Published in final edited form as:

J Nurs Scholarsh. 2023 May ; 55(3): 605–622. doi:10.1111/jnu.12863.

Barriers and Facilitators to Primary Care Engagement for People Who Inject Drugs: A Systematic Review

Omeid Heidari[1], **Kayla Tormohlen**[2], **Derek T. Dangerfield II**[3,4], **Karin E. Tobin**[5], **Jason Farley**[6], **Shoshana V. Aronowitz**[7]

[1]University of Washington, School of Nursing, Department of Child, Family, and Population Health Nursing, 1959 NE Pacific Street, Seattle, WA 98195

[2]Johns Hopkins University, Bloomberg School of Public Health, Department of Health Policy and Management, 615 N. Wolfe St, Baltimore, MD 21205

[3]George Washington University, Milken Institute School of Public Health, Department of Prevention and Community Health, 950 New Hampshire Ave NW #2, Washington, DC 20052

[4]Us Helping Us, Inc. Georgia Ave. NW. Washington, DC 20010

[5]Johns Hopkins University, School of Nursing, 525 N. Wolfe St, Baltimore, MD 21205

[6]Johns Hopkins University, Bloomberg School of Public Health, Department of Health, Behavior, and Society, 615 N. Wolfe St, Baltimore, MD 21205

[7]University of Pennsylvania, School of Nursing, Department of Family and Community Health, 418 Curie Blvd, Pennsylvania, PA, 19104

Abstract

Introduction: People who inject drugs (PWID) have greater burden of multimorbid chronic diseases than the general population. However, little attention has been paid to the engagement in primary care for services related specifically to injection drug use and management of underlying chronic comorbid diseases for this population. This systematic review identified facilitators and barriers of healthcare engagement in the primary care setting among PWID.

Design and Methods: Studies were identified by a literature search of PubMed, CINAHL, and EMBASE, and by searching the references of retrieved articles. Studies were included if they measured active injection drug use, and outcomes related to primary care engagement characterized by: diagnosis of a health condition, linkage or retention in care, health condition-related outcomes, and reported patient-provider relationship.

Results: 23 articles were included. Using the Behavioral Model, factors within predisposing, enabling, need, and health behavior domains were identified. Having co-located services and a positive patient-provider relationship were among the strongest factors associated with healthcare

Corresponding Author: Omeid Heidari, PhD, MPH, ANP-C, University of Washington, School of Nursing, Department of Child, Family, and Population Health Nursing, T416-C, Seattle, Washington, 98195, Oheidar1@uw.edu.

Conflicts of interest:
The authors report no real or perceived vested interests related to this article that could be construed as a conflict of interest

Sigma Theta Tau International chapters: Nu Beta and Xi

utilization and engagement while active injection drug use was associated with decreased engagement.

Conclusions: To our knowledge this is the only review of evidence that has examined factors related to primary care engagement for people who inject drugs. Most articles were observational studies utilizing descriptive designs. Although the assessment of evidence was primarily rated 'Good', this review identifies a significant need to improve our understanding of primary care engagement for PWID. Future research and intervention strategies should consider these findings to better integrate the holistic care needs of PWID into primary care to reduce morbidity and mortality associated with injection drug use and chronic disease.

Clinical relevance: Primary care engagement is important for preventative care, early diagnosis of disease, and management of chronic diseases, including addressing problems of substance use. This review highlights factors nurses can utilize to facilitate primary care engagement of PWID.

Keywords

Primary health care; Substance use; HIV/AIDS; Advanced practice nursing; Infectious diseases; Health disparities

Introduction

People who inject drugs (PWID) have a high number of co-occurring medical conditions. In a large retrospective review of patients with active substance use, Krupski et al. (2015) found hypertension (47%), tobacco use (46%), depression (43%), hyperlipidemia (24%), hepatitis C (HCV) (22%), and diabetes mellitus (21%) were among the most frequently recorded comorbid conditions. In a random sample of individuals with opioid use disorder (OUD), 91% had at least one documented chronic illness, with a mean of 2.6 chronic illnesses, and among individuals receiving methadone, 68% were prescribed at least one additional medication for the management of their chronic illness (Cullen et al., 2009). Further, one longitudinal cohort study of PWID identified that individuals with a detectable HIV viral load were more likely to have uncontrolled comorbid diseases like diabetes or hypertension (Monroe et al., 2011). Multimorbid diseases in this population are largely undiagnosed or undertreated (Heidari et al., 2022; Salter et al., 2011).

Government organizations and national interest groups concerned with the health and wellness of PWID often limit the scope of their guidelines to harm reduction and infectious disease treatment and prevention. For example, guidelines from the Centers for Disease Control and Prevention (CDC) for primary and preventative care of PWID focuses on infectious diseases, namely HIV, HCV, hepatitis B (HBV), sexually transmitted infections (STIs), and tuberculosis (TB); these guidelines only mention the importance of referral and engagement in primary care for integrated services (CDC, 2012). Recommendations for engaging individuals with substance use disorders in primary care for treatment of comorbid conditions are lacking, and often focus mostly on the delivery of safer use supplies via syringe access programs embedded within these sites (CDC, 2015). The Substance Abuse and Mental Health Services Administration (SAMHSA) has offered funding to health care

organizations that integrate mental health and primary care but with little attention paid to PWID (Center for Mental Health Services, 2015).

An increasing number of providers are prepared to treat opioid use disorder (OUD) with evidence-based medications in the primary care setting. The 2016 Comprehensive Addiction and Recovery Act (CARA) allowed nurse practitioners and physicians associates to prescribe buprenorphine and expanded the accessibility and availability of medications for opioid use disorder (MOUD). In addition, as x-waiver requirements continue to loosen and clinicians are able to treat limited numbers of patients with buprenorphine without completing onerous training, primary care providers can play a larger role in managing the holistic care of individuals with OUD (SAMHSA, 2021). Moving OUD treatment out of specialized substance use disorder treatment centers and into primary care is important as the healthcare needs of this population extend beyond treatment with MOUD and sequela related to injection drug use (Nambiar et al., 2014).

Existing literature has highlighted the multitude of reasons why people who use drugs, especially PWID, avoid healthcare environments. These reasons include previous negative experiences with stigmatizing healthcare providers and receipt of low-quality care that failed to address their needs (Chan et al., 2004; Eaton et al., 2020; van Boekel et al., 2013). Addressing these and other barriers to healthcare engagement and providing quality primary care to people who inject drugs is vital to improving chronic illness management in this population. In addition, providing positive and affirming healthcare experiences can counter the numerous documented and undocumented negative experiences that have historically pushed people who use drugs away from healthcare environments.

Clinicians aiming to treat PWID in primary care settings may benefit from frameworks identifying barriers and facilitators to care engagement among marginalized populations. The Behavioral Model for Vulnerable populations, adapted from the Andersen Model for Healthcare Utilization, examines Predisposing, Enabling, Need, and Health Behavior characteristics associated with healthcare utilization and engagement (Andersen, 1968; Andersen et al., 2013; Gelberg et al., 2000). Predisposing factors are individual characteristics and include age, race, gender, education, relationship status, and sexual orientation. Enabling characteristics are organizational and financial factors including health insurance status, health service resources, and region of residence. Need characteristics refer to those that are both perceived by an individual and those evaluated by healthcare providers. Finally, health behaviors are actions taken by PWID that inhibit or enable their ability to engage in their healthcare. This framework is useful to characterize the factors associated with healthcare utilization and engagement for this marginalized population.

The purpose of this review, guided by the Behavioral Model for Vulnerable Populations, is to identify the barriers and facilitators to primary care engagement for PWID. Our review addresses a gap in knowledge regarding factors associated with primary care engagement among individuals with active injection drug use. Findings can be used to inform clinical interventions and future research to improve healthcare engagement among this population.

Methods

Search Strategy

This review utilized the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) checklist for its organization and reported elements (Moher, 2009). We searched PubMed, CINAHL, and EMBASE using a combination of MeSH (or CINAHL/EMBASE equivalent) for articles published between 2000–2020. Keywords searches combined common terms for 1) engagement in care (patient participation, patient acceptance of healthcare, patient compliance, utilization), 2) intravenous substance use, and 3) primary healthcare (primary, preventative health, primary prevention, secondary prevention, tertiary prevention). A comprehensive search strategy is listed in Appendix A. We also reviewed reference lists from studies in the full test phase for additional studies that met inclusion criteria.

Inclusion criteria

The outcome of interest was engagement in primary care. Articles that reported a study population of people who actively inject drugs (within the past 12 months) and outcomes related to engagement in primary care were included. We define “engagement” broadly to encompass a wide range of outcomes. Previous literature has highlighted that people who use drugs may avoid healthcare environments due to past negative experiences. Thus, any level of engagement, even just receipt of medication, represents an opportunity to provide a positive healthcare experience and potentially change an individual’s perception of the benefits of engaging with healthcare providers. We characterized indicators for engagement in healthcare by any of the following outcomes: 1) Visits with a healthcare provider for disease diagnosis or management, including reported patient-provider relationship; 2) Receipt of or adherence to medications or health services, for example receipt and adherence to antiretroviral therapy (ART) for HIV; 3) Control of diagnosed disease, such as blood pressure control or curative treatment for Hepatitis C.

Articles with study populations only partially made up of active PWID were considered for inclusion if they stratified analysis to include effect estimates for people who actively inject. We excluded studies focused on people reporting a history of injection drug use (but no current injection drug use), and those that did not explicitly measure injection drug use. Studies were also excluded if they did not explicitly measure engagement outcomes with PWID or did not report any domains related to engagement in primary care.

Review articles, conference abstracts and qualitative studies were excluded. Articles without full-text unavailability or that were published in a language other than English were also excluded. Finally, given differences in healthcare delivery systems, study populations outside the United States were excluded.

Data extraction

Guided by the theoretical domains of the Behavior Model of Healthcare Utilization, we categorized studies by factors associated with the predisposing, enabling, need, or health behavior domains; studies could include factors that are in multiple domains of the

framework. ‘Predisposing characteristics’ are existing characteristics that are not directly responsible for an individual’s decision to engage in care (ex. age, gender, race); ‘enabling conditions’ are facilitators or barriers to care engagement outside the individual’s control (ex. stigma, racism, structural barriers, delivery of salient services, etc.); ‘need conditions’ are divided into actual need (presence of a medical condition) and perceived need (the level to which patients desire care engagement); ‘health behaviors’ included substance use patterns and harm reduction uptake (Andersen, 1968; Andersen et al., 2013; Gelberg et al., 2000). Two authors (OH and KT) conducted data extraction and quality assessments based on published guidelines (Center for Reviews and Dissemination [CRD], 2009; Wong, Cheung, & Hart, 2008).

Results

A total of 801 articles were identified using the search terms in PubMed, CINAHL, and EMBASE, 73 of which were duplicates (Figure 1). OH and KT screened 728 titles and abstracts for relevance. An additional five were included from reference lists of articles reviewed in the full text phase. OH and KT reviewed 132 full texts for inclusion, with JF adjudicating one disagreement. A total of 23 articles were included in the final review (Figure 1). Table 1 displays the study characteristics for each included article. The majority (56%) were cross-sectional design or a cross-sectional secondary analysis of cohort or randomized control studies. The rest were from cohort studies (28%) or program evaluations (16%). Most articles (56%) were rated as ‘Good’ quality, with eleven articles rated as ‘Fair’ or ‘Poor’ (Table 2). The main issue affecting methodological quality was lack of information regarding data sources and limitations of statistical analysis (CRD, 2009; Wong et al., 2008). Table 3 presents a summary of factors associated with healthcare engagement.

Predisposing factors associated with healthcare engagement

Sex or gender—Two studies measured the impact of sex or gender on HIV engagement outcomes among PWID. Specifically, one cohort study saw increases in uptake in antiretroviral therapy (ART) for women (aPR 1.15; 95% CI 1.06, 1.24) and men (aPR 1.06; 95% CI 1.01, 1.10) over the course of the study period (Hoots et al., 2017). In contrast, Lesko, et al., who reported outcomes stratified by gender and race found that white women had the lowest percentage of person-time in care after ART initiation, and that both white and Black women had the greatest percentage of person-time in care with a detectable HIV viral load (>1,500 copies/mL) compared to male counterparts (Lesko et al., 2018). That study, however, only displayed percentages of person-time stratified by race and gender with ART and viral load outcomes, without conducting relevant multivariable analysis or testing for differences between the groups.

Race and Ethnicity—Two studies measured engagement outcomes among PWID by race and ethnicity. One demonstrated that over 3 years, Black (aPR 1.07; 95% CI 1.02–1.13) and Hispanic (aPR 1.10; 95% CI 1.02–1.18) PWID significantly increased ART initiation (Hoots et al., 2017). Another study found Hispanic (aOR 2.28; 1.37–3.82) and non-Hispanic Black (aOR 2.22; 95% CI 1.71–2.87) PWID had greater odds of having a HIV prevention

discussion with their healthcare provider at their most recent visit compared to non-Hispanic white PWID (Wilkinson et al., 2006).

Education—Results regarding education and engagement were inconsistent. Two studies were mixed on findings regarding education and medication adherence, specifically ART use. Knowlton et al. (2010) found significantly lower odds of ART initiation among PWID with less than an 8th grade education (aOR 0.54; 95% CI 0.35–0.85) compared to PWID with an 8th grade education or higher. Conversely, another cohort study found that over a 3-year period, PWID with a high school or less education significantly increased ART use (aPR 1.10; 95% CI 1.05–1.15), but the association was not true for PWID with a high school education or higher (Hoots et al., 2017). Regarding uptake of infectious disease screening, one study found PWID with a high school or higher education had significantly higher odds of testing for Hepatitis C in the last year (aOR 1.19; 95% CI 1.4–2.5) compared to PWID who had not attained high school education (Barocas et al., 2014). With regards to patient-provider outcomes, one study found PWID with a high school or less education had significantly higher odds of a preventative healthcare discussion with their providers at the most recent care visit (aOR 1.86; 95% CI 1.27–2.72) compared to education beyond high school (Wilkinson et al., 2006).

Age—Two studies measured the effect of age on ART use. Both showed that older age was significantly associated with ART use in multivariable models (Hoots et al., 2017; Knowlton et al., 2010). Additionally, Riley et al. (2002) found that age greater than or equal to 39 was associated with increased primary care utilization in a multivariable model, compared to age less than 39 (aOR 1.82; 95% CI 1.09–3.05).

Enabling factors associated with healthcare engagement

Health insurance and financial barriers—Five studies that examined the effect of having health insurance on a measure of engagement in care, and all showed a significant positive association. Multiple studies demonstrated a significant increase in primary care visits for PWID with health insurance compared to uninsured PWID, with point estimate odds ranging from 2.00 to 2.58 (Barocas et al., 2014; Riley et al., 2002; Wilkinson et al., 2007). Having health insurance was also significantly associated with increases in ART uptake (Hoots et al., 2017; Knowlton et al., 2010). One study grouped lack of health insurance, inability to afford co-pay, and indicators of a poor relationship with provider, including not feeling comfortable with provider, scared to see a provider, and not having an established provider into one variable of “barriers to seeing a primary care provider (PCP).” As such, PWID who had a higher mean number of these barriers were less likely to see a PCP in the last year ($p<0.001$) (Dion et al., 2020). High cost was the most frequently reported barrier to accessing healthcare in one study focused on commercial sex workers who inject drugs (Owens et al., 2020).

Location of services—Three studies reported quality measurements related to co-location of primary care services with another service salient to PWID (i.e. hepatitis C treatment or buprenorphine). Results were promising with high retention in care (61%) with buprenorphine services and high success for hepatitis C treatment (98%) when co-located in

the primary care setting (Butner et al., 2017; Hersh et al., 2011). In another study, women who injected drugs reported strong desire for receipt of primary care at needle exchange (72%), supervised consumption sites (78%), and though mobile care (70%) (Owens et al., 2020). These studies, however, reported on care outcomes without exploring differences by individual or structural factors, and only conducted descriptive analyses. One additional study with comparison groups found that location of usual care differed significantly; PWID living with HCV were more likely to report utilizing the emergency room over primary care compared to HCV antibody negative PWID (p=0.02) (Tsui et al., 2019).

Patient-provider relationship and substance use stigma—The two articles that examined the effect of patient-provider relationship on engagement in care both indicated a that positive patient-provider relationship was associated with increased ART initiation (aOR 1.45; 95% CI 1.09–1.93) (Knowlton et al., 2010), while a lack of rapport with their primary care provider was associated with not testing for HCV in the last 12 months (p=0.02) (Barocas et al., 2014). With respect to the relationship with their PCP, PWID who reported a higher mean of harm reduction topics discussed with their PCP (p<0.001) and those whose PCP was aware of their substance use (p<0.001) were more likely to have a PCP visit in the last year (Dion et al., 2020).

Housing—Both articles that examined the effect of housing found a deleterious effect of homelessness on engagement in care (Knowlton et al., 2010; Liappis, Laake, & Delman, 2014). Among those living with HIV, those actively engaged in injection drug use were more likely to report homelessness compared to those who were not actively injecting (p<0.001); active PWID in that study were found to have worse health outcomes, even when utilizing HIV primary care (Liappis et al., 2014). Conversely, stable housing was significantly associated with uptake of ART (aOR 2.05; 95% CI 1.11–3.77) compared to PWID reporting unstable housing (Knowlton et al., 2010). *Peer norms*

One study demonstrated the positive influence of peers on engagement. Peers acted as social support during substance use disorder treatment and helped improve ART adherence and clinic appointment attendance (Broadhead et al., 2002). Findings were limited to 14 patients in this feasibility study, but this peer support model demonstrated success in improving care engagement among PWID. Participants receiving peer support kept 84% of scheduled primary care appointments, and the intervention led to sustained ART adherence (90% of participants) and enrollment in substance use disorder treatment (75% of participants) (Broadhead et al., 2002).

Need factors associated with healthcare engagement

Perceived need—One study found that PWID with increased healthcare utilization (increased number of visits) had significantly increased odds of taking ART 6 months later (aOR 1.44; 95% CI 1.09–1.91) compared to PWID with less utilization (Knowlton et al., 2010). Another study noted that rating HIV care as ‘very important’ (aOR 1.77; 1.31, 2.37) was significantly associated with having a HIV prevention discussion with a healthcare provider compared those who rated HIV care as less than ‘very important’ on a 4-point Likert scale (Wilkinson et al., 2006).

Actual need—In two studies, HIV disease stage was significantly associated with engagement in healthcare. PWID with a CD4 counts <350 were more likely than those with higher counts to be taking ART at the 6 month follow up visit (aOR 1.65; 95% CI 1.23–2.22), while those with CD4 counts >= 200 had more visits with a primary care provider than those with lower counts (aOR 1.64; 95% CI 1.10–2.46) (Knowlton et al., 2010; Wilkinson et al., 2007). Four studies measured diagnosed chronic health conditions among PWID. One study demonstrated that people actively injecting drugs were significantly more likely to be diagnosed with chronic infectious diseases (HIV, HCV, Hepatitis B) compared to past injection drug users ($p<0.001$) (Liappis et al., 2014). In another study, PWID living with HIV had 2 times higher adjusted odds of a major depression diagnosis compared to people living with HIV who did not report active injection drug use (95% CI 1.75–2.73) (Mimiaga et al., 2013). An additional study found that PWID with a higher reported mean of conditions treated by their PCP were more likely to have seen their PCP in the last year ($p=0.04$) (Dion et al., 2020). Finally, one study measured syndemic psychological and structural distress among PWID, finding that higher levels of psychological distress were significantly associated with not taking ART (aOR 2.47; 95% CI 1.41–4.30), poor adherence to ART (aOR 2.56; 95% CI 1.07–2.63), and a detectable viral load (aOR 2.24; 95% CI 1.18–4.27) (Mizuno et al., 2015).

Health behaviors associated with healthcare engagement

Active injection drug use—Nine studies noted the adverse effect of active injection drug use on engagement in healthcare (Brewer et al., 2007; Chitwood et al., 2001; Chitwood et al., 2002; Kavasery et al., 2009; Knowlton et al., 2010; Liappis et al., 2014; Marquez et al., 2009; Ompad et al., 2004; Westergaard et al., 2013). While outcomes of engagement in care were measured differently, similarities included four studies which found negative associations with ART uptake and adherence (Kavasery et al., 2009; Knowlton et al., 2010; Liappis et al., 2014; Marquez et al., 2009) while another four found decreased healthcare visits and satisfaction (Brewer et al., 2007; Chitwood et al., 2001; Chitwood et al., 2002; Westergaard et al., 2013) for participants who were actively injecting drugs. The remaining study found that PWID who injected daily in the last 6 months and PWID who injected at least once in the last 6 months were less likely to initiate and complete a Hepatitis B vaccine series compared to those who reported non-injection substance use (Ompad et al., 2004).

Syringe exchange services—One study measured the association between participation in harm reduction services and healthcare engagement. In their multivariable model, exchanging more needles per visit to a syringe exchange program was significantly associated with primary care utilization compared to those with a lower volume of needles exchanged (aOR 2.4; 95% CI 1.5–4.1) (Riley et al., 2002).

Discussion

This systematic review identified factors related to engagement in primary care among people actively injecting drugs. Among the 23 included articles, the majority were observational studies utilizing descriptive designs. Although the assessment of evidence was

primarily rated ‘good’, this review identifies a significant need to improve our understanding of primary care engagement for PWID.

Two prior systematic reviews have been conducted with similar populations. Brennan, et al (2014) conducted a systematic review that used the Andersen Healthcare Utilization Model to assess utilization of hospital-based outpatient services among people living with HIV. However, this review did not specifically focus on PWID. Another review conducted using literature published between 2000–2010 examined models of primary care delivery and the acceptability of these services by PWID (Islam et al., 2012a), but had an international focus and also did not restrict to active injection drug use. Additionally, Visconti, Sell, and Greenblatt (2019), published an article related to primary care engagement among PWID, but did not take a systematic approach and only reported clinical care recommendations.

Guided by the Behavioral Model for Vulnerable Populations, we synthesized factors within the model’s four domains, and their impact on engagement in primary care outcomes (Gelberg et al., 2000). From the Enabling domain, patient-provider relationship emerged as a strong factor related to care engagement: across all the studies reviewed, positive patient-provider relationship was associated with greater engagement and negative relationships associated with less engagement. These findings were consistent with the broader literature of chronic disease management showing positive patient-provider relationships associated with higher levels of care engagement (Alexander et al., 2012; Peimani et al., 2020). Co-location of services also emerged as a facilitator to primary care engagement, but studies associated with this finding were not highly rated due to limitations related to statistical analysis. Other international studies with PWID have also identified provision of medications for opioid use disorder (MOUD) in the primary care setting as a factor correlated to engagement in healthcare, though these international studies did not meet criteria for inclusion in this review (Islam et al., 2013; Jack et al., 2009; McNeil et al., 2014; Mehta et al., 2015; Morozova et al., 2017; Parmenter et al., 2013; Wang et al., 2013). Finally, current insurance status was associated with healthcare engagement across the five studies that measured it, but only two were published on data collected after the Affordable Care Act. These finding suggest that linkage to healthcare insurance could be more salient to healthcare engagement with the expansion of health insurance. One recent study found that PWID in Medicaid expansion states were more likely to have insurance (aPR 2.3; 95% CI 2.0–2.6) and have a usual source of healthcare (aPR 1.5; 95% CI 1.3–1.9) (Lewis et al., 2020) than PWID in non-expansion states. This study was not included in our analysis due to the authors’ definition of PWID including individuals reporting non-injection opioid use.

Predisposing factors were not well measured or well represented across the studies with a few exceptions. Only one study stratified analysis by sex or gender but did not conduct analyses or provide effect estimates of engagement in care (Lesko et al., 2018). As a whole, measures and comparisons of race and ethnicity were also inconsistent. While differences in race as a predisposing factor were reported, little can be drawn from them without reported effect estimates and improved study design. Andro- and ethnocentrism was evident since many studies had samples that were over 50% male and rarely had balance in racial and ethnic groups, which also limits conclusions regarding sex, gender, race and ethnicity.

Evidence from the need domain described the complicated nature of care engagement for PWID. Studies demonstrated high burden of multimorbidity, difficulty engaging with accessible healthcare services that meet perceived needs, and the competing nature of active substance use with engagement in primary care. Health behaviors were most consistently measured across studies, with strong evidence that active injecting was a salient barrier to care engagement. This could be an area where clinicians can better assess injecting practices and provide harm reduction services in the primary care setting (Visconti et al., 2019) or co-locate health services within harm reduction centers (Islam et al., 2010).

There were limitations to this study. Filters on publishing date were applied to this systematic review, though we reviewed evidence over a 20-year period. This introduces bias as secular changes in healthcare policy and service access contribute greatly to healthcare engagement. Additionally, engagement in healthcare as an outcome proved difficult for data synthesis, as outcomes for engagement are wider ranging than healthcare utilization measures alone. This broader definition, however, allows for more nuanced analysis and understanding of healthcare needs of this population. Finally, many studies were excluded because they did not explicitly measure active injection drug use or stratify their results based on active injecting. Future studies with PWID would benefit from collecting and reporting on active versus historical injection drug use and incorporating a clear conceptual framework to define healthcare engagement outcomes.

Clinical Relevance

Nursing plays an important role in healthcare engagement for PWID. Recent evidence has shown that nurse-led clinics and the expansion of medications for opioid use disorder address critical gaps in these essential services for PWID, particularly in rural areas (Auty et al., 2020; Barnett et al., 2019; Cos et al., 2021; Klein et al., 2022; Sorrell et al., 2020). Additionally, nurses and nurse case managers working in the primary care setting play a critical role in addressing holistic care needs of patients, including some barriers identified by this review, and can engage PWID in primary care long term (Beharie et al., 2022; Wason et al., 2021). Overall, nurses in the primary care setting play an important role in addressing barriers to care engagement, improving access to essential substance use and primary care services, and developing meaningful patient-nurse and patient-care team relationships.

Conclusions

Although the preponderance of evidence is mixed, we identified several factors as barriers or facilitators to engagement in primary care for PWID. Given the ongoing overdose crisis, we must develop evidence-based strategies to engage individuals in the primary care setting for needs extending beyond infectious disease prevention and management and treatment of substance use disorders (Nambiar et al., 2014). Clinical practice and research should continue to consider patients and research participants' aggregate needs rather than the sum of their disease parts. While most of the studies here focused on engagement in HIV and substance use disorder care within the primary care setting, our findings can direct future research focused on PWID's engagement in primary care broadly.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Funding:

Dr. Heidari's work was supported by the National Institutes of Health (T32DA007292; Maher, PI).

Data availability:

The data in form of database search terms that supports the findings of this study are available in the supplementary material of this article

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Clinical Resources:

- American Association of Nurse Practitioners and American Society of Addiction Medicine 24-hours Waiver Training: https://elearning.asam.org/products/nppa-24-hour-waiver-training-aanp
- Addiction Nursing Competencies: A Comprehensive Toolkit for the Addictions Nursing: https://www.bmcobat.org/resources/?category=13
- Office Based Addictions Treatment best practice guidelines: https://www.bmcobat.org/resources/?category=1

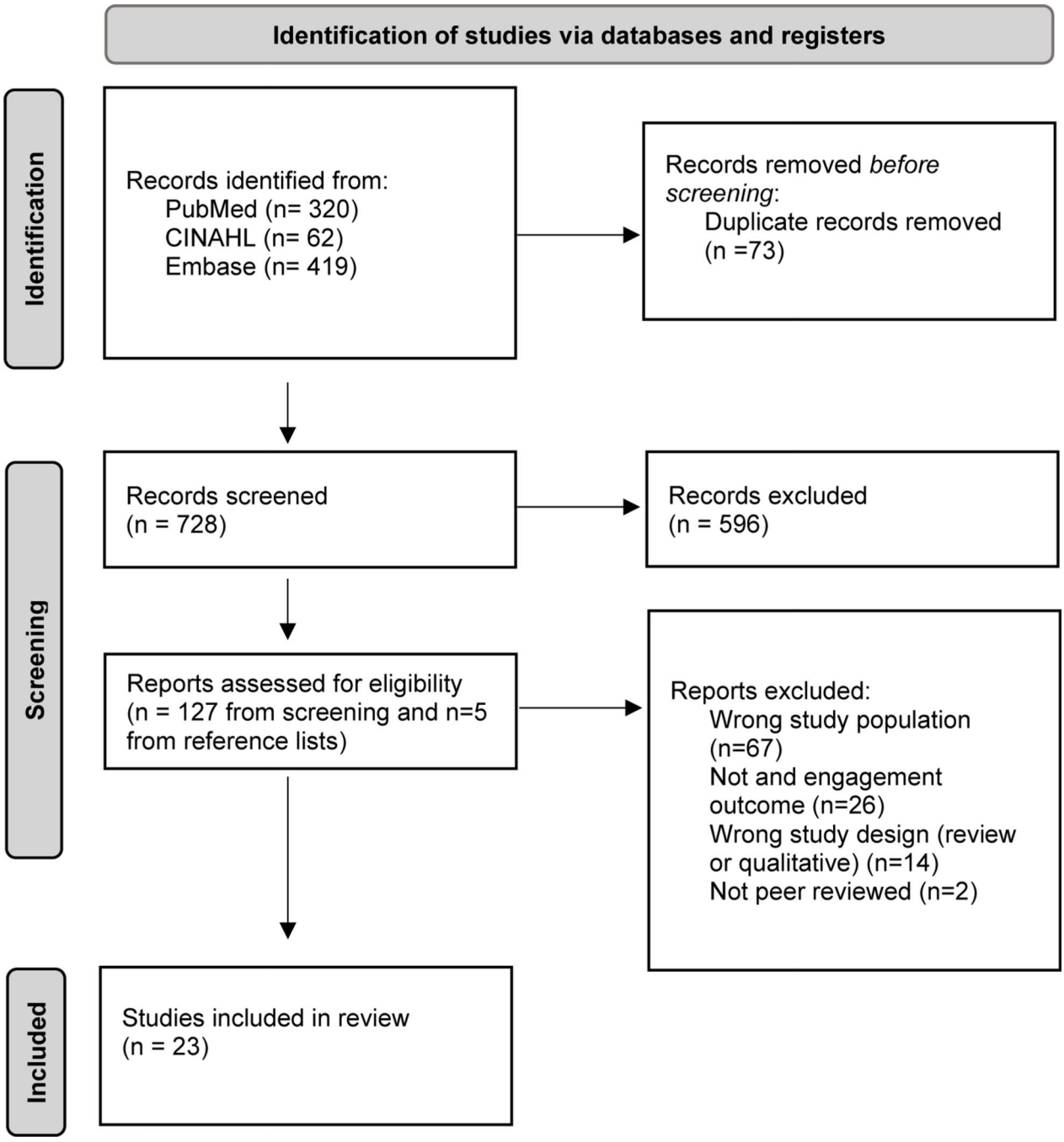

Figure 1.
PRISMA diagram of selected studies

J Nurs Scholarsh. Author manuscript; available in PMC 2023 November 09.

Table 1.

Characteristics of 23 included studies

Reference	Participant Characteristics	Type of Study	Source of Data	Time period of data	Number of patients included	Duration of follow-up
Barocas et al., 2014	PWID* utilizing a free syringe exchange program	Mixed methods with cross sectional quantitative design	88-item questionnaire and qualitative interview	June-August 2012	553 in the quantitative arm	n/a
Broadhead et al., 2002	PWID living with HIV	Program/intervention feasibility	Demographic and selected outcomes	1996	14	Up to 14 weeks
Brewer et al., 2007	PLWH** recently positive with less than 1 visit to primary care and not initiated ART	Cross sectional from a randomized clinical trial	Baseline ARTAS data	May 2001-May 2002	282, 31 PWID	n/a
Butner et al., 2017	PWID enrolled in an OTP and receiving direct acting antiretroviral for HCV treatment	Program/intervention evaluation	Clinical charts	2015	74	Through SVR (12 weeks following treatment)
Chitwood et al., 2001	Individuals with current IDU, non-IDU substance use, or nondrug users	Cross sectional	Multiple questionnaires collected by trained study staff	April 1996-November 1997	1,254, 224 PWID	n/a
Chitwood et al., 2002	Individuals with IDU, non-IDU substance use, or non-drug users	Cross sectional	Multiple questionnaires collected by study staff	April 1996-Nov. 1997	1,477, 384 PWID	n/a
Dion et al., 2020	PWID drugs attending a syringe exchange program	Cross sectional	Survey with demographics and healthcare utilization	April-May 2019	141	n/a
Hersh et al., 2011	Individuals enrolled in office based opiate treatment program (OBOT) pilot program	Program/intervention evaluation	Secure database of data collected at clinical visits	September 2003-August 2005	57	Up to 12 months
Hoots et al., 2017	PWID participating in the National HIV Behavior Surveillance (NHBS)	3 cross-sectional data collections	National HIV Behavioral Surveillance (NHBS)	2009–2015	2009: 548 2012: 608 2015: 545	n/a
Kavasery et al., 2009	PLWH and reporting injecting in the last year at baseline	Longitudinal prospective cohort	AIDS Linked Intravenous Experience; biannual data collection	1996–2005	335	Up to 10 years
Knowlton et al., 2010	Eligibility criteria included injection drug use in the past year, willingness to participate in group education session, and sex with an opposite-sex partner in the last 3 months	Secondary longitudinal analysis of HIV prevention intervention randomized control trial	Data from baseline and 6 month follow up study visits	2001–2005	Full sample: 1,225 HIV Primary Care: 1,040	12 months for full study but 6 months in this analysis
Lesko et al., 2018	Patients engaged in HIV continuity care	Retrospective cohort	Medical records	2010–2015	3,021	Up to 6 years
Liappis et al., 2014	People living with HIV at a Washington DC with a history of or ongoing substance use	Retrospective cohort	Electronic medical records	1998–2009	316; 141 PWID	Between 6 months and 11 years
Marquez et al., 2009	PLWH receiving care at one of UCSF's HIV primary care clinics	Cross sectional	Anonymous surveys sent to participants	2004 & 2006 recruitment	653	n/a

Reference	Participant Characteristics	Type of Study	Source of Data	Time period of data	Number of patients included	Duration of follow-up
Mimiaga et al., 2013	PLWH receiving primary care services as part of the Centers for AIDS Research Network of Integrated Clinical Systems study	Prospective cohort	CNICS data repository	2005–2010	Model 1: 3, 413 Model 2: 2,618 Model 3: 1,292	First clinic assessment included in CNICS
Mizuno et al., 2015	Eligibility criteria included living with HIV, injecting in the past year, willingness to participate in group education session, and sex with an opposite-sex partner in the last 3 months	Cross sectional analysis of a secondary HIV prevention intervention study	Baseline assessment	2001–2005	1,052	n/a
Ompad et al., 2004	PWID and PWUD*** from two separate ongoing studies in New York City susceptible to Hep B and accepted a referral for Hep B vaccination	Prospective cohort	Study surveys and vaccination cards from participating clinics	August 2000-January 2004	100 PWID 42 initiated the HBV series	6 months
Owens et al., 2020	Women who inject drugs in Seattle, Washington	Cross sectional	National HIV Behavioral Surveillance- Seattle arm	2016	144	n/a
Riley et al., 2002	PWID utilizing a free syringe exchange program	Cross sectional	Questionnaire administered by trained study staff	June 1998-May 1999	269	n/a
Tsui et al., 2019	PWID in Seattle, Washington	Cross sectional	National HIV Behavioral Surveillance	June-Nov 2015	535	n/a
Westergaard et al., 2013	PLWH and reporting injecting in the last year at baseline	Prospective cohort	AIDS Linked Intravenous Experience; biannual data collection by study staff	1998–2011	790	Up to 13 years
Wilkinson et al., 2006	Eligibility criteria included living with HIV, injecting in the past year, willingness to participate in group education session, and sex with an opposite-sex partner in the last 3 months	Cross sectional analysis of a secondary HIV prevention intervention study	Baseline assessment	2001–2005	1101	n/a
Wilkinson et al., 2007	Eligibility criteria included injection drug use in the past year, willingness to participate in group education session, and sex with an opposite-sex partner	Cross sectional analysis of a secondary HIV prevention intervention study	Data from baseline, 6 and 12 month follow up study visits	2001–2005	966	12 months

Table 2.

Assessment of quality measures of 25 included studies using the Center for Reviews and Disseminations tool

Reference	Selection bias	Information bias	SE, SD, or 95% CI reported	Multivariable analysis	Generalizability	Overall assessment of quality
Barocas et al., 2014	Unlikely	Unlikely	Yes	Yes	SEP offered to a wide range of urban, suburban, and rural populations	Good
Broadhead et al., 2002	Likely	Likely	No	No	Concentrated on 14 individuals with clinician assessed poor adherence but accessed HIV primary care	Poor
Brewer et al., 2007	Unlikely	Unlikely	Yes	Yes	IDU was not associated with outcome in adjusted model	Fair
Butner et al., 2017	Likely	Unlikely	No	No	Analysis limited to only the first 75 individuals meeting treatment criteria	Fair
Chitwood et al., 2001	Unlikely	Unlikely	Yes	Yes	Representative sample of an urban IDU population	Good
Chitwood et al., 2002	Unlikely	Unlikely	Yes	Yes	Representative sample of an urban IDU population	Good
Dion et al., 2020	Unlikely	Likely	Yes	No	Not a representative sample of urban PWID	Fair
Hersh et al., 2011	Likely	Unlikely	No	No	Demographics not generalizable to larger population of PWID	Fair
Hoots et al., 2017	Unlikely	Unlikely	Yes	Yes	National representative sample of PWID over three reporting periods	Good
Kavasery et al., 2009	Unlikely	Unlikely	Yes	Yes	Aging population of PWID in urban center	Good
Knowlton et al., 2010	Likely	Unlikely	Yes	Yes	Individuals recruited from an urban centers where HIV primary care maybe different	Good
Lesko et al., 2018	Likely	Unlikely	No	Yes	Data stratified by PWID vs non IDU but test statistics not reported for measures of those actively injecting	Fair
Liappis et al., 2014	Likely	Unlikely	No	No	This analysis was restricted to those actively engaged in HIV care but comparisons are between people with active IDU to former IDU	Fair
Marquez et al., 2009	Likely	Unlikely	Yes	No	Findings not generalizable to general injecting population	Fair
Mimiaga et al., 2013	Unlikely	Unlikely	Yes	Yes	Good study design, though models were limited due to low number of PWID	Good
Mizuno et al., 2015	Likely	Unlikely	Yes	Yes	Individuals recruited from an urban centers where HIV primary care maybe different	Good
Ompad et al., 2004	Likely	Unlikely	Yes	Yes	Older study with participants recruited from ongoing studies	Good
Owens et al., 2020	Likely	Likely	No	No	Respondent driven sampling and small sample size limit generalizability	Fair
Riley et al., 2002	Likely	Unlikely	Yes	Yes	Convenience sample of PWID from two urban based NEPs	Good
Tsui et al., 2019	Likely	Unlikely	Yes	No	Respondent driven sampling and geographic area are not generalizable to general PWID	Fair
Westergaard et al., 2013	Unlikely	Unlikely	Yes	Yes	Aging population of PWID in urban center	Good

Reference	Selection bias	Information bias	SE, SD, or 95% CI reported	Multivariable analysis	Generalizability	Overall assessment of quality
Wilkinson et al., 2006	Likely	Unlikely	Yes	Yes	Individuals recruited from an urban centers where HIV primary care maybe different	Good
Wilkinson et al., 2007	Likely	Unlikely	Yes	Yes	Individuals recruited from an urban centers where HIV primary care maybe different	Good

Table 3.

Summary of results framed by the Behavioral Model for Vulnerable Populations

Reference	Predisposing	Enabling	Need	Health Behaviors
Barocas et al., 2014	*Education:* Completing college or technical school associated with HCV test in the last year compared to lower level of education: aOR 1.9 (1.4–2.5).	*Insurance:* Having a primary care provider (aOR 2.0; 1.3–3.0) and health insurance (p=0.02) associated with HCV testing the past year. *Location:* Urban and Suburban had higher testing in the last 12m (p=0.05) Milwaukee zip code (aOR 2.3; 1.5–3.5). *Relationship:* Lack of rapport with provider associated with not testing (p=0.02).	*Overdose:* History of opioid overdose associated with HCV testing: aOR 1.8 (1.1–2.8).	
Broadhead et al., 2002		*Peer support:* The results suggest that an alternative social support structure to drug treatment is feasible for increasing active drug user's adherence to medical care		
Brewer et al., 2007				*IDU*[*]*:* PWID[**] had lower proportions of initiating HIV primary care compared to non-drug users (p<0.01) but in adjusted model injecting not associated with initiating HIV primary care
Butner et al., 2017		*Co-location:* 98% of participants completing treatment obtained SVR; 99% of patients adhered to HCV and OTP treatment		*IDU:* Ongoing drug use occurred in 23% of patients undergoing treatment
Chitwood et al., 2001				*IDU*: Associated with decreased odds of receipt of a primary physical examination (aOR 0.54; 0.37–0.79)
Chitwood et al., 2002				*IDU:* Significantly negatively associated with satisfaction with access to healthcare in adjusted analysis (p<0.001)
Dion et al., 2020		*Enabling:* Barriers within this domain were grouped for analysis. PWID with higher mean number of barriers were less likely to see their PCP (p<0.001). These barriers were also lower when the PCP was aware of drug use (p=.02)	*Comorbidities:* Participants with a higher reported mean of conditions treated with PCP[***] were more likely to see their PCP in the last year (p=0.04)	*Harm reduction:* Participants with a higher mean of harm reduction topics discussed with PCP were more likely to see their PCP in the last year (p<0.001). This mean was also higher when PCP was aware of drug use (p<0.001)
Hersh et al., 2011		*Co-location:* 61% retention in care after 1 year at an office based buprenorphine program		*SU:* Reduction in toxicology positive for opioids from baseline (58%) to 1 year follow up (14%)
Hoots et al., 2017	Prevalence ratios comparing ART[****] use per 3-year increase: *Sex:* Female (aPR 1.15; 1.06–1.24)	Prevalence ratios comparing ART use per 3-year increase: *Insurance*: Current insurance (aPR 1.07; 1.03–1.11)		

J Nurs Scholarsh. Author manuscript; available in PMC 2023 November 09.

Reference	**Predisposing**	**Enabling**	**Need**	**Health Behaviors**
	Male (aPR 1.06 (1.01–1.10) *Race and Ethnicity:* Black (aPR 1.07; 1.02–1.13) Hispanic: aPR 1.10 (1.02–1.18) *Age:* Age<50 (aPR 1.09; 1.02–1.17) Age>=50 (aPR 1.07 (1.01–1.12) *Education:* HS or less education (aPR 1.10; 1.05–1.15)			
Kavasery et al., 2009				*IDU:* Daily injecting associated with interruption of ART (aOR 1.43; 1.02–1.98) and early interruption of ART (aOR 1.80; 1.04–3.10). Daily or greater injecting less likely to restart ART (aOR 0.69; 0.49–0.97)
Knowlton et al., 2010	*Age:* Older age associated with taking ART (aOR 1.03; 1.00–1.05) *Education:* Self-report education <8th grade associated with lower odds of taking ART (aOR 0.54; 0.35–0.85)	Predictors of taking ART: *Insurance*: aOR 2.13(1.40–3.25) *Stable Housing*: aOR 2.05 (1.11–3.77) *Relationship:* Patient-provider engagement rated as perfect (aOR 1.45; 1.09–1.93)	*Disease stage*: CD4<350 associated with taking ART (aOR1.65; 1.23–2.22) *Care visits:* Greater than 4 visits in the last 6 months associated with taking ART (aOR 1.44; 1.09–1.91)	*Substance use*: Drug use in the last 3 months associated with lower odds of taking ART (aOR 0.67; 0.50–0.90)
Lesko et al., 2018	*Sex and race:* White females had the lowest % time in care post ART (88.5%), and both White and Black female PWID had the greatest % of time in care with viral load >1500 copies (21.6%) and time in care post-ART with a viral load >1500 copies (White 15.9%; Black 18.7%)			
Liappis et al., 2014		*Housing:* Active IDU were more likely to report homelessness (61%) (p<0.001) compared to non-active IDU	*Comorbidities:* Active IDU were more likely to be smokers (93%) (p<0.001), in a methadone program (63%) (p<0.001), have comorbid HBV (88%) (p<0.001), HCV (95%) (p<0.001), Stroke (6%) (p=0.05), DVT/PE (12%) (p<0.001), multiple BSI (13%) (p<0.02), and less likely to be on ART (68%vs 82% p=0.003), and have an undetectable viral load (31% vs 43% (p=0.02) compared to non-active IDU	
Marquez et al., 2009				*IDU:* The only route of use associated with poor adherence in methamphetamine users was injection (PR: 2.1, 95% CI: 1.0–4.6)
Mimiaga et al., 2013	*Age:* PWID were less likely to be older (p<0.01) *Race:* PWID were less likely to be Black (aOR 0.26; 0.16–0.42)		*Comorbidities:* PWID higher odds of major depression (aOR 2.19; 1.75–2.73) and report drug treatment (aOR 5.00; 4.03–6.20)	*IDU:* More likely to have a detectable viral load (aOR 1.48; 1.15–1.90), higher non adherence scores (aOR 1.44; 1.27–1.63),
Mizuno et al., 2015			Report of 1 (aOR 2.03; 1.20–3.43), 2 (aOR 2.07; 1.24–3.44), 3 (aOR 2.79; 1.63–4.78), and 4–6 (2.47 (1.41–4.30) problems (vs. no problems)	Those with 3 problems (aOR 2.12; 1.16–3.89) and 4 problems (aOR 4.85; 2.62–9.00) were more likely to reports sharing needles and equipment with HIV negative or unknown status

J Nurs Scholarsh. Author manuscript; available in PMC 2023 November 09.

Reference	**Predisposing**	**Enabling**	**Need**	**Health Behaviors**
			were all associated with not currently taking HIV medication. 3 problems (aOR 3.34; 1.01–5.42) and 4 problems (aOR 2.56; 1.07–2.63) were associated with non-adherence to HIV medication (<90%) in the previous day); 4 problems was associated with a detectable HIV viral load (aOR 2.24; 1.18–4.27)	partners in the last 3 months Problems were related to syndemic psychological and structural distress without diagnosis of a mental health disorder
Ompad et al., 2004				*IDU:* Daily injectors (42%) and injectors in the last 6 months (42%) were less likely to initiate the vaccine series (p=0.03); 16% of daily and 36% of injectors in the last 6 months were less likely to complete vaccine series (p=0.02) compared to non-injectors. Daily injectors were less likely to complete the vaccine series (aOR 0.28; 0.09, 0.88)
Owens et al., 2020		*Enabling:* Female PWID who exchanged sex reported cost (45%) and need for evening hours (22%) as the most common reasons for not getting needed care. *Co-location:* High desire for receiving medical care at needle exchange (72%), supervised consumption sites (78%), and mobile care sites (70%).		
Riley et al., 2002	*Age:* Older age (>39) was associated with primary care utilization in the last 3 years (aOR 1.82; 1.09–3.05) *Health insurance:* Health insurance associated with primary care utilization 2.2 (1.2–3.9)	*Insurance:* Associated with primary care utilization in the last 3 years (aOR 2.16; 1.20–3.86) and drug treatment in the last 3 years (aOR 2.05; 1.19–3.56)		*Harm reduction:* Exchanging more than 7.5 syringes per visit was associated with primary care utilization in the last 3 years (aOR 2.45; 1.46–2.33)
Tsui et al., 2019			*Care visits:* Location of usual care was significantly different for PWID found to be HCV Ab+ compared to those who were Ab- (p=0.02). Addiction treatment was reported more frequently in HCV Ab+ PWID (44%), significantly higher than HCV Ab- PWID (28%); (p=0.03)	
Westergaard et al., 2013				*IDU:* Injection associated with lapses in HIV care (aOR 1.25; 1.06–1.49) and virologic failure (aOR 1.28; 1.02–1.61)
Wilkinson et al., 2006	*Race and Ethnicity:* Hispanic (aOR 2.28; 1.37–3.82) and non-Hispanic Black (aOR 2.22; 1.71–2.89) compared to non-Hispanic Whites *Education:* High school or less education (aOR 1.86; 1.27–2.72), were more likely to report a prevention discussion at the most recent care visit		*Care visits:* Rating HIV care very important (aOR 1.77; 1.31–2.37) and engagement with a provider (aOR 1.74; 1.17–2.57) associated with prevention discussion	

Reference	**Predisposing**	**Enabling**	**Need**	**Health Behaviors**
Wilkinson et al., 2007	*Self efficacy:* Increase in importance of HIV care scale score (OR = 5.65; P = 0.01) increased empowerment (OR = 2.42; p = 0.005), taking greater control of one's health (OR = 2.17; p = 0.001), were significantly associated with reporting 2 or more primary HIV care visits in the past 6 months.	*Health insurance*: Associated with primary HIV care visits (OR = 2.58; P = 0.003) *Case management:* Associated with primary HIV care visits (OR = 3.14; P = 0.027)	*Disease stage:* CD4 count <200 cells/mm3 (OR = 2.09; P = 0.007) was significantly associated with primary HIV care visits	

* Injection drug use

** People who inject drugs

*** Primary care provider

**** Antiretroviral therapy