HHS Public Access

Author manuscript

Subst Abus. Author manuscript; available in PMC 2024 January 31.

Published in final edited form as:

Subst Abus. 2023 October ; 44(4): 301–312. doi:10.1177/08897077231200745.

Treatment initiation, substance use trajectories, and the social determinants of health in persons living with HIV seeking medication for opioid use disorder

Ryan R. Cook[1], **Erin N. Jaworski**[2], **Kim A. Hoffman**[3], **Elizabeth N Waddell**[3], **Renae Myers**[1], **P. Todd Korthuis**[1], **Pamela Vergara-Rodriguez**[4]

[1]Department of Medicine, Section of Addiction Medicine, Oregon Health and Science University, Portland

[2]Center for Dissemination and Implementation Science, Department of Medicine, University of Illinois-Chicago, Chicago, IL

[3]Oregon Health and Science University-Portland State University School of Public Health, Portland

[4]Ruth M. Rothstein CORE Center – Cook County Health, Chicago, IL

Abstract

Background.—People living with HIV and opioid use disorder (OUD) are disproportionally affected by adverse socio-structural exposures negatively affecting health, which have shown inconsistent associations with uptake of medications for OUD (MOUD). This study aimed to determine whether social determinants of health (SDOH) were associated with MOUD uptake and trajectories of substance use in a clinical trial of people seeking treatment.

Methods.—Data are from a 2018–2019 randomized trial comparing the effectiveness of different MOUD to achieve viral suppression among people living with HIV and OUD. SDOH were defined by variables mapping to Healthy People 2030 domains: education (Education Access and Quality), income (Economic Stability), homelessness (Neighborhood and Built Environment), criminal justice involvement (Social and Community Context), and recent SUD care (Health Care Access and Quality). Associations between SDOH and MOUD initiation were assessed with Cox proportional hazards models, and SDOH and substance use over time with generalized estimating equation models.

Corresponding Author: Ryan R. Cook, PhD, MSPH, 3181 SW Sam Jackson Park Road, Portland, OR USA 97239-3098, (503) 494-8044, cookry@ohsu.edu.

Author Contributions

RC, EJ, PVR, KH, TK originated the work, and TK obtained funding for the parent clinical trial. RC, EJ, PVR drafted the original manuscript. RC performed statistical analyses. All authors interpreted results, provided critical feedback and revisions, and approved the final manuscript.

Compliance, Ethical Standards, and Ethical Approval

This research was conducted in accordance with the Declaration of Helsinki. Institutional Review Boards at Advarra and Cook County Health reviewed and approved the study in September-December 2017.

Declaration of Conflicting Interests

The authors declare that there is no conflict of interest.

Results.—Participants (N=114) averaged 47 years old, 63% were male, 56% were Black, and 12% Hispanic. Participants reported an average of 2.3 out of 5 positive SDOH indicators (SD=1.2). Stable housing was the most commonly reported SDOH (61%), followed by no recent criminal justice involvement (59%), having a high-school level education or greater (56%), income stability (45%), and recent SUD care (13%). Each additional favorable SDOH was associated with a 25% increase in the likelihood of MOUD initiation during the study period [adjusted HR=1.25, 95% CI=(1.01, 1.55), p=.044]. Positive SDOH were also associated with a decrease in the odds of baseline opioid use and a greater reduction in opioid use during subsequent weeks of the study (p<.001 for a joint test of baseline and slope differences).

Conclusions.—Positive social determinants of health, in aggregate, may increase the likelihood of MOUD treatment initiation among people living with HIV and OUD.

Keywords

social determinants of health; substance use disorder; opioid use disorder; medication for opioid use disorder; HIV

Background

The social determinants of health (SDOH), defined by the World Health Organization as "the conditions in which people are born, grow, work, live, and age, and the wider set of forces and systems shaping the conditions of daily life" [1], influence a wide range of public health challenges, including the HIV and opioid epidemics. These fundamental non-medical contributors such as income, education, housing, and access to healthcare may be a useful framework for understanding the complex barriers that many persons living with HIV encounter when deciding to initiate treatment for opioid use disorder (OUD). HIV and OUD are highly comorbid [2,3], overlapping public health crises, rooted in and amplifying the impact of socioeconomic and health disparities in communities. Low socioeconomic status, unemployment, criminal justice involvement, and housing instability are circumstances faced by many people living with both HIV and OUD [4–6]. Having OUD increases the risk of acquiring HIV and vice-versa [7], and addressing common risk factors and root causes such as SDOH is key to ending both epidemics [8].

FDA-approved medications for opioid use disorder (MOUD), including methadone, buprenorphine, and extended-release naltrexone, decrease opioid use and mortality while decreasing HIV risk behaviors [9] and increasing antiretroviral (ART) uptake, retention in HIV care and viral suppression in people living with HIV and OUD [10–12]. Despite these benefits, MOUD treatment initiation is often suboptimal. Nationally, only about one in four people with OUD receive MOUD [13,14] and comorbid HIV reduces that likelihood by about half [2], although uptake varies widely across populations. For example, although 65% of Medicaid beneficiaries living with HIV and OUD in New York state received MOUD [15], only 5% of veterans initiated medication treatment within thirty days of their first OUD treatment encounter, and patients with HIV were less likely than their peers to receive MOUD during that period [16]. Treatment availability, medication type, and provider characteristics could partially explain some of these challenges, but even in OUD treatment

studies where medication or referral was offered to all research participants, initiation rates ranged from 41% to 96% [17–19].

Increased positive SDOH is associated with more positive HIV outcomes [20]; however, the role that the SDOH play in MOUD initiation is understudied, with mixed findings [21,22]. Homelessness and income-assistance have been positively and negatively correlated with engagement in MOUD treatment [23–25], while lack of insurance, minority race/ethnicity, and the presence of medical comorbidities may negatively affect treatment uptake [25–27]. Among women living with HIV, adversities and economic hardship were correlated with greater drug use than their peers during HIV treatment [28], which may reduce the likelihood of MOUD initiation [29,30]. Access to care, treatment setting, type of MOUD, methodology and rigor of research, and a multitude of other factors may explain heterogeneity in results, and further studies are warranted.

People living with both HIV and OUD are a highly prevalent, especially marginalized, high transmission-risk group with outsized implications for ending the HIV and OUD epidemics. Therefore, we investigated associations between five supportive SDOH and MOUD initiation, opioid use, and other substance use over a six-month period in persons living with HIV enrolled in an OUD treatment randomized trial. We hypothesized that increased supportive SDOH would be associated with increased likelihood of MOUD initiation and reduced substance use over the trial period.

Methods

Study Sample

Data are from the NIDA Drug Abuse Treatment Clinical Trials Network (CTN) study "Comparing Treatments for HIV-Infected Opioid Users in an Integrated Care Effectiveness Scale-up Study" (CHOICES, CTN-0067, ClinicalTrials.gov NCT03275350) [18]. CHOICES was a open-label, randomized, non-inferiority trial comparing a long-acting injectable MOUD (extended-release naltrexone) to office-based buprenorphine or methadone. The primary outcome was achievement of HIV viral suppression at 24 weeks; findings have been previously published [18]. Advarra and Cook County Health Institutional Review Boards reviewed and approved the study [31]. Enrollment took place between March 2018 and May 2019; eligible participants had unsuppressed HIV (HIV viral load ≥200 copies/mL), moderate to severe OUD, and had received no MOUD in the four weeks prior to enrollment. All participants were willing/interested in beginning MOUD treatment and were given equivalent access to MOUD as part of study participation (conditional on treatment assignment). The study enrolled 114 participants who were randomized to extended-release naltrexone (n=55) or treatment as usual (n=59) and were followed for six months. Extended-release naltrexone was administered by study clinicians in HIV clinics, while individuals in the treatment as usual group were offered medication by the study clinician (buprenorphine) or provided with a referral and linkage assistance (methadone or buprenorphine). Trained research staff administered computer-based questionnaires face-to-face or over the phone at all study visits, which occurred at least monthly. Participants provided a urine sample monthly, which was tested for opioids (excluding methadone and buprenorphine) and other

drugs using a point of care urine drug screen panel. Detailed study recruitment strategies, methods, and main outcomes have been previously described [18].

Social Determinant of Health Indicators

CHOICES participants completed a series of standardized questionnaires at baseline. The study was not designed to measure SDOH, and therefore, all desired SDOH indicators were not available in our data set. However, we selected and created indicator variables relating to the U.S. Department of Health and Human Services' Healthy People 2030 SDOH priority areas [32]. The variables map to the following Healthy People 2030 domains: high school education or greater (Education Access and Quality), currently receiving income from employment or disability (Economic stability), no homelessness in the past 6 months (Neighborhood and Built Environment), no arrest, incarceration, probation or parole in past 3 months (Social and Community Context), and SUD care of any kind in the past 28 days, including inpatient, outpatient, or individual or group counseling, excluding 12-step programs, self-help, or detoxification-only inpatient stays (Health Care Access and Quality). For this analysis, we conceptualized SDOH as positive resources or supports and coded and labeled them as follows: education (completed high school or greater = 1), current economic stability (current employment or disability income = 1), housing stability (housed = 1), no criminal justice involvement (none = 1), and SUD treatment (any non-medication treatment, as defined above, in the 28 days prior to study baseline = 1). All SDOH data were participant self-reported.

Outcomes

MOUD treatment data were abstracted approximately monthly for six months from clinical trial treatment logs, covering the entire study period for each participant. MOUD initiation date was defined as the first day of the first abstraction period where a prescription for buprenorphine, an injection of extended-release naltrexone, or a dose of methadone was received (the exact dates of MOUD receipt were not recorded, only whether or not MOUD was received during each abstraction period). Participants who did not initiate MOUD were censored at the last day of their final abstraction period. Participants provided urine drug screens (UDS) and completed timeline follow-back assessments of substance use monthly for six months. Opioid use at each timepoint was defined as having either a positive UDS for opioids (excluding methadone and buprenorphine) or any self-reported use of heroin, prescription opioids, fentanyl, methadone, or buprenorphine to get high during the assessment window. In this study, "other drugs" included methamphetamine, cocaine, benzodiazepines, or heavy alcohol use (5+/4+ drinks on 5+ occasions in one month for men/women). Similar to opioids, participants were classified as having used other drugs if they were UDS positive for or self-reported any use of methamphetamine, cocaine, or benzodiazepines or self-reported heavy alcohol use during an assessment window. Missing opioid/other drug use data points were imputed as positive, as in the parent clinical trial [18]; rates of missing data averaged 17% at each timepoint and were highest at the 20-week assessment (26%). We also conducted sensitivity analyses omitting missing drug use datapoints (treating missing data as completely at random).

Statistical Analyses

Participant characteristics and rates of SDOH were summarized with descriptive statistics. Cumulative incidences of MOUD initiation by SDOH were described using Kaplan-Meier curves and analyzed with Cox proportional hazards models, controlling for age, sex, race, ethnicity, baseline pain score, history of serious psychiatric conditions, injecting opioids in 30 days prior to baseline assessment (binary), and treatment arm (extended-release naltrexone vs. treatment as usual). SDOH were treated individually, as both binary indicator variables and also a continuous variable representing the sum total of SDOH supports. Prior to analysis, the proportional hazards assumption was verified by examining and testing for an association between scaled Schoenfeld residuals and (transformed) study time. The assumption was violated for the analysis of recent SUD care; based on graphical examination, two hazard ratios were estimated, one for the first 30 days of the study (i.e., the first abstraction period for MOUD prescription data) and another for subsequent days.

Associations between SDOH and opioid use over time were analyzed using logistic GEE models with autoregressive working correlation structures (chosen by quasi-information criteria), controlling for the same covariate set as above. Prior to model fitting, plots of observed proportions of opioid use over time were examined. A number of potential specifications of the time effect were considered, and a linear spline model with a single knot at 4 weeks (a “bent-line” model) was chosen as the optimal compromise between interpretability and fit to the observed data. As the data come from an opioid use treatment trial and many participants initiated MOUD early in the study, there is a strong theoretical rationale for estimating different rates of change in opioid use early and later in the study. Associations between SDOH and other drug use were examined similarly, except with time effects modeled using cubic B-splines with a single knot at the median assessment time (12 weeks). Single or joint hypothesis tests of time effect parameters were conducted to determine whether changes in opioid/other drug use differed between SDOH groups. All analyses were conducted using R v.3.6.2 with the ‘survival’, ‘geepack’, and ‘splines’ packages at a two-tailed level of significance of .05.

Results

Participant Characteristics and SDOH

Participants (N = 114) averaged 47 years old (SD = 11.1); 63% were male; 56% were Black; and 12% were Hispanic. Out of five possible, participants reported an average of 2.3 supportive SDOH (SD = 1.2), with 6 participants reporting zero SDOH (5%), 23 reporting one (20%), 32 two (28%), 33 three (29%), 19 four (17%), and a single participant reporting all five (1%). Stable housing was the most commonly reported supportive SDOH (n = 70, 61%), followed by no recent criminal justice involvement (n=67, 59%) and a high-school level education or greater (n=64, 56%). Less than half of participants reported economic stability (n=51, 45%) and few had any kind of recent SUD care (n=15, 13%). Table 1 provides further detail on participant characteristics and SDOH.

SDOH and MOUD Initiation

Overall, 81 out of 114 participants initiated MOUD during the study (71%). Participants randomized to the extended-release naltrexone arm were less likely to initiate their assigned medication than those randomized to treatment as usual (47% vs. 73%), and twelve participants randomized to extended-release naltrexone started buprenorphine during the study period. Kaplan-Meier cumulative incidences of MOUD initiation by SDOH are presented in Figure 1. When examining the cumulative effect of SDOH as a linear covariate in Cox regression, each additional SDOH was associated with a 25% increase in the likelihood of MOUD initiation during the study period [adjusted HR = 1.25, 95% CI = (1.01, 1.55), $p = .044$]. There was no evidence that the association between SDOH and MOUD initiation was dependent on treatment assignment (p for interaction = .65) or that the impact of cumulative SDOH was nonlinear (p for quadratic effect = .15, cubic effect = .45).

Recent non-medication SUD care was associated with 3.7 times the likelihood of MOUD initiation within the first 30 days of study participation [aHR = 3.72 (1.76, 7.78), $p < .001$], but not during the remainder of follow-up. There was some evidence that participants who were stably housed [aHR = 1.53 (0.86, 2.73), $p = .145$] and those with at least a high-school education [aHR = 1.6, (0.9, 2.6), $p = .07$] were also more likely to initiate MOUD, although those effects did not reach the threshold of statistical significance. There was little evidence that recent criminal justice involvement or economic stability affected treatment initiation. Full Cox regression results are presented in Table 2.

SDOH and Opioid Use

Observed and model-fitted probabilities of opioid use over time by SDOH are depicted in Figure 2. Estimated slopes (on the log-odds scale) and hypothesis test results are presented in Table S1. When considering the cumulative effect of SDOH as a linear covariate, each additional SDOH support was associated with a substantial decrease in the log-odds of baseline opioid use and a greater reduction in opioid use during subsequent weeks of the study [$p < .001$ for a test of overall difference (Figure 2) and $p < .05$ for each individual effect (Table S1)]. Stable housing ($p = .043$), recent SUD care (p .002), and having a stable income ($p = .051$) were associated with, or trended towards association with, lower odds of opioid use early in the study. However, those differences attenuated over time (Figure 2). No statistically significant relationships between education or criminal justice involvement and opioid use were observed. Sensitivity analyses treating missing opioid use datapoints as completely at random did not show substantial changes in patterns of use over time (Table S2, Figure S1).

SDOH and Other Drug Use

Proportions of participants using other drugs by SDOH are presented in Figure 3. When analyzed as a cumulative linear covariate, participants with more positive SDOH were more likely to not change or decrease other drug use early in the study, while those with fewer positive SDOH were more likely to increase. Regression to the mean was noted in all groups in the second half of the study, resulting in groups being quite similar at 24 weeks. Substantially less use of other drugs at baseline was observed among participants with recent SUD care. No other differences in baseline use of other drugs or changes in other drug use

over time were associated with SDOH (Figure 3). Sensitivity analyses treating missing other drug use datapoints as completely at random did not show substantial changes in patterns of use over time (Figure S2).

Discussion

These data suggest that positive social determinants of health, in aggregate, may increase the likelihood of MOUD treatment initiation among people living with HIV and OUD. Recent non-medication SUD care, which we included as a marker of healthcare access, positively impacted early MOUD initiation. People with more positive SDOH had substantially lower baseline opioid use, a steeper reduction in use during the first month of the trial, but an attenuation of effects in months two through six compared to those with fewer SDOH supports. Use of other substances over time showed fewer differences associated with SDOH. Our study contributes novel, longitudinal data suggesting that positive SDOH contribute to increased MOUD treatment uptake and a stronger treatment effect, at least initially.

People living with HIV and OUD are some of the most marginalized in the US, and are disproportionately affected by lack of jobs, education, income, access to healthcare and increased involvement in the criminal-legal system [33–35]. The COVID-19 pandemic exacerbated these disparities, which may have amplified inequalities in healthcare access, reduced treatment engagement, and resulted in substantially worse COVID, HIV, and substance use outcomes [36–38]. Our results emphasize the value of targeting these and other “upstream” societal and structural determinants of OUD outcomes in this vulnerable population. Addressing root causes such as the SDOH to improve OUD outcomes may require large and complex interventions, if not major societal shifts, but promise has been shown by supportive housing programs [39], employment assistance and skills training [40], integration of OUD care into the criminal-legal system [41], large-scale community opioid education programs [42], collegiate recovery communities [43], and multifactorial initiatives such as Massachusetts’s “Access to Recovery” program [44].

Inequalities in SDOH often result in healthcare access gaps, which may be a principal mediator of poor outcomes [45]. Importantly, in this clinical trial, all participants had relatively equivalent access to MOUD (conditional on their randomized treatment assignment) and all expressed willingness to initiate treatment (inclusion criteria). Still, 29% of randomized participants did not receive medication during the six-month trial, and differences between initiators and non-initiators could not be attributable to lack of access. Our finding that greater cumulative SDOH were linked to increased likelihood of engaging in evidence-based, lifesaving treatment supports holistic and intersectional models of health disparities. These findings further suggest that access is not enough; rather, improving a broad range of SDOH is key to reducing disparities [46–48].

The only individual SDOH predicting MOUD initiation was having a recent history of non-medication SUD treatment, an association supported by previous studies [24,49]. There was some evidence that higher levels of education and stable housing positively impacted treatment engagement, although these findings did not reach the threshold for statistical

significance. Significant barriers impede access to OUD care for those who lack stable housing [25,50]. Our study suggests that there may be additional benefits associated with stable housing once access is established; furthermore, housing interventions have shown numerous benefits to HIV and OUD outcomes [39,51,52].

Analyses of opioid use over time showed a steeper reduction in early use associated with more positive SDOH, generally. This likely follows from increased rates of MOUD initiation among those with more SDOH support. Reductions in opioid use attenuated over time, possibly as participants discontinued MOUD or were lost to follow-up. Retention on MOUD remains a major challenge; less than half of people who initiate MOUD are expected to continue beyond 6 months [13]. Poor SDOH are associated with reduced MOUD retention [53,54]. Despite engagement in OUD treatment, we observed that other drug use including stimulants, benzodiazepines, heavy alcohol consumption, and other drugs (cannabis excluded) was frequent and relatively stable, consistent with previous research [55,56]. Baseline use of other substances tended to be lower among people with more positive SDOH, but we found no relationship between the number of SDOH and changes in other substance use throughout the study. This is not surprising given that the focus of this clinical trial was treatment of OUD. Especially considering methamphetamine's role in HIV transmission [57] and the high degree of co-use of opioids and methamphetamine [58], our data support increasing calls to better address polysubstance use during OUD care [56]. Medications such as combined bupropion/extended-release naltrexone for methamphetamine use disorder [59] and interventions such as contingency management [60], integrated harm reduction [61], and peer support services to increase retention [62] are potential strategies that could be incorporated.

The major limitation to our analyses, especially of opioid and other drug use over time, is that SDOH were not measured longitudinally. Some SDOH, such as housing status or criminal justice involvement, may fluctuate rapidly in this population. By examining only baseline levels of these variables, we risk missing important relationships between time-varying SDOH, MOUD treatment, and longitudinal outcomes. Including longitudinal and time-to-event outcome data is a strength, but a more complete evaluation of the SDOH should also include multiple exposure measurements to better understand how these factors change, and how those changes play a role in OUD treatment. We also acknowledge that, as a secondary analysis of a clinical trial, we were unable to measure several important SDOH and characteristics which may be relevant to treatment initiation and outcomes. We also caution that these results come from a single clinical trial. While clinical trial participants are not usually representative of "real-world" OUD patients [63], this particular trial included historically disenfranchised groups: mostly Black and Latino participants, a substantial number of patients without stable housing, and many individuals with other substance use. These groups are disproportionally impacted both by HIV and OUD. We also recognize that imputing missing UDS data as positive is a suboptimal, but common practice in SUD treatment trials [64]. We chose this strategy to be consistent with the analytic strategy utilized in the parent clinical trial and completed sensitivity analyses treating missing data as completely at random. Finally, we recognize that this was a small clinical trial, and tests to detect nonlinear relationships between SDOH and MOUD initiation as well as associations between individual SDOH and outcomes may have been underpowered. The true burden of

health disparities caused by cumulative, or intersectional, marginalizing factors is likely to be greater than suggested by a linear relationship.

Conclusions

Interventions targeting SDOH are increasingly recognized by the National Institute on Drug Abuse and others as vital to mitigating harms of the opioid epidemic and preventing future use disorders [65]. Our study suggests that modifiable social determinants of health, including income, education, housing, criminal justice involvement, and engagement in SUD treatment may impact MOUD initiation and opioid use outcomes among people living with HIV and OUD. These findings, when added to the body of literature showing similar associations, provide possible intervention targets for future experimental studies. Especially following the steep rise in inequalities and overdose deaths during the COVID-19 pandemic, which disproportionately affected people of color, people experiencing homelessness, and those with co-occurring conditions including HIV, results highlight the need to address SDOH as part of OUD care [48].

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Funding

Research reported in this publication was supported by the National Institute On Drug Abuse of the National Institutes of Health under Award Number UG1DA015831. The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health. RC was supported by NIH/NIDA K01DA055130.

References

1. World Health Organization. Social Determinants of Health. Accessed December 13, 2022. https://www.who.int/health-topics/social-determinants-of-health#tab=tab_1
2. Tsui JI, Akosile MA, Lapham GT, et al. Prevalence and Medication Treatment of Opioid Use Disorder Among Primary Care Patients with Hepatitis C and HIV. J Gen Intern Med. Apr 2021;36(4):930–937. doi:10.1007/s11606-020-06389-7 [PubMed: 33569735]
3. Chang MH, Moonesinghe R, Schieber LZ, Truman BI. Opioid-Related Diagnoses and Concurrent Claims for HIV, HBV, or HCV among Medicare Beneficiaries, United States, 2015. J Clin Med. Oct 24 2019;8(11)doi:10.3390/jcm8111768
4. Surratt HL, O'Grady CL, Levi-Minzi MA, Kurtz SP. Medication adherence challenges among HIV positive substance abusers: the role of food and housing insecurity. AIDS Care. 2015;27(3):307–14. doi:10.1080/09540121.2014.967656 [PubMed: 25314042]
5. Denis CM, Dominique T, Smith P, et al. HIV Infection and Depression Among Opiate Users in a US Epicenter of the Opioid Epidemic. AIDS Behav. Jul 2021;25(7):2230–2239. doi:10.1007/s10461-020-03151-2 [PubMed: 33449236]
6. Sulley S, Ndanga M. Inpatient Opioid Use Disorder and Social Determinants of Health: A Nationwide Analysis of the National Inpatient Sample (2012–2014 and 2016–2017). Cureus. Nov 3 2020;12(11):e11311. doi:10.7759/cureus.11311 [PubMed: 33282587]
7. Cernasev A, Veve MP, Cory TJ, et al. Opioid Use Disorders in People Living with HIV/AIDS: A Review of Implications for Patient Outcomes, Drug Interactions, and Neurocognitive Disorders. Pharmacy (Basel). Sep 11 2020;8(3)doi:10.3390/pharmacy8030168

8. Springer SA. Ending the HIV Epidemic for Persons Who Use Drugs: the Practical Challenges of Meeting People Where They Are. Journal of General Internal Medicine. 2023/03/31 2023;doi:10.1007/s11606-023-08142-2

9. Blue TR, Gordon MS, Schwartz RP, et al. Longitudinal analysis of HIV-risk behaviors of participants in a randomized trial of prison-initiated buprenorphine. Addiction Science & Clinical Practice. 2019/12/02 2019;14(1):45. doi:10.1186/s13722-019-0172-2 [PubMed: 31787108]

10. Hoffman KA, Ponce Terashima J, McCarty D. Opioid use disorder and treatment: challenges and opportunities. BMC Health Serv Res. Nov 25 2019;19(1):884. doi:10.1186/s12913-019-4751-4 [PubMed: 31767011]

11. Meyer JP, Althoff AL, Altice FL. Optimizing care for HIV-infected people who use drugs: evidence-based approaches to overcoming healthcare disparities. Clin Infect Dis. Nov 2013;57(9):1309–17. doi:10.1093/cid/cit427 [PubMed: 23797288]

12. Fanucchi L, Springer SA, Korthuis PT. Medications for Treatment of Opioid Use Disorder among Persons Living with HIV. Curr HIV/AIDS Rep. Feb 2019;16(1):1–6. doi:10.1007/s11904-019-00436-7 [PubMed: 30684117]

13. Williams AR, Nunes EV, Bisaga A, Levin FR, Olfson M. Development of a Cascade of Care for responding to the opioid epidemic. Am J Drug Alcohol Abuse. 2019;45(1):1–10. doi:10.1080/00952990.2018.1546862 [PubMed: 30675818]

14. Mauro PM, Gutkind S, Annunziato EM, Samples H. Use of Medication for Opioid Use Disorder Among US Adolescents and Adults With Need for Opioid Treatment, 2019. JAMA Network Open. 2022;5(3):e223821-e223821. doi:10.1001/jamanetworkopen.2022.3821 [PubMed: 35319762]

15. Choi S, Yerneni R, Healy S, Goyal M, Neighbors CJ. Predictors of Medication Utilization for Opioid Use Disorder Among Medicaid-Insured HIV Patients in New York. Am J Addict. Mar 2020;29(2):151–154. doi:10.1111/ajad.12998 [PubMed: 31951083]

16. Wyse JJ, Robbins JL, McGinnis KA, et al. Predictors of timely opioid agonist treatment initiation among veterans with and without HIV. Drug Alcohol Depend. May 1 2019;198:70–75. doi:10.1016/j.drugalcdep.2019.01.038 [PubMed: 30878769]

17. Lee JD, Nunes EV Jr, Novo P, et al. Comparative effectiveness of extended-release naltrexone versus buprenorphine-naloxone for opioid relapse prevention (X:BOT): a multicentre, open-label, randomised controlled trial. Lancet. Jan 27 2018;391(10118):309–318. doi:10.1016/S0140-6736(17)32812-X [PubMed: 29150198]

18. Korthuis PT, Cook RR, Lum PJ, et al. HIV clinic-based extended-release naltrexone versus treatment as usual for people with HIV and opioid use disorder: a non-blinded, randomized non-inferiority trial. Addiction. Jul 2022;117(7):1961–1971. doi:10.1111/add.15836 [PubMed: 35129242]

19. Lucas GM, Chaudhry A, Hsu J, et al. Clinic-based treatment of opioid-dependent HIV-infected patients versus referral to an opioid treatment program: A randomized trial. Ann Intern Med. Jun 1 2010;152(11):704–11. doi:10.7326/0003-4819-152-11-201006010-00003 [PubMed: 20513828]

20. Menza TW, Hixson LK, Lipira L, Drach L. Social Determinants of Health and Care Outcomes Among People With HIV in the United States. Open Forum Infect Dis. Jul 2021;8(7):ofab330. doi:10.1093/ofid/ofab330

21. Simon CB, Tsui JI, Merrill JO, Adwell A, Tamru E, Klein JW. Linking patients with buprenorphine treatment in primary care: Predictors of engagement. Drug Alcohol Depend. Dec 1 2017;181:58–62. doi:10.1016/j.drugalcdep.2017.09.017 [PubMed: 29035705]

22. Manhapra A, Stefanovics E, Rosenheck R. Initiating opioid agonist treatment for opioid use disorder nationally in the Veterans Health Administration: Who gets what? Subst Abus 2020;41(1):110–120. doi:10.1080/08897077.2019.1640831 [PubMed: 31403914]

23. Piske M, Zhou H, Min JE, et al. The cascade of care for opioid use disorder: a retrospective study in British Columbia, Canada. Addiction. Aug 2020;115(8):1482–1493. doi:10.1111/add.14947 [PubMed: 31899565]

24. Englander H, King C, Nicolaidis C, et al. Predictors of Opioid and Alcohol Pharmacotherapy Initiation at Hospital Discharge Among Patients Seen by an Inpatient Addiction Consult Service.

J Addict Med. Sep/Oct 2020;14(5):415–422. doi:10.1097/adm.0000000000000611 [PubMed: 31868830]

25. McLaughlin MF, Li R, Carrero ND, Bain PA, Chatterjee A. Opioid use disorder treatment for people experiencing homelessness: A scoping review. Drug Alcohol Depend. Jul 1 2021;224:108717. doi:10.1016/j.drugalcdep.2021.108717 [PubMed: 33985863]
26. Cantone RE, Garvey B, O'Neill A, et al. Predictors of Medication-Assisted Treatment Initiation for Opioid Use Disorder in an Interdisciplinary Primary Care Model. J Am Board Fam Med. Sep-Oct 2019;32(5):724–731. doi:10.3122/jabfm.2019.05.190012 [PubMed: 31506368]
27. Eger WH, Altice FL, Lee J, et al. Using nominal group technique to identify barriers and facilitators to preventing HIV using combination same-day pre-exposure prophylaxis and medications for opioid use disorder. Harm Reduct J. Oct 28 2022;19(1):120. doi:10.1186/s12954-022-00703-8 [PubMed: 36307817]
28. Shokoohi M, Bauer GR, Kaida A, et al. Patterns of social determinants of health associated with drug use among women living with HIV in Canada: a latent class analysis. Addiction. Jul 2019;114(7):1214–1224. doi:10.1111/add.14566 [PubMed: 30698902]
29. Eastwood B, Strang J, Marsden J. Change in alcohol and other drug use during five years of continuous opioid substitution treatment. Drug Alcohol Depend. Jan 1 2019;194:438–446. doi:10.1016/j.drugalcdep.2018.11.008 [PubMed: 30502545]
30. Frost MC, Lampert H, Tsui JI, Iles-Shih MD, Williams EC. The impact of methamphetamine/amphetamine use on receipt and outcomes of medications for opioid use disorder: a systematic review. Addict Sci Clin Pract. Oct 11 2021;16(1):62. doi:10.1186/s13722-021-00266-2 [PubMed: 34635170]
31. Nichols C, Kunkel LE, Baker R, et al. Use of single IRBs for multi-site studies: A case report and commentary from a National Drug Abuse Treatment Clinical Trials Network study. Contemp Clin Trials Commun. Jun 2019;14:100319. doi:10.1016/j.conctc.2019.100319 [PubMed: 30656242]
32. People Healthy 2030. Social Determinants of Health. Office of Disease Prevention and Health Promotion. Accessed December 13, 2022. https://health.gov/healthypeople/priority-areas/social-determinants-health
33. Hodder SL, Feinberg J, Strathdee SA, et al. The opioid crisis and HIV in the USA: deadly synergies. Lancet. Mar 20 2021;397(10279):1139–1150. doi:10.1016/s0140-6736(21)00391-3 [PubMed: 33617769]
34. Godley BA, Adimora AA. Syndemic theory, structural violence and HIV among African-Americans. Curr Opin HIV AIDS. Jul 2020;15(4):250–255. doi:10.1097/coh.0000000000000634 [PubMed: 32487818]
35. Perlman DC, Jordan AE. The Syndemic of Opioid Misuse, Overdose, HCV, and HIV: Structural-Level Causes and Interventions. Curr HIV/AIDS Rep. Apr 2018;15(2):96–112. doi:10.1007/s11904-018-0390-3 [PubMed: 29460225]
36. Bleasdale J, Leone LA, Morse GD, Liu Y, Taylor S, Przybyla SM. Socio-Structural Factors and HIV Care Engagement among People Living with HIV during the COVID-19 Pandemic: A Qualitative Study in the United States. Trop Med Infect Dis. Sep 23 2022;7(10)doi:10.3390/tropicalmed7100259
37. Spears CE, Taylor BS, Liu AY, Levy SM, Eaton EF. Intersecting epidemics: the impact of coronavirus disease 2019 on the HIV prevention and care continua in the United States. Aids. Nov 1 2022;36(13):1749–1759. doi:10.1097/qad.0000000000003305 [PubMed: 35730392]
38. Beltran RM, Holloway IW, Hong C, et al. Social Determinants of Disease: HIV and COVID-19 Experiences. Curr HIV/AIDS Rep. Feb 2022;19(1):101–112. doi:10.1007/s11904-021-00595-6 [PubMed: 35107810]
39. Towe VL, Wiewel EW, Zhong Y, Linnemayr S, Johnson R, Rojas J. A Randomized Controlled Trial of a Rapid Re-housing Intervention for Homeless Persons Living with HIV/AIDS: Impact on Housing and HIV Medical Outcomes. AIDS Behav. Sep 2019;23(9):2315–2325. doi:10.1007/s10461-019-02461-4 [PubMed: 30879212]
40. Brandeis Opioid Resource Connector. Jobs and Hope. Accessed July 6, 2023. https://jobsandhope.wv.gov/

41. Moore KE, Roberts W, Reid HH, Smith KMZ, Oberleitner LMS, McKee SA. Effectiveness of medication assisted treatment for opioid use in prison and jail settings: A meta-analysis and systematic review. J Subst Abuse Treat. Apr 2019;99:32–43. doi:10.1016/j.jsat.2018.12.003 [PubMed: 30797392]
42. Hohmann L, Phillippe H, Marlowe K, et al. A state-wide education program on opioid use disorder: influential community members' knowledge, beliefs, and opportunities for coalition development. BMC Public Health. 2022/05/04 2022;22(1):886. doi:10.1186/s12889-022-13248-z [PubMed: 35508988]
43. Laudet A, Harris K, Kimball T, Winters KC, Moberg DP. Collegiate Recovery Communities Programs: What do we know and what do we need to know? J Soc Work Pract Addict. Jan 2014;14(1):84–100. doi:10.1080/1533256x.2014.872015 [PubMed: 24634609]
44. Brandeis Opioid Resource Connector. Access to Recovery. Accessed July 6, 2023. https://opioid-resource-connector.org/program-model/access-to-recovery
45. Butkus R, Rapp K, Cooney TG, Engel LS. Envisioning a Better U.S. Health Care System for All: Reducing Barriers to Care and Addressing Social Determinants of Health. Ann Intern Med. Jan 21 2020;172(2 Suppl):S50-s59. doi:10.7326/m19-2410
46. Dover DC, Belon AP. The health equity measurement framework: a comprehensive model to measure social inequities in health. Int J Equity Health. Feb 19 2019;18(1):36. doi:10.1186/s12939-019-0935-0 [PubMed: 30782161]
47. Lucyk K, McLaren L. Taking stock of the social determinants of health: A scoping review. PLoS One. 2017;12(5):e0177306. doi:10.1371/journal.pone.0177306
48. Hansen H, Jordan A, Plough A, Alegria M, Cunningham C, Ostrovsky A. Lessons for the Opioid Crisis-Integrating Social Determinants of Health Into Clinical Care. Am J Public Health. Apr 2022;112(S2):S109–s111. doi:10.2105/ajph.2021.306651 [PubMed: 35349328]
49. Lee CS, Liebschutz JM, Anderson BJ, Stein MD. Hospitalized opioid-dependent patients: Exploring predictors of buprenorphine treatment entry and retention after discharge. Am J Addict. Oct 2017;26(7):667–672. doi:10.1111/ajad.12533 [PubMed: 28324627]
50. Swartz N, Adnan T, Peréa F, Baggett TP, Chatterjee A. "Sick and tired of being sick and tired": Exploring initiation of medications for opioid use disorder among people experiencing homelessness. J Subst Abuse Treat. Jul 2022;138:108752. doi:10.1016/j.jsat.2022.108752 [PubMed: 35277306]
51. Krahn J, Caine V, Chaw-Kant J, Singh AE. Housing interventions for homeless, pregnant/parenting women with addictions: a systematic review. Journal of Social Distress and Homelessness. 2018/01/02 2018;27(1):75–88. doi:10.1080/10530789.2018.1442186
52. Tuten M, DeFulio A, Jones HE, Stitzer M. Abstinence-contingent recovery housing and reinforcement-based treatment following opioid detoxification. Addiction. May 2012;107(5):973–82. doi:10.1111/j.1360-0443.2011.03750.x [PubMed: 22151478]
53. Parlier-Ahmad AB, Radic M, Svikis DS, Martin CE. Short communication: Relationship between social determinants and opioid use disorder treatment outcomes by gender. Drug Alcohol Depend. Mar 1 2022;232:109337. doi:10.1016/j.drugalcdep.2022.109337 [PubMed: 35123364]
54. Wyse JJ, McGinnis KA, Edelman EJ, et al. Twelve-Month Retention in Opioid Agonist Treatment for Opioid Use Disorder Among Patients With and Without HIV. AIDS Behav. Mar 2022;26(3):975–985. doi:10.1007/s10461-021-03452-0 [PubMed: 34495424]
55. Saloner B, Whitley P, LaRue L, Dawson E, Huskey A. Polysubstance Use Among Patients Treated With Buprenorphine From a National Urine Drug Test Database. JAMA Network Open. 2021;4(9):e2123019–e2123019. doi:10.1001/jamanetworkopen.2021.23019 [PubMed: 34505888]
56. Cicero TJ, Ellis MS, Kasper ZA. Polysubstance Use: A Broader Understanding of Substance Use During the Opioid Crisis. American Journal of Public Health. 2020;110(2):244–250. doi:10.2105/ajph.2019.305412 [PubMed: 31855487]
57. Grov C, Westmoreland D, Morrison C, Carrico AW, Nash D. The Crisis We Are Not Talking About: One-in-Three Annual HIV Seroconversions Among Sexual and Gender Minorities Were Persistent Methamphetamine Users. JAIDS Journal of Acquired Immune Deficiency Syndromes. 2020;85(3):272–279. doi:10.1097/qai.0000000000002461 [PubMed: 32740370]

58. Strickland JC, Stoops WW, Dunn KE, Smith KE, Havens JR. The continued rise of methamphetamine use among people who use heroin in the United States. Drug Alcohol Depend. Aug 1 2021;225:108750. doi:10.1016/j.drugalcdep.2021.108750 [PubMed: 34052690]

59. Trivedi MH, Walker R, Ling W, et al. Bupropion and Naltrexone in Methamphetamine Use Disorder. New England Journal of Medicine. 2021;384(2):140–153. doi:10.1056/NEJMoa2020214 [PubMed: 33497547]

60. De Crescenzo F, Ciabattini M, D'Alò GL, et al. Comparative efficacy and acceptability of psychosocial interventions for individuals with cocaine and amphetamine addiction: A systematic review and network meta-analysis. PLoS Med. Dec 2018;15(12):e1002715. doi:10.1371/journal.pmed.1002715 [PubMed: 30586362]

61. Taylor JL, Johnson S, Cruz R, Gray JR, Schiff D, Bagley SM. Integrating Harm Reduction into Outpatient Opioid Use Disorder Treatment Settings : Harm Reduction in Outpatient Addiction Treatment. J Gen Intern Med. Dec 2021;36(12):3810–3819. doi:10.1007/s11606-021-06904-4 [PubMed: 34159545]

62. Stack E, Hildebran C, Leichtling G, et al. Peer Recovery Support Services Across the Continuum: In Community, Hospital, Corrections, and Treatment and Recovery Agency Settings - A Narrative Review. J Addict Med. Jan-Feb 01 2022;16(1):93–100. doi:10.1097/adm.0000000000000810 [PubMed: 33560695]

63. Susukida R, Crum RM, Stuart EA, Ebnesajjad C, Mojtabai R. Assessing sample representativeness in randomized controlled trials: application to the National Institute of Drug Abuse Clinical Trials Network. Addiction. Jul 2016;111(7):1226–34. doi:10.1111/add.13327 [PubMed: 26825855]

64. McPherson S, Barbosa-Leiker C, Burns GL, Howell D, Roll J. Missing data in substance abuse treatment research: current methods and modern approaches. Exp Clin Psychopharmacol. Jun 2012;20(3):243–50. doi:10.1037/a0027146 [PubMed: 22329556]

65. National Institue on Drug Abuse. HEAL Initiative: Preventing Opioid Misuse and Co-Occurring Conditions by Intervening on Social Determinants (RFA-DA-23–051). Accessed December 16, 2022. https://grants.nih.gov/grants/guide/rfa-files/RFA-DA-23-051.html

Highlights:

- Among people with opioid use disorder and HIV, positive social determinants of health may increase the likelihood of medication treatment initiation.
- Medication for opioid use disorder may be more effective, at least early on, for those with more positive social determinants of health.
- Results support calls to address root causes of health inequality, such as the social determinants of health, as part of opioid use disorder and HIV care.

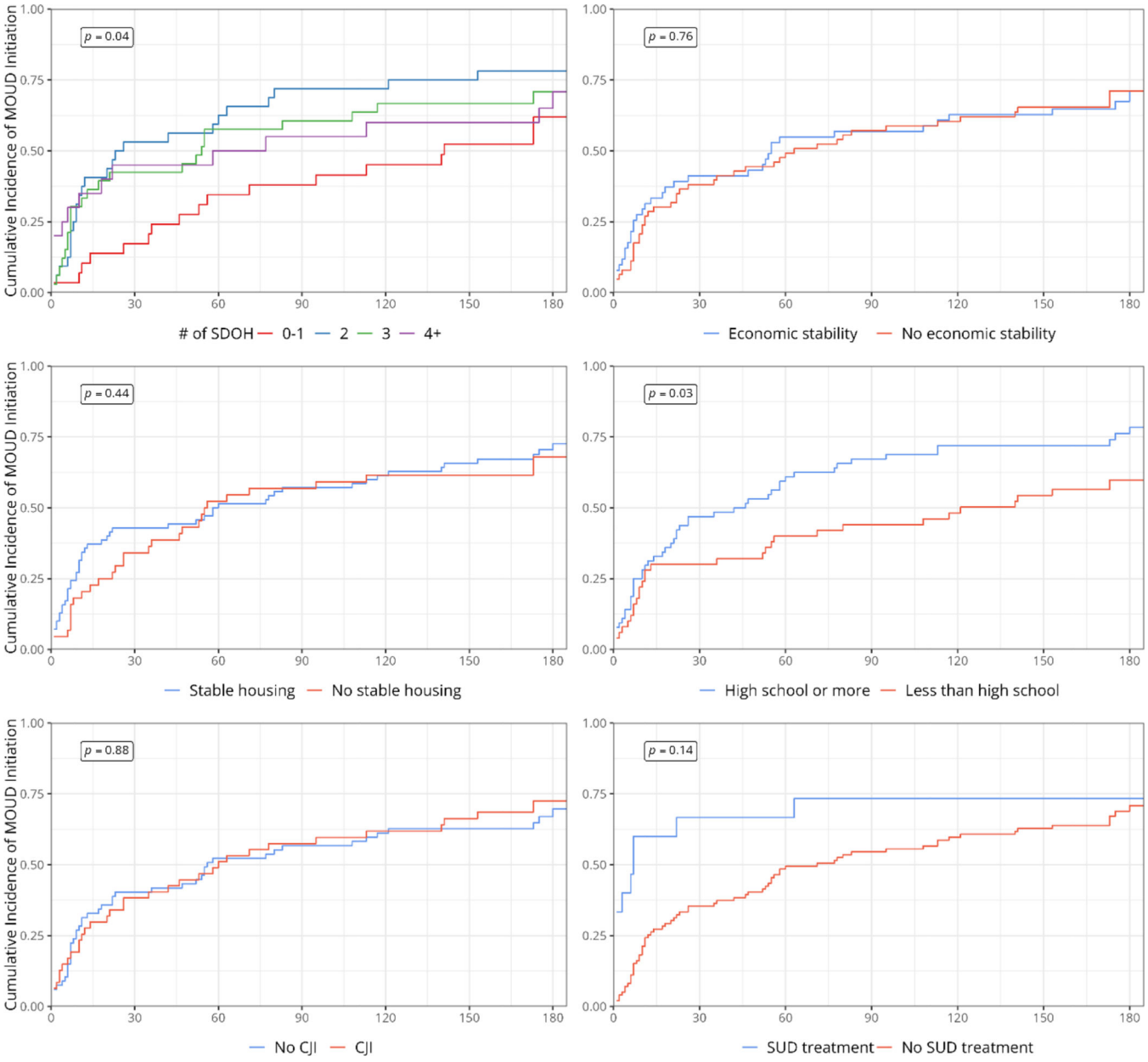

Figure 1.

Kaplan-Meier cumulative incidence of medication for opioid use disorder (MOUD) initiation by social determinants of health. CJI = criminal justice involvement; SUD = substance use disorder.

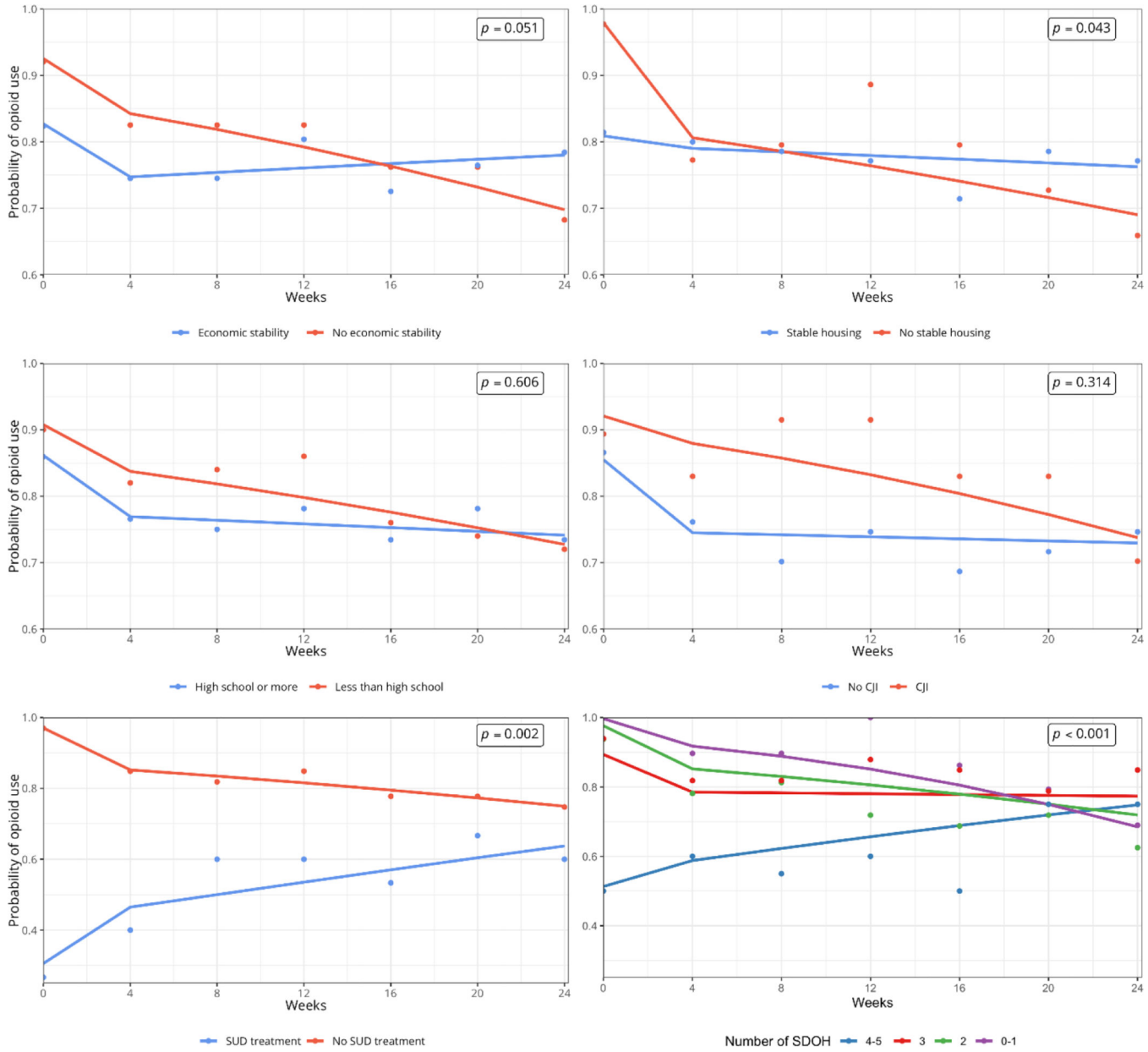

Figure 2.

Observed (dots) and fitted (lines) probability of opioid use over time by social determinants of health (SDOH), N = 114 CHOICES participants. *p* values are from hypothesis tests of any difference in rate of change over time by SDOH. CJI = criminal justice involvement; SUD = substance use disorder.

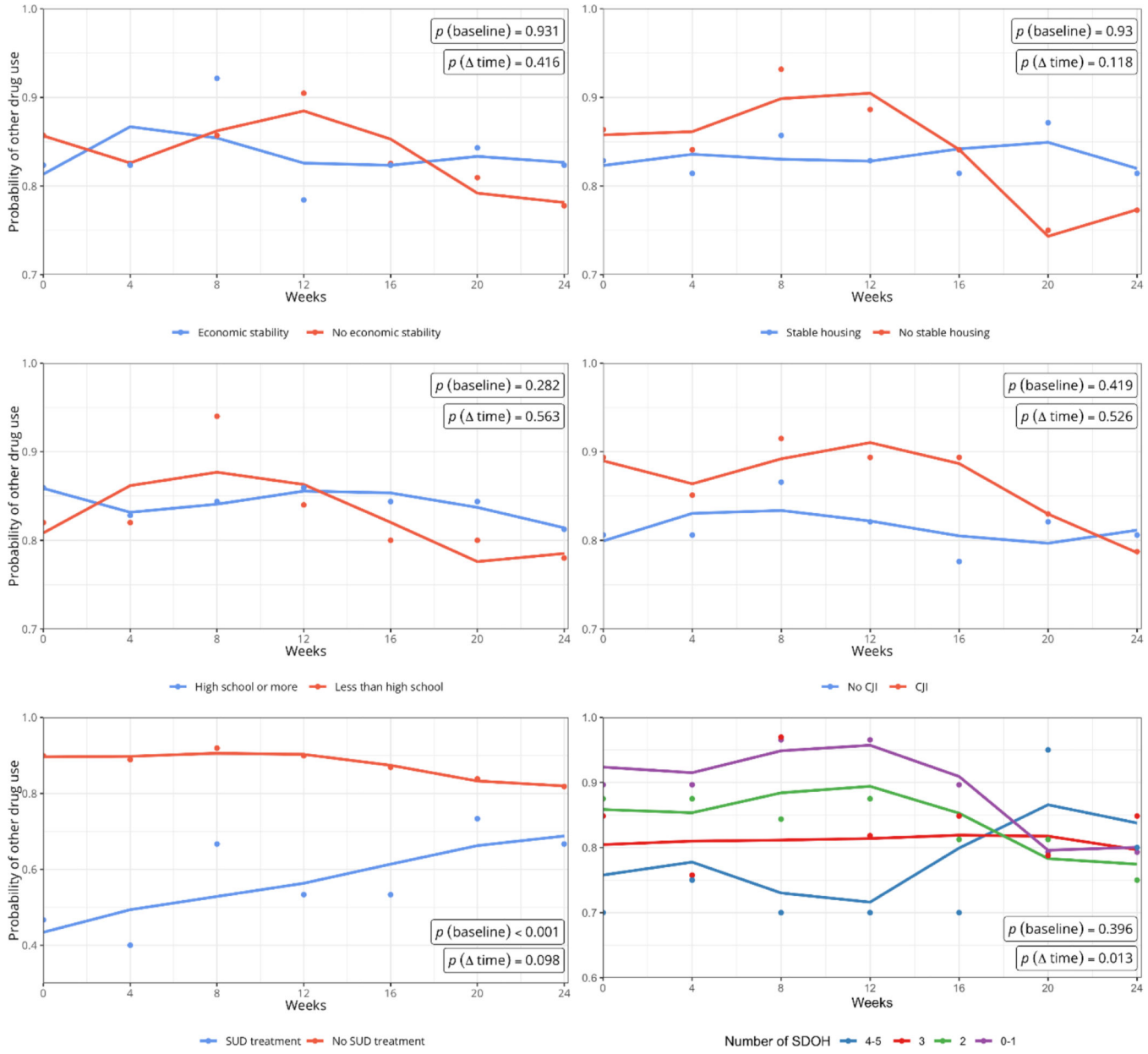

Figure 3.

Observed (dots) and fitted (lines) probability of other drug use over time by social determinants of health (SDOH), N = 114 CHOICES participants. CJI = criminal justice involvement; SUD = substance use disorder.

Table 1.

Participant baseline characteristics and social determinants of health, N = 114 CHOICES participants

Characteristic	**n(%)**	**Mean # SDOH (SD)**
Age group		
≤30	12 (10.5%)	1.5 (1.2)
31–40	22 (19.3%)	1.7 (1.2)
41–50	32 (28.1%)	2.2 (1.2)
51+	48 (42.1%)	2.8 (1)
Gender		
Male	71 (62.3%)	2.3 (1.2)
Female	43 (37.7%)	2.3 (1.2)
Race		
Black	64 (56.2%)	2.6 (1)
White	42 (36.8%)	1.7 (1.3)
Other	8 (7%)	2.2 (1.3)
Ethnicity		
Hispanic	14 (12.3%)	1.8 (1.1)
Non-Hispanic	100 (87.7%)	2.3 (1.2)
SDOH	n(%)	Mean # other SDOH (SD)
Economic stability		
Current income from work or disability	51 (44.7%)	2.1 (0.8)
Neighborhood/Physical environment		
Stably housed in past 6 months	70 (61.4%)	1.8 (0.9)
Education		
High school or more	64 (56.1%)	1.6 (1.1)
Community and social context		
No criminal justice involvement in past 3 months	67 (58.8%)	1.9 (0.9)
Health care system (SUD Care)		
Received SUD treatment in past 28 days	15 (13.2%)	2.6 (0.7)

SDOH = social determinants of health; SD = standard deviation; SUD = substance use disorder;

Table 2.

Associations between supportive SDOH and MOUD initiation, N = 114 CHOICES participants

SDOH	Number initiating MOUD/N (%)	aHR (95% CI)	*p*
Linear effect of +1 SDOH		1.25 (1.01, 1.55)	.044
Economic stability			
Current income from work or disability	37/51 (73%)	1.10 (0.66, 1.84)	.709
No stable income	44/63 (70%)	Ref	
Stable housing			
Stably housed in past 6 months	52/70 (74%)	1.53 (0.86, 2.73)	.145
Homeless in past 6 months	29/44 (66%)	Ref	
Education			
High school or more	51/64 (80%)	1.59 (0.96, 2.63)	.072
Less than high school	30/50 (60%)	Ref	
Criminal justice involvement			
No CJI in past 3 months	48/67 (72%)	1.01 (0.60, 1.64)	.967
CJI in past 3 months	33/47 (70%)	Ref	
Substance use disorder treatment			
MOUD initiation in first 28 days in study			
Received non-medication SUD treatment in 28 days prior to baseline	10/15 (67%)	3.72 (1.77, 7.85)	<.001
No SUD treatment in past 28 days	35/99 (35%)	Ref	
MOUD initiation during subsequent days			
Received non-medication SUD treatment in 28 days prior to baseline	1/5 (20%)	0.32 (0.04, 2.42)	.271
No SUD treatment in past 28 days	35/64 (55%)	Ref	

SDOH = social determinants of health; MOUD = medication for opioid use disorder; aHR = adjusted hazard ratio; CI = confidence interval; CJI = criminal justice involvement; SUD = substance use disorder