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Are Lesbian, Gay, and Bisexual People Who Inject Drugs in Rural Communities More at Risk for Hepatitis C Virus?

By

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Master of Public Health

Epidemiology

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Bachelor of Science in Public Health
Indiana University
2022

Thesis Committee Chair: Dr. Hannah LF Cooper, ScD

An abstract of
A thesis submitted to the Faculty of the
Rollins School of Public Health of Emory University
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Abstract

Are Lesbian, Gay, and Bisexual People Who Inject Drugs in Rural Communities More at Risk for Hepatitis C Virus?

By Karma Plaisance

Introduction Compared to urban areas, rates of hepatitis C virus (HCV) have surged in rural United States (U.S.) areas, and this increase is driven by injection drug use (IDU) and associated risk behaviors. While little is known about lesbian, gay and bisexual (LGB) risk for HCV among people who inject drugs (PWID) in rural areas, research from urban U.S. areas suggests that LGB PWID may be more vulnerable to HCV and associated injection-related risk behaviors compared to their heterosexual counterparts. The objective of this analysis is to describe the association between sexual orientation and HCV among rural PWID.

Methods This study analyzed survey and laboratory data collected by the Rural Opioid Initiative (ROI) from 2018 to 2020. Data were collected via respondent-driven sampling among people who use drugs in rural communities. Our analytic sample was limited to those who had reported a lifetime history of injecting, had a conclusive HCV test result, and had a valid response to ROI's sexual orientation question. Logistic regression was used to analyze the relationship between sexual orientation and HCV status, adjusting for nesting within the recruitment chain.

Results Among 1422 PWID, bisexual PWID had 48% higher odds of testing positive for HCV compared to heterosexual PWID, while lesbian and gay (L/G) PWID had 55% lower odds.

Conclusions The divergent relationships to HCV status among bisexual vs. L/G PWID indicate that these two groups face differing risk and protective factors that influence their acquisition of HCV. Further research is needed to explore these differing factors, particularly the protective factors experienced by local L/G communities that may also be used to protect bisexual PWID from HCV.

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Table of Contents

I. Introduction

Lesbian, gay, and bisexual (LGB) individuals who inject drugs in rural areas may be a neglected epicenter of the United States (U.S.) hepatitis C virus (HCV) epidemic. In the U.S., HCV rates are overwhelmingly driven by injection drug use (IDU) and associated risk behaviors like receptive syringe sharing and sharing of other injection equipment (e.g., cookers, cotton) (1–5). Rural areas are experiencing large surges in HCV prevalence. Among the four predominately rural Appalachian states most affected by the opioid epidemic (Kentucky, Tennessee, Virginia, and West Virginia), HCV infection rates surged by 364% between the years 2006 and 2012, with the incidence of HCV in rural areas being twice that of urban areas within these states (6). This geographic disparity still persists, as a recent study using data from 2020 found that among people who inject drugs (PWID), HCV seropositivity was significantly higher among those residing in rural communities (71.0%) compared to those in non-rural communities (46.8%) (4).

Research conducted with PWID in U.S. cities over the past few decades suggests that LGB PWID may be more vulnerable than their heterosexual PWID counterparts to HCV and associated injection-related risk behaviors (7–9). In a sample of PWID living in Baltimore from 2009 to 2018, LGB PWID were almost three times more likely to share syringes for drug splitting relative to heterosexual PWID (7). In a study from 1990 to 2013, gay and bisexual men who inject drugs were up to 9 times more likely to have HCV or co-occurring drug-related harms, like HIV/HCV and HIV/HCV/HBV, compared to heterosexual men who inject drugs (8). Additionally, another study from San Francisco suggests that gay PWID were less likely to engage in syringe service programs than their heterosexual counterparts (9). Meyer's minority stress model is a commonly used framework to explain how minority-specific stressors influence engagement in risky behaviors and other inequities in drug-related harms. Though mechanisms

are understudied, existing research suggests that LGB people in the general population experience higher levels of both distal stressors, such as stigma and discrimination, and proximal stressors, like internalized stigma and fear of rejection, both of which are established correlates of HCV and related injection behaviors (10). Furthermore, PWID who identify as bisexual may be at increased risk of HCV compared to those who identify as lesbian or gay (L/G), as they experience minority stressors, such as stigma and identity invalidation, from both L/G and heterosexual communities (10,16).

Though drug-related epidemics have expanded from urban to rural settings over the past 20 years, and despite documented elevated injection-related risk behaviors among LGB PWID in urban areas, little is known about HCV or other drug-related harms among rural LGB PWID (1,11). LGB PWID in rural areas may face minority-specific stressors that put them at greater risk for drug-related harms, compared to urban LGB PWID, and compared to heterosexual PWID in rural areas (1,11). Generally, LGB individuals in rural locations are overlooked in terms of receiving support and resources. Fewer people within rural communities means that differences, like sexuality, stand out- which can contribute to stressors such as identity concealment (11). While there are already a limited number of services in rural locations, heterosexist discrimination can further limit access (11). Compared to 57% of urban LGB individuals, only 11% of rural LGB individuals have access to a LGBT-friendly health center (11). Those who identify as bisexual, again, may face additional rural-specific health disparities compared to their monosexual counterparts that contribute to HCV acquisition (12).

This study analyzes data collected with PWID living in six rural sites participating in the Rural Opioid Initiative (ROI) Research Consortium. ROI aims to aid rural communities in developing interventions to prevent and treat substance use-related health outcomes. The purpose of this

analysis is to assess the relationship between sexual orientation and HCV lab test results to determine if LGB PWID in rural communities are more at risk for HCV than their rural heterosexual PWID counterparts. Left untreated, HCV can cause liver damage, failure, cancer, cirrhosis, or even death (13). While there is no vaccine for HCV, it can be treated with antiviral medication or prevented via harm reduction programs, education, or accessible healthcare services. The health effects related to HCV, along with its high transmission rate (14), emphasize a need for rural interventions. Through this analysis, we hope to develop the evidence base for tailored resources for LGB people who use drugs and live in rural areas.

II. Methods

Overview: To discern the relationship between sexual orientation and HCV among PWID, we used survey and laboratory data collected by ROI. ROI is a collaborative study designed to describe the epidemiology of drug-related epidemics across eight rural U.S. communities (15). From 2018 to 2020, data were collected from people who use drugs (PWUD) in Kentucky, Ohio, North Carolina, Illinois, New England, Oregon, Wisconsin, and West Virginia (15).

Sample: Participants were recruited by ROI using respondent-driven sampling (RDS) (15). Seeds were individuals who were initially recruited via community-based programs or previous studies. Each seed was invited to recruit up to three peers (15). Seeds received an incentive for recruiting each eligible peer ranging from $10 to $20 depending on the site (15). Individuals were eligible to take part in the study if they: (1) reported using opioids or injecting any drug to “get high” in the past 30 days; (2) were aged 18 or older; (3) resided in a county participating in the ROI (15).

To create the analytic sample for our cross-sectional analysis, we further limited the ROI sample to PWUD who: (1) reported a lifetime history of injecting; (2) had a conclusive ROI-

administered HCV test result; and (3) had a valid response to the ROI's sexual orientation question. All participants from the West Virginia site were excluded from the analytic sample because that site did not conduct HCV testing. All participants from the Wisconsin site were excluded because that site's survey did not query sexual orientation. Unfortunately, due to the small frequency, those who identified as transgender and who identified as an 'Other' sexuality were excluded as well. These exclusions generated a total sample of 1422 PWUD living in six ROI sites.

Measures:

Outcome Data collection protocols and surveys were harmonized across all ROI sites. Participants received an incentive to complete this survey that ranged from $40 to $60 depending on the site (15). We measured the outcome via HCV rapid antibody and confirmatory RNA tests. All participants received a rapid HCV rapid antibody test (15). If they tested preliminarily positive on the antibody test, their blood specimens were forwarded to the Global Hepatitis Outbreak Surveillance Technology (GHOST) Sequencing Center for a confirmatory RNA test (15).

Primary exposure Depending on the site, surveys were administered to participants by either interviewers or Audio Computer-Assisted Self-Interview (15). The survey queried sexual orientation using the following item: "What is your sexual orientation? Choose one." The response options for sexual orientation were: "Straight," "Lesbian or gay," "Bisexual," and "Other." In this analysis, we excluded the small number of people (N=2) who were otherwise eligible but responded "Other" to this item.

Covariates The selection of covariates was conceptually informed based on what may impact an individual's disclosure of their sexual orientation and what may affect an individual having a positive confirmatory HCV test result, and excluded constructs that might lie in the causal pathway between sexual orientation and HCV status. Covariates included but were not limited to site, gender, and drug of choice.

Analyses: After conducting extensive exploratory analysis all variables, we developed the model in the following stages: (1) logistic models examining bivariate relationships between each covariate and the outcome; because they were theoretically generated, all variables from the bivariate analyses were included in the multivariable model. (2) multivariable logistic model adjusting for site and gender, as those are direct confounders of both having a positive confirmatory HCV test result and disclosure of sexual orientation. And (3) a complete adjusted model was created controlling for all covariates: site, gender, age, race/ethnicity, educational attainment, insurance, and drug of choice. All models were estimated using PROC GENMOD in SAS V9.4 and assumed exchangeability via RDS chain.

Research Ethics: IRB approval was attained by each site.

III. Results

In total, there were 1422 individuals in our analytic sample. Of those, 12% identified as LGB, with 10% of the total sample identifying as bisexual and 2% identifying as L/G (Table 1). Approximately two-thirds of the sample had a positive confirmatory HCV test. While our sample included those who have *ever* injected drugs, 89% of individuals indicated that they were still currently injecting. The median age of the sample was 35 years (IQR: 29, 43) and a majority identified as male (56%) and were non-Hispanic white (87%). Table 1 summarizes various

characteristics and risk behaviors of the total sample overall, and as stratified by identified sexual orientation.

Among bisexuals, a majority identified as female (84%) despite a majority of the analytic sample identifying as male. Additionally, 70% had a positive confirmatory HCV test and 51% preferred heroin as their drug of choice. At the time of the survey, 91% of bisexual individuals indicated that they were currently injecting. Interestingly, while identifying as bisexual was not associated independently with testing positive for HCV, when controlling for both study site and gender a positive association appeared (1.49, 95% CI [1.02, 2.16]). The positive association was retained in the full multivariate model as well (1.48, 95% CI [1.03, 2.12]).

Among those who identified as L/G, 55% were male and only 34% had a positive confirmatory HCV test. Seventy-nine percent of those who identified as L/G were currently injecting at the time of the survey and 38% preferred methamphetamines as their drug of choice. Identifying as L/G was independently associated with testing positive for HCV (0.35, 95% CI [0.17, 0.72]), as well as when controlling for study site and gender (0.40, 95% CI [0.19, 0.83]). In the full multivariate model identifying as L/G remained significantly associated with testing positive for HCV (0.45, 95% CI [0.21, 0.96]); however, the association was weaker than the two previous models. The final multivariable model indicates that among those who have ever injected drugs there is a significant association between identifying as bisexual and having a positive HCV test compared to heterosexual counterparts in rural sites when controlling for covariates. Conversely, our model also indicates that there is a significant association between identifying as L/G and not having a positive HCV test compared to heterosexual counterparts. All models were adjusted for nesting within the recruitment chain.

IV. Discussion

This analysis is among the first to explore the relationship between sexual orientation and HCV in rural areas, despite the increase in IDU and HCV in rural areas. Our results suggest that among rural residents who have ever injected drugs, the odds of having a positive confirmatory HCV test among bisexual individuals was 48% higher than the odds among heterosexual individuals. Conversely, the odds of having a positive confirmatory HCV test among L/G individuals was 55% lower than the odds of heterosexual individuals. The odds for L/G PWID being lower than the odds of heterosexual PWID, while bisexual PWID had higher odds, may indicate that risk and protective factors differ within the LGB community.

The minority stress theory posits that stressors attributed to sexual identity, such as stigma and identity concealment, contribute to poor health outcomes (16). Bisexual individuals experience minority stressors from both heterosexual and L/G communities, like the illegitimizing of their identity or bi-specific stereotypes (16). The increased odds found in our results may be due to the dual rejection and stigmatization bisexual individuals face (16). Though they constitute a majority of the LGBT community, bisexual individuals experience health disparities that have been largely overlooked (17). Our study is one of the first to identify this inequity with HCV in the rural environment. A recent study published by Wiley. et al. using data from the same ROI cohort generated finding that illuminate possible causal mechanisms underlying this association: they found that bisexual individuals in this rural cohort were more likely to share syringes for injection compared to monosexual individuals (98% of the sample were heterosexual) (10). Additionally, bisexual women had a higher injection frequency compared to monosexual women (10). Due to stigma, more bisexual women reported not receiving healthcare in the past 6-months, as well as reported not receiving drug treatment in fear of disrespect (10). These

mechanisms and others (e.g., higher HCV prevalence in injecting networks) might explain the association with HCV in this same sample, and parallels urban findings that show increased IDU-acquired HCV among sexual minorities.

While the magnitude of the protective association between identifying as L/G and having a positive confirmatory HCV test weakened as more covariates were added to the model, the significance persisted. Based on previous literature from urban-based samples indicating L/G PWID engage in more IDU-related risk behaviors, compared to heterosexual PWID, we expected to see a positive association between sexual orientation and testing positive for HCV (7,9). The persistence of this association may speak to the findings and should be further explored to parse out why the relationship may be protective. It is possible that these individuals engage in more protective behaviors that reduce their risk for HCV. Minority stress associated with HIV-related discrimination and HIV-awareness may be a possible pathway as to why we see this association. While there is limited research on rural PWID and LGB PWID, international research suggests that HIV awareness among PWID is associated with safer injection practices (18).

Limitations

Findings should be interpreted in light of several limitations. Due to the survey data being self-reported, there may be underreporting of stigmatized characteristics. In particular, there may be misclassification of our exposure. If fewer LGB individuals reported that they identify as LGB, this may undervalue the significance of the relationship between sexual orientation and HCV, implying there may be a stronger relationship present than the one we have already estimated. Notably, however, our outcome was laboratory tested rather than self-reported, which minimizes misclassification of the outcome. Additionally, because of the racial/ethnic composition of the ROI sites, the vast majority of ROI participants were non-Hispanic White. Rural areas are,

however, racially, and ethnically diverse, and future research should encompass these areas to explore the generalizability of these findings across racial/ethnic groups (19).

Public Health Implications

Based on the results of this analysis, we can draw two main conclusions: (1) rural individuals who identify as LGB and have ever injected drugs face significantly different odds of having a positive HCV test compared to heterosexual counterparts; and (2) these odds diverge across bisexual and L/G populations. Findings about bisexual PWID are supported by evidence from cities (and one ROI paper) that show that bisexual individuals routinely face health inequities compared to their heterosexual and L/G counterparts. Future research should explore the protective behaviors employed by local L/G communities that may also be used to protect bisexual individuals from IDU-acquired HCV and other drug-related harms.

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Figures

Table 1. Characteristics of people who report lifetime injecting and live in one of six rural areas participating in the Rural Opioid Initiative (N= 1422)				
		Sexual Identity		
Characteristics	Total (N= 1422)	Heterosexual (N=1245)	Lesbian/Gay (N=29)	Bisexual (N=148)
Age				
18-28	330 (23%)	267 (21%)	11 (38%)	52 (35%)
29-39	593 (42%)	513 (41%)	12 (41%)	68 (46%)
20-50	339 (23%)	311 (25%)	5 (17%)	23 (16%)
51+	160 (11%)	154 (12%)	1 (3%)	5 (3%)
Gender/Sex				
Men/Male	801 (56%)	761 (61%)	16 (55%)	24 (16%)
Women/Female	621 (44%)	484 (39%)	13 (45%)	124 (84%)
Race & Ethnicity				
Non-Hispanic White	1244 (87%)	1092 (88%)	23 (79%)	129 (87%)
Non-Hispanic American Indian	70 (5%)	56 (4%)	4 (14%)	10 (7%)
Non-Hispanic Other or Mixed Race	62 (4%)	55 (4%)	2 (7%)	5 (3%)
Hispanic	46 (3%)	42 (3%)	0 (0%)	4 (3%)
Missing or Refused	15 (1%)	12 (1%)	1 (3%)	2 (1%)
Site				
New England	458 (32%)	383 (31%)	6 (21%)	69 (47%)
Kentucky	289 (20%)	272 (22%)	6 (21%)	11 (7%)
Ohio	205 (14%)	184 (15%)	0 (0%)	21 (14%)
North Carolina	198 (14%)	169 (14%)	7 (24%)	22 (15%)
Oregon	146 (10%)	129 (10%)	4 (14%)	13 (9%)
Illinois	126 (9%)	108 (9%)	6 (21%)	12 (8%)
Education				
Less Than High School	365 (26%)	315 (25%)	5 (17%)	45 (30%)
High School Diploma or GED	674 (47%)	591 (48%)	19 (66%)	64 (43%)
Some College	278 (20%)	247 (20%)	4 (14%)	27 (18%)
Higher Education Degree	104 (7%)	91 (7%)	1 (3%)	12 (8%)
Missing or Refused	1 (0%)	1 (0%)	0 (0%)	0 (0%)
Sexual Orientation				
Heterosexual	1245 (88%)	1245 (100%)	0 (0%)	0 (0%)
Lesbian/Gay	29 (2%)	0 (0%)	29 (100%)	0 (0%)
Bisexual	148 (10%)	0 (0%)	0 (0%)	148 (100%)
Drug of Choice				

Heroin	643 (45%)	557 (45%)	10 (34%)	75 (51%)
Methamphetamine/Crystal Meth	385 (27%)	330 (27%)	11 (38%)	44 (30%)
Opiate Painkillers	131 (9%)	119 (10%)	5 (17%)	7 (5%)
Cocaine/Crack	91 (6%)	79 (6%)	2 (7%)	10 (7%)
Buprenorphine	65 (5%)	62 (5%)	0 (0%)	3 (2%)
Fentanyl/Carfentanil	50 (4%)	46 (4%)	0 (0%)	4 (3%)
Other	58 (4%)	52 (4%)	1 (3%)	5 (3%)
Has Health Insurance				
Yes	1086 (76%)	953 (76%)	20 (69%)	113 (76%)
No	309 (22%)	272 (22%)	8 (28%)	29 (19%)
Missing or Refused	27 (2%)	20 (2%)	1 (3%)	6 (4%)
Current Injection Drug Use				
Yes	1260 (89%)	1103 (89%)	23 (79%)	134 (91%)
No	162 (11%)	142 (11%)	6 (21%)	14 (9%)
Hepatitis C Virus Test Result				
HCV Positive	905 (64%)	792 (64%)	10 (34%)	103 (70%)
HCV Negative	517 (36%)	453 (36%)	19 (66%)	45 (30%)

Table 2. Bivariate regressions of HCV status on covariates in a sample of people who report lifetime injecting and live in one of six rural areas participating in the Rural Opioid Initiative (N= 1422)

Covariates	Odds Ratio	95% CI	P-value
Sexual Orientation			
Straight/Heterosexual	Ref	Ref	Ref
Lesbian/Gay	0.35	0.17, 0.72	0.004
Bisexual	1.36	0.97, 1.90	0.076
Site			
New England	Ref	Ref	Ref
Kentucky	1.23	0.83, 1.84	0.31
Ohio	1.95	1.10, 3.44	0.022
North Carolina	0.42	0.28, 0.63	<.0001
Oregon	0.46	0.30, 0.70	0.0003
Illinois	0.39	0.22, 0.69	0.0012
Gender/Sex			
Men/Male	Ref	Ref	Ref
Women/Female	0.92	0.76, 1.12	0.41
Highest Educational Attainment			
<Highschool/GED	Ref	Ref	Ref
Highschool grad/GED	1.15	0.91, 1.44	0.24
Some college	1.07	0.76, 1.50	0.69
College grad or more	0.70	0.45, 1.08	0.11
Race & Ethnicity			
Non-Hispanic White	Ref	Ref	Ref
Non-Hispanic American Indian	0.59	0.32, 1.08	0.089

Hispanic/Latinx	1.02	0.55, 1.87	0.96
Non-Hispanic Other	0.92	0.58, 1.47	0.74
Age			
<=28	0.76	0.59, 0.98	0.032
29-39	Ref	Ref	Ref
40-50	0.93	0.71, 1.22	0.60
51-61	0.79	0.54, 1.17	0.24
62+	0.65	0.21, 2.01	0.45
Has Health Insurance			
No	Ref	Ref	Ref
Yes	1.33	1.05, 1.68	0.018
Drug of Choice			
Heroin	Ref	Ref	Ref
Methamphetamine	0.46	0.34, 0.62	<.0001
Opiate painkillers	0.42	0.28, 0.62	<.0001
Cocaine/crack	0.79	0.56, 1.10	0.16
Buprenorphine	1.07	0.66, 1.73	0.78
Fentanyl	0.90	0.45, 1.81	0.78
Other	0.65	0.38, 1.14	0.13

Table 3. Results of regressing HCV status on sexual orientation, adjusting for site and gender/sex, in a sample of people who report lifetime injecting and live in one of six rural areas participating in the Rural Opioid Initiative (N= 1422)

Covariates	Odds Ratio	95% CI	P-value
Sexual Orientation			
Straight/Heterosexual	Ref	Ref	Ref
Lesbian/Gay	0.40	0.19, 0.83	0.015
Bisexual	1.49	1.02, 2.16	0.037
Site			
New England	Ref	Ref	Ref
Kentucky	1.30	0.86, 1.97	0.21
Ohio	1.99	1.12, 3.55	0.020
North Carolina	0.44	0.29, 0.66	<.0001
Oregon	0.48	0.31, 0.73	0.0007
Illinois	0.41	0.23, 0.72	0.0021
Gender/Sex			
Men/male	Ref	Ref	Ref
Women/female	0.85	0.68, 1.05	0.12

Table 4. Results of regressing HCV status on sexual orientation, adjusting for all covariates, in a sample of people who report lifetime injecting and live in one of six rural areas participating in the Rural Opioid Initiative (N= 1422)

Covariates	Odds Ratio	95% CI	P-value
Sexual Orientation			
Straight/Heterosexual	Ref	Ref	Ref
Lesbian/Gay	0.45	0.21, 0.96	0.040
Bisexual	1.48	1.03, 2.12	0.033
Site			
New England	Ref	Ref	Ref
Kentucky	1.73	1.06, 2.81	0.027
Ohio	2.23	1.22, 4.09	0.0092
North Carolina	0.72	0.41, 1.25	0.24
Oregon	0.68	0.42, 1.11	0.12
Illinois	0.57	0.32, 1.02	0.060
Gender/Sex			
Men/male	Ref	Ref	Ref
Women/female	0.90	0.73, 1.12	0.34
Highest Educational Attainment			
<Highschool/GED	Ref	Ref	Ref
Highschool grad/GED	1.24	0.96, 1.62	0.10
Some college	1.29	0.86, 1.94	0.22
College grad or more	0.73	0.44, 1.20	0.21
Race & Ethnicity			
Non-Hispanic White	Ref	Ref	Ref
Non-Hispanic American Indian	0.59	0.32, 1.08	0.089
Hispanic/Latinx	1.02	0.55, 1.87	0.96
Non-Hispanic Other	0.92	0.58, 1.47	0.74
Age			
<=28	0.72	0.55, 0.96	0.026
29-39	Ref	Ref	Ref
40-50	1.04	0.76, 1.41	0.81
51-61	0.90	0.56, 1.45	0.67
62+	0.90	0.25, 3.32	0.88
Has Health Insurance			
No	Ref	Ref	Ref
Yes	1.18	0.89, 1.56	0.24
Drug of Choice			
Heroin	Ref	Ref	Ref
Methamphetamine	0.49	0.35, 0.67	<.0001
Opiate painkillers	0.38	0.25, 0.58	<.0001
Cocaine/crack	0.76	0.54, 1.06	0.11
Buprenorphine	0.99	0.56, 1.76	0.98
Fentanyl	0.81	0.36, 1.83	0.62
Other	0.68	0.37, 1.23	0.20