajikistan²⁵ and likely some Tajik migrant women in Russia do so as well. Meanwhile, a government survey found that women in Tajikistan know little to nothing about STIs and how to prevent them.²⁶ If adapted for migrant women who inject drugs, the MASLIHAT intervention could prove successful in increasing their STI knowledge while reducing their risk. Nonetheless, the traditional cultural belief system that governs Tajik women's gender roles, including expectations for marital and other sexual partnering, would need to be considered to assure that the intervention proves effective and culturally acceptable.²⁷

Risk for HIV and for STIs are behaviourally entwined as they share the same set of sexual practices that can lead to infection. Concern exists that the increasing successful use of medical protection and treatment for HIV will accelerate risky sexual behavior and greatly increase STI rates globally due to the psychosocial effects of risk compensation as personal fear of contracting HIV diminishes.^{4,28} Yet, results of research investigating this possibility are inconclusive.²⁹ Meanwhile, the data in our study showed a decline in STI rates over a 12-month period HIV despite MASLIHAT participants' increased knowledge about HIV and its successful prevention and treatment.

Limitations. The STI outcomes and sexual risk behaviors in this study were self-reported. Self-reports cannot be verified and may be subject to the demand characteristics of the intervention or to social desirability bias. Also, most STDs are asymptomatic making them difficult to detect.¹ Consequently, the rates of STI incidence experienced by our study participants may be an under report of actual infection. Also as an important reminder, our sample is composed entirely of migrant men who inject drugs while in Moscow and does not represent the sexual behavior of their Tajik counterparts who do not.

Conclusions

The MASLIHAT peer-education intervention proved effective during a 12-month clinical trial in reducing STIs among Tajik labour migrant participants and their network members who inject drugs. As such, it responds to WHO's call for HIV/STI interventions and research findings that help to inform and meet the goals of its widely adopted, "Global health sector strategies on, HIV, viral hepatitis and sexually transmitted infections for the period 2022–2030."³⁰ Arguably MASLIHAT's protective effects also may help to inhibit possible forward transmission of STIs among intervention participants to their wives and/or other sexual partners. If culturally adapted for other ethnicities, the intervention holds potential promise in reducing STIs among male migrant labour populations who inject drugs in other destination countries.

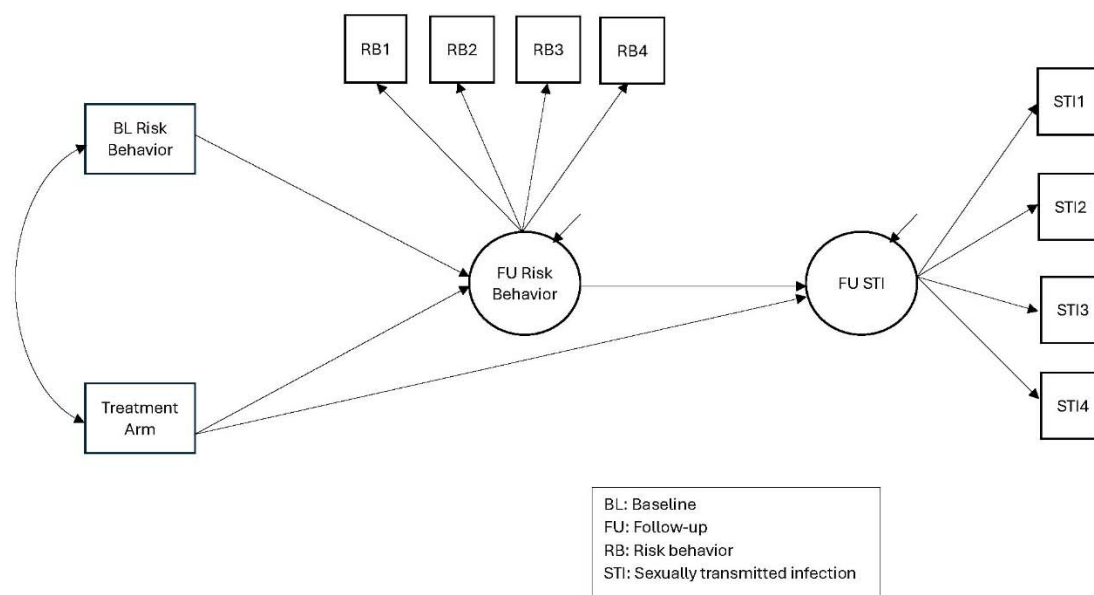


Figure 1. Structural equation model testing mediation of treatment arm effect on STI during 12-month follow-up by sexual risk behavior during follow-up

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Competing interests

The authors have no competing interests to declare.

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Clinical trial registration

The MASLIHAT trial was registered with ClinicalTrials.gov, NCT04853394.

Authors' contributions

JAL and MEM contributed to the study conception and design. Material preparation and data collection were performed by JJ and CML. Data analysis was conducted by MEM and CML. The first drafts of the manuscript were written by MEM and JAL and all authors commented on previous versions of the manuscript. All authors read and approved the final manuscript.

Disclaimer

The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

Data Availability Statement

The datasets supporting the findings of this study are available in the Open Science Framework repository. Project: MASLIHAT Randomized Controlled Trial [DOI 10.17605/OSF.IO/7G3YH]. Data link: <https://osf.io/ws5mp/>.

Supporting Information

Supplemental File 1: Mplus output for structural equation model (plain text)

List of abbreviations

ARR: absolute risk reduction

CS: condomless sex

CS/FSW: condomless sex with female sex workers

EECA: Eastern Europe and Central Asia

FSW: female sex worker

HIV: Human Immunodeficiency Virus

MASLIHAT: Migrants' Approached Self-Learning Intervention in HIV/AIDS for Tajiks

NM: Network member

PE: Peer educator

PWID: People who inject drugs

STI: Sexually transmitted infection

TANSIHAT: Targeted Application of Network and Social Intervention on Health Assistance for Tajiks

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