
Gender differences in drug use and sexual risk behaviors among non-injecting heroin users in Puerto Rico

IRMALY SOSA-ZAPATA, Ph Dc; HÉCTOR M. COLÓN, Ph D; RAFAELA R. ROBLES, Ed D
MYRNA CABASSA, MS

Introduction: During the 1990s non-injected heroin use (NIHU) increased notably in several countries. However, very few studies have examined the drug-using practices and other problem behaviors of NIHUs. In this study, we compared male and female NIHUs from Puerto Rico across a number of domains.

Methods: Recruitment proceeded through visits to drug-copping areas and the local hangouts in their vicinity. Subjects were eligible if they were 18 to 25 years old, had never injected any drugs, and had recently used heroin or cocaine. Study participants were administered a computer-assisted personal interview.

Results: Of the 412 NIHUs recruited at the time of this study, 74 (18.0%) were females. Female NIHUs were more likely to report sexual assaults and more likely to manifest severe symptomatology of post-traumatic stress disorder than male NIHUs (35.1% vs. 3.6%, $p<.01$, and

40.5% vs. 25.7%, $p=.01$, respectively). Females were less likely to report a source of emotional support than males (86.5% vs. 95.3%, $p<.01$). Close to one in four of the females (23.0%) reported a history of sexually transmitted infections, compared to three percent of the males ($p<.01$). HIV seroprevalence among females was 4.3% compared to 0.6% among males ($p=.01$).

Discussion: Female heroin users seem to present a host of different needs compared to male heroin users. Given the scarcity of existing programs for female drug users in Puerto Rico, designing supportive systems that effectively address the specific needs of drug-using women should become a high-priority public health issue.

Key words: Gender differences; NIHUs; Sexually transmitted diseases; HIV; HCV; Emotional support; Drug abuse; Sexual risk behavior; Drug using women.

The use of heroin through non-injected routes increased notably during the 1990s. Reports from cities such as New York, New Haven and Chicago showed marked increases in the proportion of non-injecting heroin users (NIHUs) entering publicly funded drug treatment programs (1-3). Increases in the use of non-injected heroin were also reported in several European countries during the same period (4-5). In Puerto Rico, cases of heroin snorting almost doubled from 23.9% in 1990 to 41.8% in 1996 among heroin admissions to public drug treatment (6). This increase in the use of non-injected heroin during this period coincided with increasing levels

of purity, decreasing prices of the street heroin, and increasing rates of drug overdose deaths (7-8). Notwithstanding the convergence of these indicators, very few studies have examined the drug-using practices and other problem behaviors of NIHUs.

NIHUs are at risk of transitioning to injection drug use, thus increasing their risks of infection with blood-borne pathogens. The majority of studies that have looked at the initiation of heroin injection have reported that it is generally preceded by a period of heroin use through non-injection modes (9). However, there is very little information about NIHUs and their risks of initiating drug injection.

NIHUs are also at risk of HIV infection through their sexual practices. To date, only a handful of studies have examined the sexual behaviors of NIHUs. Des Jarlais and colleagues (10) reported high rates of multiple sex partners among heroin sniffers. Trading of sex for heroin and sex for money among heroin users has also been documented (11-12). Neaigus and colleagues found that many HIV and/or Hepatitis C Virus (HCV) infected NIHUs had lower-risk sex partners, potentially becoming a bridge

Center for Addiction Studies, Universidad Central del Caribe School of Medicine, Bayamón, Puerto Rico.

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Address correspondence to: Irmaly Sosa Zapata, Ph. Dc., Center for Addiction Studies, Universidad Central del Caribe School of Medicine, PO Box 60327, Bayamón, Puerto Rico 00960-6032, Tel: (787) 288-0200, Fax: (787) 288-0242, E-mail: isosa@uccaribe.edu

population transmitting HIV and HCV to lower-risk partners (13). Chitwood and colleagues found a high prevalence of HIV among heroin sniffers, and increases in high-risk sexual behaviors among heroin sniffers who also used crack (14). Thus, the few available studies suggest that NIHUs might have an important impact in sustaining HIV transmission through their risks of transitioning to injection drug use as well as through their high-risk sexual practices.

HIV transmission fueled by NIHUs is of critical concern in Puerto Rico. The island is one of the HIV epicenters of the United States and the Caribbean, consistently ranking among the ten U.S. states and territories with the highest AIDS incidence rates (15) and having the highest cumulative number of AIDS cases in the Caribbean after Haiti (16). Moreover, Puerto Ricans are the Latino group with the highest prevalence of AIDS in the U.S. and, in contrast to other U.S. populations, injection drug use is the most common-risk category for AIDS cases in Puerto Rico and among Puerto Ricans in the U.S. mainland (17). Recent epidemiological studies estimate HIV seroprevalence among IDUs in Puerto Rico at about 20%, (18) seroincidence at a very high rate of 3.5 per 100 person years at risk, (19) and HCV seroprevalence at 89% (20). Moreover, there is evidence suggesting that HIV and HCV infection occurs earlier among Puerto Rican new injectors than among new injectors of other ethnic/racial groups (21).

In this study, we compared male and female NIHUs from Puerto Rico across a number of domains, including sociodemographic characteristics, drug use patterns and drug dependence, history of trauma and psychopathology, social support, and sexual risk behavior and history of sexually transmitted diseases.

Methods

This study is part of an ongoing parent project aimed at investigating transitions to injection-drug use among heroin and cocaine users.

Recruitment and Eligibility

The study catchment area was comprised of the core municipalities of the San Juan metropolitan area (i.e., San Juan, Guaynabo, Bayamón, and Cataño). Recruitment proceeded through visits to drug-copping areas and the local hangouts in their vicinity (e.g., basketball courts, parks). Study personnel visited the areas and informally talked with those present about the study. Individuals knowledgeable of the drug dynamics in the area were identified (e.g., drug dealers, community leaders) and offered an economic incentive of five dollars for referring

eligible individuals. Potentially eligible subjects were identified by either having been referred by these knowledgeable individuals, coming forward themselves after learning of the study, or having been referred by other participants. Already recruited participants were also offered the economic incentive for referring eligible individuals. Subjects deemed eligible were offered transportation to an assessment facility where a formal informed consent was taken, eligibility was confirmed, and an initial assessment was conducted. Subjects were then counseled about the HIV, HCV, and Hepatitis B Virus (HBV) tests and offered these. All the study procedures were reviewed and approved by the University Institutional Review Board (IRB) prior to the implementation of the field activities.

Subjects were eligible if they were 18 to 25 years old, had never injected any drugs, and had recently used heroin or cocaine. Age was confirmed with drivers' licenses or by looking up birth certificates in the Demographic Registry. Recent heroin or cocaine use was confirmed with urinalysis. The study phlebotomist inspected the extremities to verify the absence of skin lesions and abscesses to confirm no previous drug injection.²² The study phlebotomist also asked a number of questions to explore history of injection (e.g., "Where would you prefer I puncture you for the blood test; why there?"). At the time of this study, 632 subjects had been invited to participate. Of these, 26 refused to participate and 63 were disqualified for failing to meet the eligibility criteria. For this study, subjects not using heroin ($n = 131$) were excluded from the analyses.

Measures and Interviewing

Study participants were administered a computer-assisted personal interview. The interview protocol included questions about demographics, education and employment, drug use history, drug treatment history, incarceration episodes, medical history and use of health services, and attitudes toward injecting drugs. The interview protocol also assessed several psychiatric disorders. Drug dependence was measured with the Substance Abuse module of the World Health Organization Composite International Diagnostic Interview (CIDI), which implements DSM-IV Psychiatric nosology.²³ Posttraumatic stress disorder was assessed with the Posttraumatic Stress Scale (PDS)²⁴ Anxiety and depression was assessed with the Beck's Depression Index²⁵ and Beck's Anxiety Index.²⁶ Lifetime sexual behavior as well as that of the last six months was ascertained using a self-administered questionnaire.

The study phlebotomist collected blood samples from subjects agreeing to be tested.

Analyses

Chi-square tests of independence and T tests were computed to compare subject characteristics across gender groups.

Results

Table 1 shows the demographic characteristics of NIHUs and their gender comparisons. Of the 412 NIHUs recruited at the time of this study, 74 (18.0%) were females. On average, participants were 21.2 years old and there was no

children were similar (20.3% vs. 16.9%, $p=.49$). Current employment status differed significantly between females and males ($p<.01$). Higher proportions of females reported no employment and employment in illicit activities (12.2% vs. 2.7% and 59.5% vs. 39.6%, respectively). Conversely, lower proportions of females reported informal employment and a full-time formal job (18.9% vs. 29.9% and 9.5% vs. 27.8%, respectively).

Table 2 shows drug-related measures of NIHUs. Three quarters of participants reported at least weekly use of marihuana, with females being less likely to report it than

Table 1. Sociodemographic Characteristics of Young (18 to 25 Years Old) Non-injecting Heroin Users by Gender, Puerto Rico (n = 412).

Measure	Total Sample			Males			Females			p
	n	%	Mean(SD) ^a	n	%	Mean(SD) ^a	n	%	Mean(SD) ^a	
Gender										
Males	338	82.0								
Females	74	18.0								
Age			21.2(2.0)			21.2(2.0)			21.3(2.2)	.68
Completed high school or currently enrolled in educational program	138	33.5		121	35.8		17	23.0		.03
Current living arrangement [†]										
Living with spouse	84	20.4		68	20.1		16	21.6		
Living with parents/grandparents	228	55.3		199	58.9		29	39.2		
Living with other adults	52	12.6		42	12.4		10	13.5		<.01
Living without other adults	48	11.7		29	8.6		19	25.7		
Raising children	72	17.5		57	16.9		15	20.3		.49
Current employment status [‡]										
No employment	18	4.4		9	2.7		9	12.2		
Employment in illicit activities [‡]	178	43.2		134	39.6		44	59.5		
Informal employment, no illicit activities [§]	115	27.9		101	29.9		14	18.9		<.01
Full-time formal job	101	24.5		94	27.8		7	9.5		

^a SD = standard deviation[†] mutually exclusive categories[‡] includes drug dealing, prostitution, stealing, or fencing, with or without reporting licit employment[§] includes irregular jobs, self-employment, or jobs outside the books, without reporting any illicit activity

significant age difference between females and males. Only a third of the NIHUs had completed a high school education or were currently enrolled in an educational program (33.5%). Females were significantly less likely than males to have completed a high school education or to be currently enrolled in an educational program (23.0% vs. 35.8%, $p=.03$). The living arrangements of NIHUs differed significantly between females and males ($p<.01$). Similar proportions of females and males lived with spouses (21.6% vs. 20.1%) and other adults (13.5% vs. 12.4%), but a lower proportion of females lived with parents or grandparents (39.2% vs. 58.9%) and a higher proportion lived alone without any other adults (25.7% vs. 8.6%). The proportions of females and males who reported raising

males (56.8% vs. 79.3%, $p<.01$). Regular use of all other drugs did not differ significantly across gender groups. Cocaine was used at least once a week by 37.4% of participants, crack by 35.2%, heroin by 86.9%, barbiturates/tranquilizers by 26.2%, amphetamines by 0.5%, and other opiates by 12.1%. The great majority of NIHUs (88.1%) were using two or more drug classes at least once a week, with a mean number of 2.7 drug classes being used at least once a week. Regular marihuana users reported smoking a mean of 4.1 marihuana joints a day. Cocaine users reported snorting or smoking a mean of 2.8 cocaine bags a day. Regular crack users reported smoking a mean of 13.3 crack rocks a day with females reporting almost twice the amount of males (mean of 20.7 crack rocks

Table 2. Drug Use of Young (18 to 25 Years Old) Non-injecting Heroin Users by Gender, Puerto Rico (n = 412).

Measure	Total Sample			Males			Females			p
	n	%	Mean(SD)*	n	%	Mean(SD*)	n	%	Mean(SD*)	
Drugs used regularly, last 30 days [†]										
Marihuana	310	75.2		268	79.3		42	56.8		<.01
Cocaine (not including crack cocaine)	154	37.4		130	38.5		24	32.4		.33
Crack cocaine	145	35.2		112	33.1		33	44.6		.06
Heroin	357	86.9		292	86.4		65	89.0		.54
Barbiturates/Tranquilizers	108	26.2		91	26.9		17	23.0		.48
Amphetamines	2	0.5		2	0.6		0	0.0		.51
Other opiates [‡]	50	12.1		41	12.1		9	12.2		.99
Regular polydrug use [§]	362	88.1		301	89.1		61	83.6		.19
Mean number of drugs used regularly			2.7(1.2)			2.8(1.2)			2.6(1.1)	.17
Daily Consumption ^{Q%}										
Marihuana joints			4.1(3.7)			4.2(3.8)			3.8(2.8)	.51
Cocaine bags			2.8(2.8)			2.8(2.9)			2.2(1.8)	.05
Crack rocks			13.3(17.1)			11.1(15.7)			20.7(19.6)	<.01
Heroin decks			3.6(3.7)			3.4(3.3)			4.5(4.9)	.04
History of drug overdoses	84	20.4		70	20.7		14	18.9		.73
Dependence to any illicit drug, last 6 months [†]	352	85.4		295	87.3		57	77.0		.02
History of drug treatment	155	37.6		125	37.0		30	40.5		.57

* SD = standard deviation[†] at least once a week[‡] opiates other than heroin[§] two or more drug classes used at least once a week each^{Q%} among those using each drug class at least once a week[†] meeting DSM-IV criteria during last 6 months

vs. 11.1, $p < .01$). Regular heroin users reported snorting or smoking a mean of 3.6 heroin decks a day, with females reporting a larger amount than males (mean of 4.5 heroin decks vs. 3.4, $p = .04$). History of drug overdoses was reported by 20.4% of participants with no significant gender differences. A large majority of participants met criteria for drug dependence during the most recent six-month period (85.4%) with females less likely to meet dependence criteria than males (77.0% vs. 87.3%, $p = .02$). Slightly over a third of participants had undergone drug

treatment (37.6%) with no significant gender differences.

Table 3 compares male and female NIHUs on measures of violence, trauma, social support, depression, and anxiety. Two thirds of participants reported a history of being physically assaulted (66.5%). Females were less likely to report physical assault than males (55.4% vs. 68.9%, $p = .03$). Close to 1 in 10 of participants reported a history of sexual assault (9.2%), with women more likely to report it than males (35.1% vs. 3.6%, $p < .01$). Females were more likely to meet criteria for severe symptoms of

Table 3. Violence, Trauma, Social Support, Depression, and Anxiety of Young (18 to 25 Years Old) Non-injecting Heroin Users by Gender, Puerto Rico (n = 412).

Measure	Total Sample		Males		Females		p
	n	%	n	%	n	%	
History of violence							
Physically attacked	274	66.5	233	68.9	41	55.4	.03
Sexually attacked	38	9.2	12	3.6	26	35.1	<.01
Severe post-traumatic stress symptomatology [*]	117	28.4	87	25.7	30	40.5	.01
Social support							
Material support	402	97.6	331	97.9	71	95.9	.32
Emotional support	386	93.7	322	95.3	64	86.5	<.01
Severe depression symptomatology [†]	101	25.1	79	23.8	22	31.0	.20
Severe anxiety symptomatology [‡]	82	19.9	55	16.3	27	36.5	<.01

* measured with Impact of Events Scale, last 6 months

† measured with Beck's Depression Index, last 30 days

‡ measured with Beck's Anxiety Index, last 30 days

post-traumatic stress than males (40.5% vs. 25.7%, $p=.01$). The great majority of participants reported having at least one person who could provide material support (97.6%) with no significant gender differences. Females were less likely to report having at least one person who could provide emotional support than males (86.5% vs. 95.3%, $p<.01$). One quarter of participants met criteria for severe symptoms of depression (25.1%) with no significant gender differences. Females were more likely to meet criteria for severe symptoms of anxiety than males (36.5% vs. 16.3%, $p<.01$).

Table 4 shows the results of comparing the sexual behaviors and sexually transmitted infections of NIHUs across gender groups. The great majority of participants reported a history of multiple sexual partners (82.3%) with no significant gender differences. Females were more likely than males to report commercial sexual partners (20.3%

significantly higher among males than among females (11.2% vs. 2.9%, $p=.03$). About one third of participants showed immunity to HBV (34.6%) with no significant gender difference. Two participants showed evidence of HBV infection.

Discussion

This study examined gender differences among young non-injecting heroin users. To our knowledge, this study is one of only a handful of studies examining this population (10-14) and the first to examine non-injecting heroin users in Puerto Rico. Gender differences were analyzed across a large number of domains, including sociodemographic characteristics, drug use patterns and drug dependence, history of trauma and psychopathology, social support, and sexual risk behaviors and history of

Table 4. Sexual Behaviors and Sexually Transmitted Infections Among Young (18 to 25 Years Old) Non-injecting Heroin Users in Puerto Rico (n = 412).

Measure	Total Sample		Males		Females		p
	n	%	n	%	n	%	
Lifetime sexual behaviors							
Multiple partners	339	82.3	283	83.7	56	75.7	.10
Commercial partners	31	8.4	19	6.1	12	20.3	<.01
IDU partners	14	3.4	5	1.5	9	12.2	<.01
HIV+/HCV+ partners	7	1.7	4	1.2	3	4.1	.08
Sex while incarcerated	9	2.2	5	1.5	4	5.4	.04
Self-reported ever being diagnosed:							
Syphilis	6	1.5	2	0.6	4	5.4	<.01
Gonorrhea	4	1.0	1	0.3	3	4.1	<.01
Chlamydia	15	3.6	3	0.9	12	16.2	<.01
Genital herpes	6	1.5	5	1.5	1	1.4	.93
Any of the above	27	6.6	10	3.0	17	23.0	<.01
Tested positive for:							
HIV*	5	1.2	2	0.6	3	4.3	.01
HCV*	39	9.8	37	11.2	2	2.9	.03
HBV immunity [†]	127	34.6	109	35.5	18	30.0	.41
HBV infection [‡]	2	0.8	2	1.0	0	0.0	.51

* missing test results for 12 participants

† missing test results for 45 participants

‡ among those not testing immune to HBV

vs. 6.1%, $p<.01$), IDU partners (12.2% vs. 1.5, $p<.01$), and having had sex while incarcerated (5.4% vs. 1.5, $p=.04$). Females were significantly more likely to report all the sexually transmitted infections examined, except in the case of genital herpes. Close to one in four of the females (23.0%) reported a history of sexually transmitted infections, compared to three percent of the males ($p<.01$). HIV seroprevalence among females was 4.3% compared to 0.6% among males ($p=.01$). HCV seroprevalence was

sexually transmitted diseases.

A number of important differences were found. Compared to males, female heroin users were found to be:

- Less likely to have completed high school or to be currently studying, less likely to be living with their parents or spouses, less likely to have licit employment and more likely to have no employment or to have employment in illicit activities;
- Less likely to use marijuana regularly and to meet

criteria for drug dependence, but consuming greater amounts of crack cocaine;

- Less likely to report histories of physical aggression, but more likely to report sexual assaults and more likely to manifest severe symptomatology of post-traumatic stress disorder;
- Less likely to report having a source of emotional support;
- More likely to manifest severe symptomatology of generalized anxiety disorder;
- More likely to report commercial sex and sex with injection drug users, more likely to report a history of sexually transmitted diseases, and more likely to test HIV-positive.

The majority of the gender differences found in this study are consistent with previous studies of female drug users. For example, higher use of crack cocaine among females than among males have been reported in a number of studies (27). Compared to male drug users, female drug users have also been found in other studies to be less socially integrated to mainstream social institutions such as formal employment and education, (28) more likely to report histories of trauma – particularly sexual aggression – and other psychopathology, (29) and to be at greater risk of sexually transmitted diseases, including infection with HIV (14).

The accumulated evidence on gender differences in social support among drug users is ambiguous. Some studies have found that drug-using females report greater social support than males, (28) other studies have found males reporting greater social support, (30) and yet other studies have reported no significant difference (31). In our study, female heroin users were less likely to be living with spouses or parents and less likely to report sources of emotional support than their male counterparts. Our findings might be related to the disproportional stigma the Hispanic culture holds against drug-using women (32-33) Thus, Hispanic drug-using women might have less support from their families and friends and be more likely to be exposed to aggression than non-Hispanic drug-using women. Moreover, the research literature on the impact of social support seems to be consistent in finding that lack of social support appears to have a greater deleterious impact on females than on men (31,34).

Our study has a number of potential limitations that merit further discussion. As is the case with studies conducted with samples of community-recruited drug users, the cohort in this study cannot be considered representative of drug users in the San Juan metropolitan area. Another limitation of our study is the fact that, except for the HIV, HCV, and HBV tests, measures were derived

from self-reports. The studies that have examined self-reports of street-recruited drug users suggest that the self-reports are reasonably valid and reliable (35-36). Nevertheless, the presence of selection, recall, or social desirability biases in the data cannot be ruled out.

Notwithstanding these limitations, we believe the findings of this study are highly compelling. Female heroin users seem to present a host of different needs compared to male heroin users. Programs aimed at helping female heroin users need to address these differences adequately. Given the scarcity of existing programs for female drug users in Puerto Rico, designing supportive systems that effectively address the specific needs of Puerto Rican drug-using women should become a high-priority public health issue.

Resumen

Introducción: Durante los años 90 el uso de heroína no inyectada (UHNI) aumentó notablemente en varios países. Sin embargo, pocos estudios han examinado las costumbres y otras conductas problemáticas de los UHNI. En éste estudio, comparamos los UHNI varones y hembras a través de un número de dominios. **Métodos:** El reclutamiento se llevó a cabo mediante visitas a áreas de compra de drogas y a lugares frecuentados en la vecindad. Los sujetos eran elegibles de tener entre 18 y 25 años de edad, no haberse inyectado nunca drogas, y de haber usado heroína o cocaína recientemente. A los participantes del estudio se les administró una entrevista personal mediante asistencia computarizada. **Resultados:** De los 412 UHNI reclutados al momento de éste estudio, 74 (18.0%) eran mujeres. Las féminas UHNI eran más dadas a reportar ataques sexuales y más dadas a manifestar síntomas de desorden de ansiedad post-traumático severo que los varones UHNI (35.1% vs. 3.6%, $p < .01$ y 40.5% vs. 25.7%, $p = .01$, respectivamente). Las mujeres eran menos dadas a reportar una fuente de apoyo emocional que los varones (86.5% vs. 95.3%, $p < .01$). Cerca de una de cada cuatro mujeres (23.0%) reportó historial de infecciones sexualmente transmitidas, comparado con el tres por ciento de los varones ($p < .01$). La seroprevalencia de VIH entre las mujeres fue de 4.3%, comparado con un 0.6% entre los hombres ($p = .01$). **Discusión:** Las mujeres usuarias de heroína aparentan presentar necesidades muy diferentes en comparación con los hombres usuarios de heroína. Dada la escasez de programas para mujeres usuarias de drogas en Puerto Rico, el desarrollar sistemas que tomen en cuenta las necesidades específicas de las mujeres usuarias de drogas debe convertirse en un asunto de salud pública de alta prioridad.

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