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Weathering the Storm: Syringe Services Program Laws and Human Immunodeficiency Virus during the COVID-19 Pandemic

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Abstract

Background: Syringe services programs (SSPs) are community-based prevention programs that provide a range of harm reduction services to persons who inject drugs. Despite their benefits, SSP laws vary across the U.S. Little is known regarding how legislation surrounding SSPs may have influenced HIV transmission over the COVID-19 pandemic, a period in which drug use increased. This study examined associations between state SSP laws and HIV transmission among the Medicaid population before and after the COVID-19 pandemic.

Methods: State-by-month counts of new HIV diagnoses among the Medicaid population were produced using administrative claims data from the Transformed Medicaid Statistical Information System from 2019-2020. Data on SSP laws were collected from the Prescription Drug Abuse Policy System. Associations between state SSP laws and HIV transmission before and after the start of the COVID-19 pandemic were evaluated using an event study design, controlling for the implementation of COVID-19 nonpharmaceutical interventions and state and time fixed-effects.

Results: State laws allowing the operation of SSPs were associated with 0.54 (p=0.044) to 1.18 (p=0.001) fewer new monthly HIV diagnoses per 100,000 Medicaid enrollees relative to states without such laws in place during the nine months after the start of the COVID-19 pandemic. The largest effects manifested for population subgroups disproportionately impacted by HIV, such as male and non-Hispanic Black Medicaid enrollees.

Conclusion: Less restrictive laws on SSPs may have helped mitigate HIV transmission among the Medicaid population throughout the COVID-19 pandemic. Policymakers can consider implementing less-restrictive SSP laws to mitigate HIV transmission resulting from future increases in injection drug use.

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Keywords

HIV; syringe service programs; needle exchange; COVID-19; Medicaid; policy evaluation; harm reduction

Introduction

The human immunodeficiency virus (HIV) epidemic continues to persist in the United States despite substantial public health successes in previous decades [1]. In 2019, an estimated 1,189,700 people were living with HIV in the United States [2], making the United States the only remaining high-income country among the top ten most HIV affected countries in the world [3].

Approximately 10% of the new HIV diagnoses in 2019 in the U.S. occurred from injection drug use [4]. This particular risk factor has been further exacerbated by the COVID-19 pandemic, which was associated with an increase in drug use and overdose among people who use drugs [5,6]. Additionally, the pandemic disrupted supply chains and reduced access to harm reduction programs, which may have led persons who use drugs to seek out new sources for drugs and to use contaminated supplies [5]. The reported number of persons with a new HIV diagnosis was lower in 2020 (30,635 people) compared to 2019; however, this decrease is likely due to reductions in HIV testing, care-related services, and case surveillance activities across states and local jurisdictions [7]. The increased frequency of injection drug use risk factors and reduced access to healthcare during the COVID-19 pandemic indicate that new HIV cases likely increased during the pandemic [8].

Syndemic theory posits an interaction of social and ecological factors that simultaneously impact disease burden in populations [9]; shaped by local political, economic, and social contexts [10]. In the United States, COVID-19 exposed immuno-compromised populations, such as people with HIV (PWH), to other adverse health risks and conditions that magnified the ongoing syndemic of HIV and injection drug use. Harm reduction approaches may be helpful in addressing syndemics because they mitigate the impact of health outcomes associated with behaviors but do not require the cessation of those behavior [11].

Syringe services programs (SSPs) are community-based harm reduction programs that are designed for PWH and persons who inject drugs (PWID), which have emerged as a valuable venue to engage and provide access to care for these populations. SSPs provide a range of services, including linkage to substance use disorder treatment and access to and disposal of sterile syringes and injection equipment. Nearly 30 years of research has demonstrated that comprehensive SSPs are safe, effective, cost-saving, and play an important role in both combatting the opioid overdose epidemic and in reducing the transmission of viral hepatitis, HIV, and other infections [12]. Despite these benefits, the scope of SSPs vary across the United States, with some states' legislations limiting the reach and operation capabilities of SSPs.

Funding, community stigma, and laws affect the formation and operation of SSPs. SSPs remain illegal in several states because of paraphernalia laws that prohibit the possession

and delivery of syringes. Other states with paraphernalia laws have either exempted syringes from the definition of paraphernalia or explicitly provided immunity for SSPs' workers and participants, thus indirectly legalizing SSPs [13]. Several states have explicitly legalized the formation and operation of SSPs, with some states requiring either state or local authorization, and with some providing or addressing funding.

Little is currently known regarding how legislation surrounding SSPs may have influenced HIV transmission over the duration of the COVID-19 pandemic. State authorization of SSPs may have helped mitigate HIV transmission resulting from the increase in drug use and injection drug use observed after the start of the pandemic. Important within this context, qualitative research suggests that SSPs were able to operate and reach their intended populations (albeit with more barriers) during the height of the pandemic [14].

The purpose of this study was to evaluate the association between state SSP laws and new HIV diagnoses among the Medicaid population during the COVID-19 pandemic. Additionally, we sought to explore this association through a health equity lens, analyzing the differential impact of these policies on HIV outcomes by sex and race-ethnicity. Results from this study can help inform policymakers on the role of SSP laws in mitigating HIV transmission resulting from an exogenous increase in injection drug use.

Methods

Data

We used administrative claims data from the Centers for Medicare and Medicaid Services (CMS) Transformed Medicaid Statistical Information System (T-MSIS) to identify new HIV diagnoses within the Medicaid population. T-MSIS is a de-identified Medicaid claims dataset, which includes annual files containing demographic and eligibility information for all Medicaid beneficiaries, claims files containing service use and payment records, and annual files containing information on Medicaid managed care plans and providers [15]. Medicaid is the largest source of insurance coverage for people with HIV in the United States and is estimated to cover 42% of the adult population with HIV, making this data source ideal for our study [16]. We used data from years 2019 and 2020 for the analyses.

We produced state-by-month counts of new HIV diagnoses among Medicaid enrollees from August 2019 – December 2020 among Medicaid recipients who were fully enrolled from February 2019 to December 2020. New HIV diagnoses were defined as cases that met the following criteria: 1) First case of an ICD-10 CM code of B20-B24, B97.35, O98.7, or Z21 (diagnoses codes defined in Supplemental Table 1) for an enrollee from August 2019 – December 2020 within the inpatient and other services (including outpatient) files: and 2) No other HIV diagnosis was observed for that beneficiary during the six months prior, i.e., no additional HIV diagnosis during the "lookback period." Additionally, we aggregated new HIV counts by race-ethnicity and sex to the state by month level using the same criteria. All state-level data aggregation was conducted using SAS software version 9.4.

We collected data on state SSP laws from August 2019 – December 2020 from the Prescription Drug Abuse Policy System (PDAPS), a source of legal data that provides

detailed policy information to track key state laws related to prescription drug abuse [17]. While there are many aspects of SSP laws, we focused first on states' allowance of SSPs as the main policy of interest. States were defined as allowing SSP operation if laws were in place that either implicitly or explicitly authorized SSPs. Implicit authorization of SSPs implies that a state law did not include a legal barrier to the free distribution or simple possession of syringes; however, the law also does not "explicitly" authorize SSPs. Explicit authorization of SSPs implies that a law specifically grants the authority for the establishment and operation of SSPs and can be viewed as a more permissive stance on SSPs than implicit authorization. Given these definitions, we created a dummy variable equal to one if a state allowed the operation of SSPs and equal to zero otherwise as the main policy variable of interest. There were no changes to any state's allowance of SSPs over the study period.

Additionally, we collected CDC data on state-issued COVID-19 nonpharmaceutical interventions (NPIs) [18]. NPIs included stay-at-home orders and gathering bans as these particular policies may have influenced an individual's decision to get tested for HIV. State-issued stay-at-home orders were defined as requirements for all individuals or specific subgroups of the population to stay at home or shelter in their place of residence. State-issued gathering bans were defined as prohibitions on the gathering of at least 10 or more people. We defined the start of the COVID-19 pandemic in the U.S. as March 13, 2020 to align with the date in which COVID-19 was declared a nationwide state of emergency.

Statistical Methods

We evaluated the association between state allowance of SSPs, and new HIV diagnoses before and after the start of the COVID-19 pandemic using an event study design. The event study methodology utilizes a pre-post model and has been widely used to evaluate the impact of public health policies and interventions [19–23]. Our study takes a slight deviation from the standard event study literature, as we are not evaluating the impact of policy implementation, but rather exploring whether the presence of an existing policy may have mitigated negative public health outcomes resulting from the onset of the COVID-19 pandemic. In our study, we defined states that allowed the operation of SSPs as the "allowance" states, and states that did not allow SSPs as the "non-allowance" states. We then constructed 16 dummy variables corresponding to each month relative to the start of the pandemic (March 2020). For each of these variables, we coded an observation as 1 if the observation corresponded to a state in the allowance group and the observation was for the corresponding month, otherwise the observation was coded as 0.

We then estimated a weighted least squares regression with state-level new HIV diagnoses per 100,000 Medicaid enrollees as the dependent variable and the 16 time-policy variables representing the covariates of interest. Additionally, dummy variables controlling for the presence or absence of COVID-19 nonpharmaceutical interventions (i.e., stay-at-home orders and gathering bans), state fixed effects, and month-of-year fixed effects were included as additional covariates in the model. This model assesses the differential change in new HIV diagnoses from the baseline period (March 2020) between allowance and non-allowance states. To explore the differential association between these SSP policies

and newly diagnosed HIV rates among population subgroups, we estimated the above model separately by sex (males and females) and race/ethnicity (non-Hispanic Black people, non-Hispanic White people, Hispanic people).

The main assumption of our event study model is that trends in new HIV diagnoses would have been the same between the allowance and non-allowance states in the absence of COVID-19 (i.e. parallel trend assumption). Following recently published public health studies [20–23], we indirectly tested the validity of the event study research design by examining the coefficient estimates on the time-policy variables that corresponded to the months prior to the COVID-19 pandemic. Coefficient estimates that are not statistically different from zero for these variables is a necessary, albeit insufficient, condition for the validity of these models and would suggest that the parallel trend assumption may not be violated [19].

Furthermore, an additional assumption being made in our analyses is that changes in HIV screenings after the start of the pandemic were, on average, the same between the treated states and control states after controlling for the model covariates. It has been well documented that HIV testing decreased amid the COVID-19 pandemic [7]; however, this is only problematic for our study design if the likelihood of receiving an HIV test during the pandemic differed based on states' allowance of SSPs. To explore the validity of this assumption, we estimated an additional model with HIV screening rates per 100,000 Medicaid enrollees as the dependent variable. We identified HIV screenings in the Medicaid claims files using ICD-10 CM code Z11.4 and then aggregated screening counts to the state-level for each month.

To explore the sensitivity of our results to the HIV "lookback period" used to define new HIV cases, we estimated an additional model defining new HIV cases as: 1) First case of an ICD-10 CM code of B20-B24, B97.35, O98.7, or Z21 for an enrollee from August 2019 – December 2020 within the inpatient and other services (including outpatient) files, and 2) No other HIV diagnosis was observed for that beneficiary within one year prior.

Finally, we explored the association between explicit authorization of SSP laws and new HIV diagnoses over the COVID-19 pandemic. The event study model outlined above was estimated defining "authorization" states as those with explicit authorization of SSPs and "non-authorization" states as those without explicit authorization of SSPs.

All analyses were weighted by state Medicaid population (or the state Medicaid population of the relevant subgroup) and estimated with robust standard errors clustered at the state-level. P-values <0.05 were deemed statistically significant (equivalent to 95% confidence intervals not crossing zero). Analyses were performed using SAS software version 9.4 and figures were produced using Stata software (version 16.0; StataCorp). The formal presentations of the models are reported in the Supplemental Materials. This activity was reviewed by *** and was conducted consistent with applicable federal laws and *** policy.[z]

[z]See e.g., 45 C.F.R. part 46, 21 C.F.R. part 56; 42 U.S.C. §241(d); 5 U.S.C. §552a; 44 U.S.C. §3501 et seq.

Results:

Thirty-nine states and the District of Columbia were identified as “allowance states” and allowed the operation of SSPs over the study period. Twelve states were identified as “non-allowance states” and did not allow the operation of SSPs within their jurisdiction over the study period (Supplemental Figure 1). New HIV diagnoses rates were higher for allowance states at the start of the study period relative to non-allowance states, with rates declining for both groups over the study period, albeit a larger decline was observed in allowance states relative to non-allowance states (Figure 1).

Results from the event study model suggest that states’ allowance of SSPs was associated with 1.10 (p=0.003), 0.89 (p=0.008), 0.62 (p=0.029), 0.43 (p=0.198), 1.19 (p=0.001), 0.62 (p=0.045), 0.54 (p=0.043), 0.89 (p=0.0016), and 1.15 (p=0.002) fewer new HIV diagnoses per 100,000 Medicaid enrollees relative to the non-allowance states one to nine months, respectively, after the start of the COVID-19 pandemic (Figure 2). The coefficient estimates on the time-policy variables corresponding to months prior to the start of the pandemic were all statistically insignificant, providing necessary, albeit insufficient, evidence that the parallel trend assumption may be satisfied, supporting the validity of our research design [19].

Defining new HIV diagnoses using a more conservative one year “lookback period”, the event study model results suggest that states that allowed SSP operation had 0.67 (p=0.034), 1.08 (p=0.009), and 0.77 (p=0.026) fewer new HIV diagnosis per 100,000 Medicaid enrollees relative to the control group two months, five months and nine months, respectively, after the start of the COVID-19 pandemic (Figure 3).

Using our conservative model coefficient estimates (i.e. 12 month lookback model) to compute counterfactual levels of HIV cases (i.e., the level of cases that may have occurred in the absence of SSP allowance laws), our main analysis suggests that state allowance of SSPs were associated with an estimated 1,075 new HIV cases averted among the Medicaid population in 2020.

Differential Associations by Population Subgroup

Stratifying the association by sex, our results suggest that the allowance of SSPs was associated with 1.48 (p=0.007), 1.39 (p=0.018), 0.94 (p=0.033), 1.36 (p=0.003), 1.13 (p=0.011), 0.94 (p=0.028), and 1.94 (p=0.001) fewer new HIV diagnoses per 100,000 male Medicaid enrollees, relative to the non-allowance states one month, two months, four to seven months, and nine months, respectively, after the start of the COVID-19 pandemic (Table 1). The policy was only associated with 1.04 (p=0.023) fewer new HIV diagnoses per 100,000 female Medicaid enrollees, relative to the non-allowance states five months after the start of the COVID-19 pandemic. All other post COVID-19 coefficients for this stratification were not statistically significant.

Stratifying the association by race-ethnicity, the event study results suggest that state allowance of SSPs was associated with 2.91 (p=0.002), 2.67 (p=0.008), 3.76 (p=0.002), and 3.34 (p=0.005) fewer new HIV diagnoses per 100,000 non-Hispanic Black Medicaid

enrollees relative to the non-allowance states one month, two months, five months, and nine months, respectively, after the start of the COVID-19 pandemic (Table 1). The policy was associated with 1.62 (p=0.035) and 1.49 (p=0.035) fewer new HIV diagnoses per 100,000 Hispanic Medicaid enrollees relative to the non-allowance states one month and nine months, respectively after the start of the COVID-19 pandemic. Furthermore, the allowance of SSPs was not associated with statistically significant changes in new HIV diagnoses among non-Hispanic White Medicaid enrollees.

Sensitivity Analysis

Our model evaluating explicit authorization of SSPs suggest that these policies were associated with 0.92 (p=0.034), 0.75 (p=0.038), 0.80 (p=0.038), and 0.97 (p=0.009) fewer new HIV diagnoses per 100,000 Medicaid enrollees relative to the non-authorization states one month, two months, eight months, and nine months after the start of the COVID-19 pandemic (Supplemental Figure 3).

The event study model results from examining HIV screenings suggest that states allowing SSP operation had 6.21 (p=0.004) more HIV screenings per 100,000 Medicaid population relative to the non-allowance states seven months after the start of the pandemic (Figure 4). For all other time periods, state allowance of SSPs was not associated with differences in HIV screenings.

Discussion

SSPs need explicit or implied legal authority to operate. State allowance of SSPs was associated with fewer new HIV diagnoses among the Medicaid population after the onset of the COVID-19 pandemic. While new HIV diagnosis rates declined for both allowance and non-allowance states over the study period, rates declined more from the pre-COVID-19 baseline (March 2020) in allowance states compared to non-allowance states. Specifically, our main analysis suggests that state allowance of SSPs was associated with an estimated 1,075 new HIV cases averted among the U.S. Medicaid population in 2020.

In addition to the public health benefits, reducing the transmission rate of HIV decreases healthcare costs in the long run [24]. Using $1,250 as an estimate for the monthly medical cost of an additional HIV case [25], our model estimates suggest that laws allowing the operation of SSPs may have saved around $12 million in medical costs through averted HIV cases during the COVID-19 pandemic.

Our results suggest that the association manifested among male Medicaid enrollees and non-Hispanic Black Medicaid enrollees, two sub-populations disproportionately impacted by HIV [2]. In addition, these population subgroups are also most likely to utilize SSPs in certain geographic areas [26], providing supporting evidence that the association we are finding may be due to implicit and explicit authorization laws, as opposed to other potential confounders.

Our results also suggest that laws explicitly authorizing SSPs were associated with fewer new HIV diagnoses during the first year of the pandemic. The approach to syringe

distribution varies widely. Some laws require one-for-one syringe exchange where each SSP participant is restricted to one new syringe for every syringe returned. Some state laws further restrict distribution by explicitly prohibiting SSP participants from redistributing syringes [13]. However, evidence shows that a needs-based approach to syringe distribution is the best practice for reducing new HIV and viral hepatitis infections [27]. Needs-based syringe distribution provides SSP participants access to the number of syringes they need to ensure that a new, sterile syringe is available for each injection. A needs-based approach provides sterile syringes with no restrictions, including no requirement to return used syringes. Policymakers may want to consider removing barriers to SSP operations and covering requirements for needs-based SSPs to incentivize better access to clean injection equipment.

Sensitivity analyses exploring the association between SSP allowance laws and HIV screenings before and after the pandemic suggest that there was not a differential decrease in screening rates in SSP allowance states relative to non-allowance states. This suggests that differential changes in screening rates was not the mechanism driving our main findings.

Outside the context of the COVID-19 pandemic, our results suggest that removing barriers to SSPs and incentivizing need-based exchanges may help mitigate HIV transmission resulting from exogenous factors increasing the prevalence of injection drug use. This is of particular importance given the rise in injection drug use due to the accessibility of illicitly manufactured fentanyl [28].

Furthermore, SSPs may also encourage individuals to seek help for substance use disorders. In a study surveying a cohort of injection drug users in Seattle, new users of SSPs were five times more likely to enter drug treatment and three times more likely to stop using drugs [29], although other studies suggest that SSPs may be associated with more drug use on average [30]. Future research can continue to explore the relationship between SSPs and downstream drug use outcomes, such as overdose, particularly in response to increases in drug use in the U.S.

Limitations

The findings in this report are subject to several limitations. First, identifying new HIV diagnoses within claims data may lead to some misclassification, as some individuals already diagnosed with HIV may have been counted as “new” diagnoses; however, our results are robust to expanding the HIV “lookback period” to one year from the baseline six months, suggesting that any misclassification may be minor. Second, we are unable to observe if individuals in the Medicaid claims sample actually utilized an SSP and/or are the target population of SSPs, making it difficult to rule out potential confounders that may contribute to the estimated associations. Despite this limitation, we still believe that Medicaid claims is the best dataset to answer our research question given the time granularity of the data and the fact that a high proportion of individuals who utilize SSPs are enrolled in Medicaid [31]. Third, the identification of HIV diagnoses in this study relied on ICD-10-CM codes, and use of other definitions may reflect different estimates. Fourth, the jurisdiction variability of SSP laws differ between states, where different harm reduction strategies may have influenced our results. Fifth, analyses were limited to

Medicaid enrollees, therefore results may not be generalizable to other populations. Finally, this study used an ecological approach, thus we cannot with certainty rule out that other factors correlated with SSP authorization laws did not also contribute to the associations found from the analysis.

Conclusion:

This study demonstrated that laws allowing the operation of SSPs were associated with fewer new HIV diagnoses among the Medicaid population after the onset of the COVID-19 pandemic in the United States. The associations manifested for population subgroups disproportionately affected by HIV, particularly male and non-Hispanic Black Medicaid enrollees. Policymakers may consider implementing less restrictive SSP laws as a means to mitigate HIV transmission resulting from increases in injection drug use.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Disclaimer:

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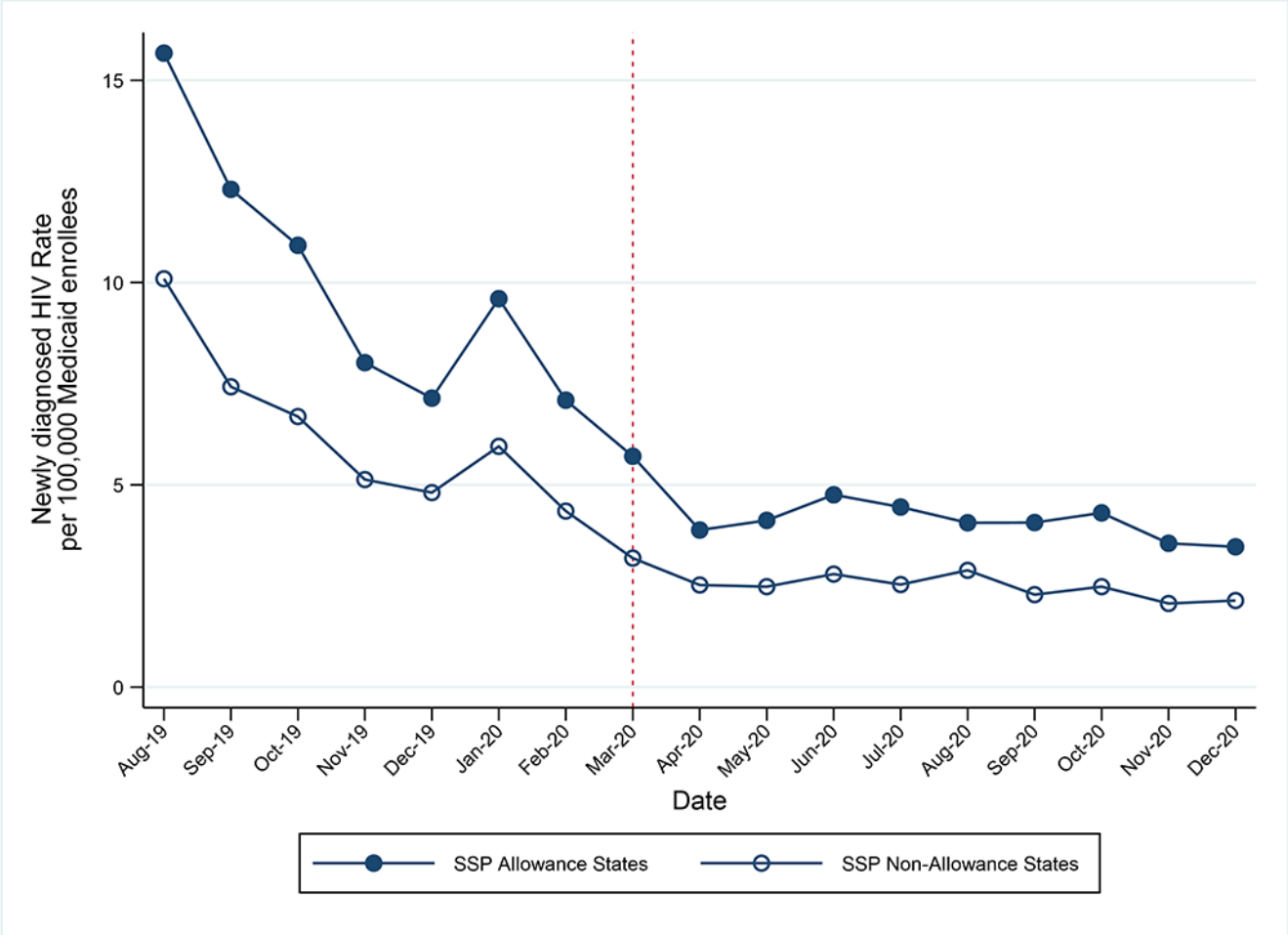

Figure 1:

Trends in newly diagnosed HIV rates among the Medicaid population by states' allowance of syringe service programs laws: before and after the start of the COVID-19 pandemic.

Notes: Data on newly diagnosed HIV rates were collected from the Transformed Medicaid Statistical Information System (T-MSIS). Data on state syringe service program laws were collected from the Prescription Drug Abuse Policy System. SSP allowance states are defined as states that allowed the operation of SSPs. SSP non-allowance states are states that had barriers in place for the operation of SSPs.

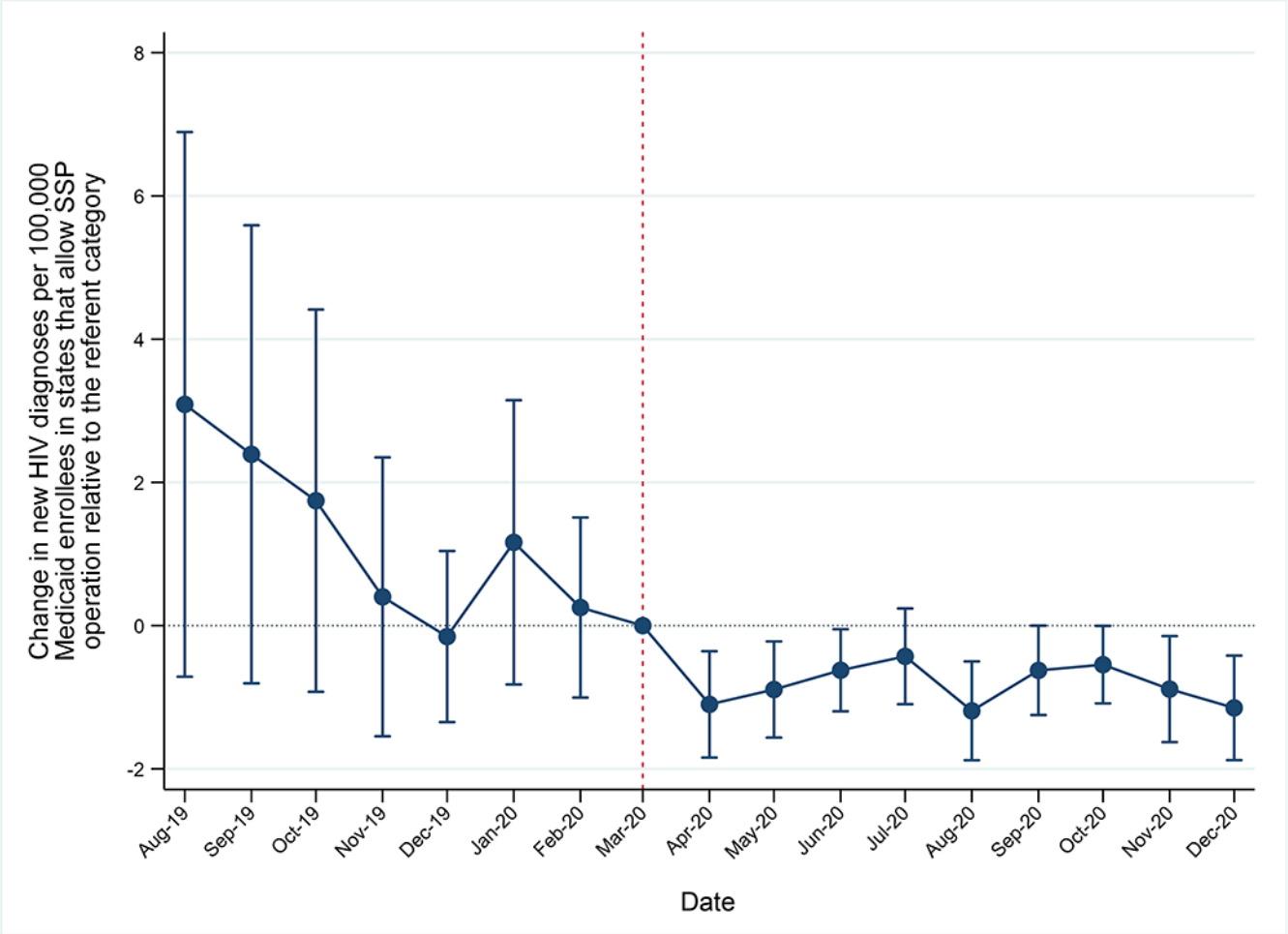

Figure 2:

Association between state allowance of syringe service programs and new HIV diagnoses before and after the start of the COVID-19 pandemic: event study results

Notes: Data on newly diagnosed HIV rates were collected from the Transformed Medicaid Statistical Information System (T-MSIS). Data on state syringe service program laws were collected from the Prescription Drug Abuse Policy System. Reported are the coefficient estimates and 95% confidence intervals from a weighted least squares regression model that included the event study policy variables, controls for COVID-19 gathering bans and stay-at-home orders, state fixed effects, and time fixed effects. The model was weighted based on state Medicaid enrollment and standard errors were clustered at the state-level.

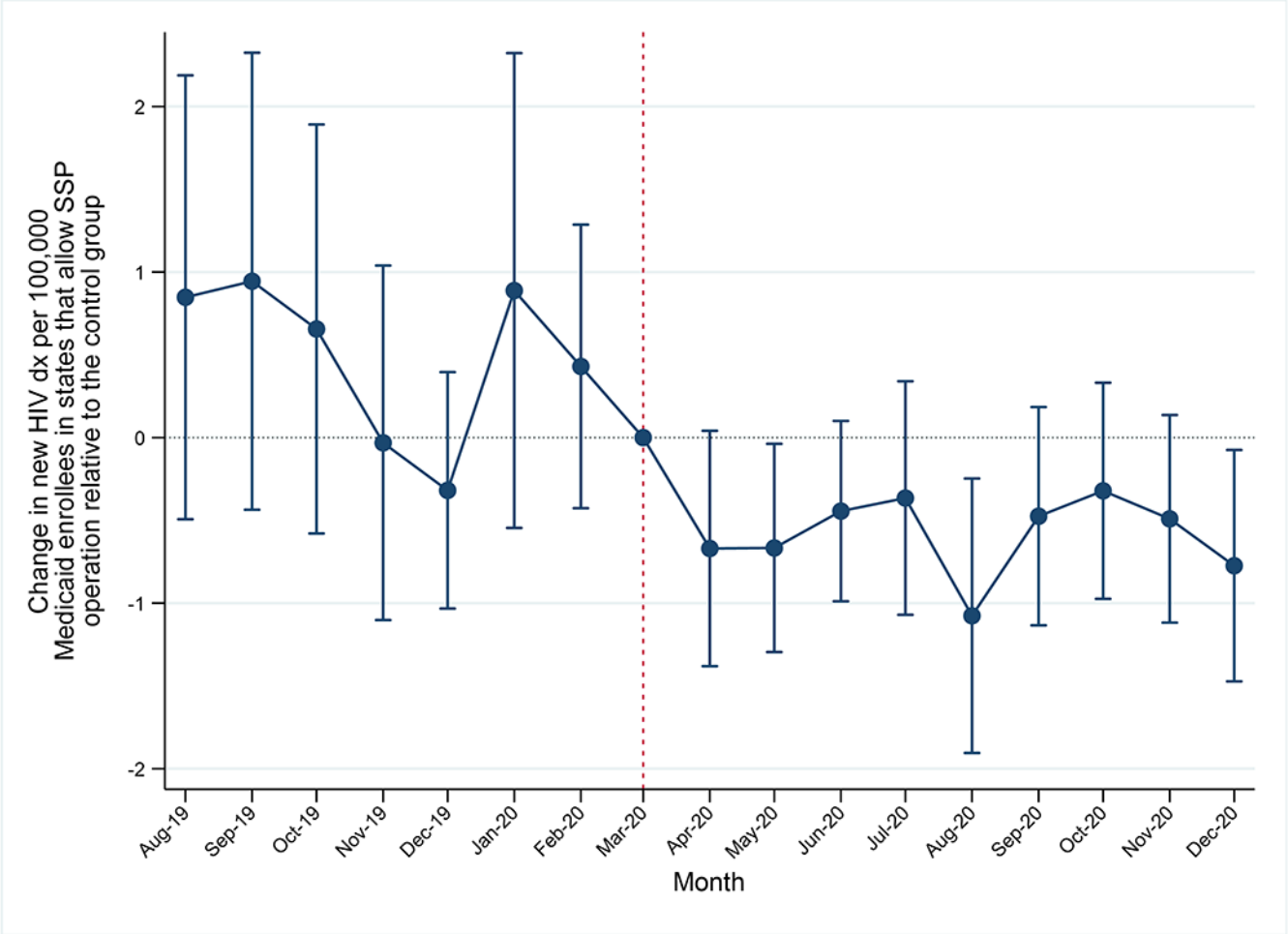

Figure 3:

Association between state allowance of syringe service programs and new HIV diagnoses before and after the start of the COVID-19 pandemic: one year “lookback period” to define new HIV diagnoses

Notes: Data on newly diagnosed HIV rates were collected from the Transformed Medicaid Statistical Information System (T-MSIS). Data on state syringe service program laws were collected from the Prescription Drug Abuse Policy System. Reported are the coefficient estimates and 95% confidence intervals from a weighted least squares regression model that included the event study policy variables, controls for COVID-19 gathering bans and stay-at-home orders, state fixed effects, and time fixed effects. The model was weighted based on state Medicaid enrollment and standard errors were clustered at the state-level.

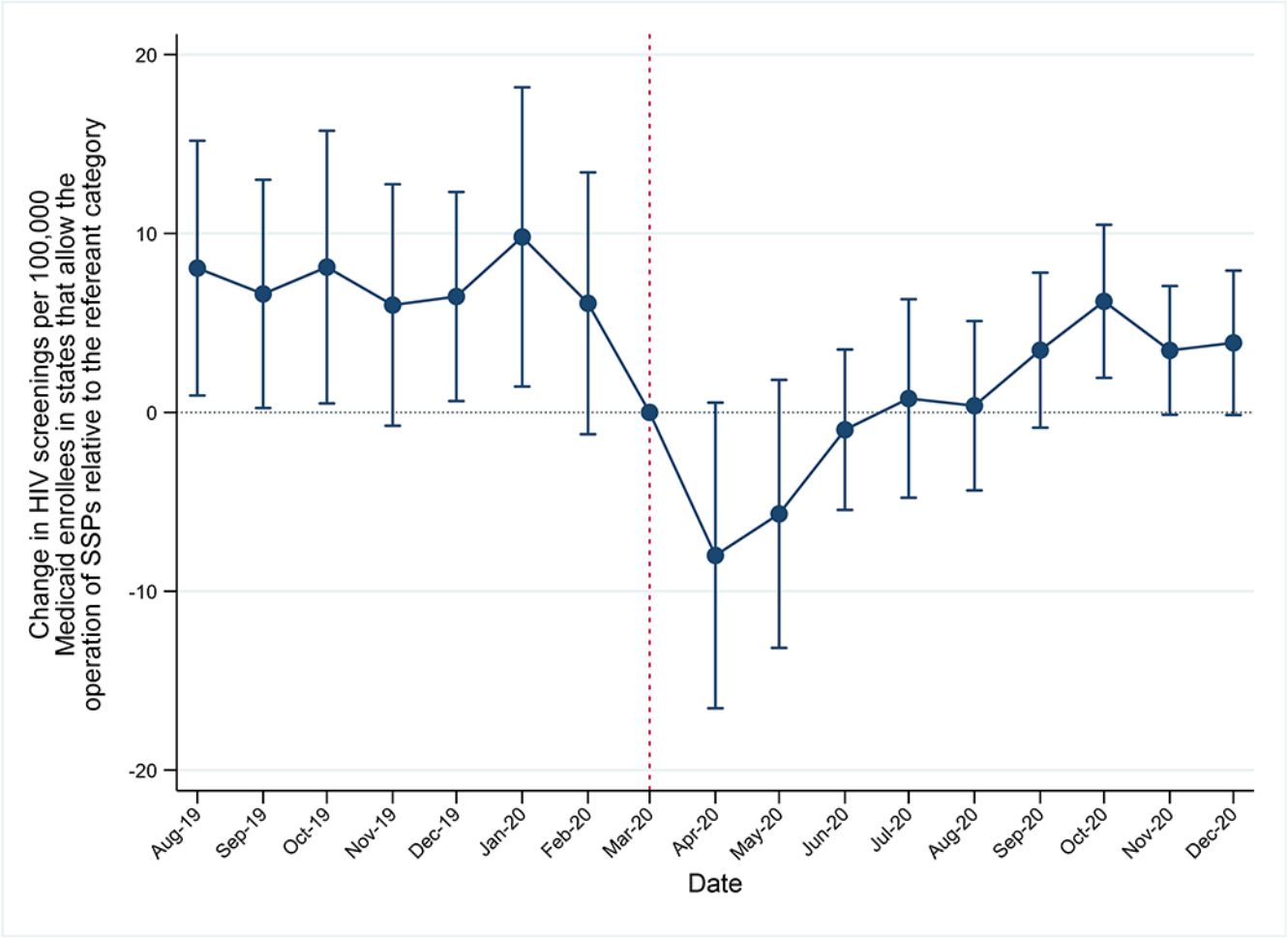

Figure 4:

Association between state allowance of syringe service programs and HIV screenings before and after the start of the COVID-19 pandemic: robustness check

Notes: Data on HIV screening rates were collected from the Transformed Medicaid Statistical Information System (T-MSIS). Data on state syringe service program laws were collected from the Prescription Drug Abuse Policy System. SSP states are defined as states that allowed the operation of SSPs. No SSP states are states that have barriers in place for the operation of SSPs. Reported are the coefficient estimates and 95% confidence intervals from a weighted least squares regression model that included the event study policy variables, controls for COVID-19 gathering bans and stay-at-home orders, state fixed effects, and time fixed effects. The model was weighted based on state Medicaid enrollment and standard errors were clustered at the state-level.

Table 1:

Association between state allowance of syringe service programs and new HIV diagnoses before and after the start of the COVID-19 pandemic by Medicaid population subgroup: event study results

	Medicaid Population Subgroup				
Time Relative to COVID-19 Pandemic	**Male**	**Female**	**Non-Hispanic White**	**Non-Hispanic Black**	**Hispanic**
7 months prior	4.57 (−0.41, 9.56)	1.93 (−1.25, 5.12)	0.88 (−1.31, 3.08)	3.39 (−6.52, 13.30)	5.31 (−1.70, 12.32)
6 months prior	**3.52 (0.15, 6.90)**	1.50 (−1.86, 4.85)	1.65 (−0.63, 3.93)	3.00 (−3.65, 9.65)	2.65 (−3.64, 8.94)
5 months prior	2.28 (−1.17, 5.73)	1.35 (−0.81, 3.51)	0.44 (−0.68, 1.55)	2.61 (−5.36, 10.58)	2.34 (−2.31, 7.00)
4 months prior	1.15 (−1.36, 3.67)	−0.20 (−1.79, 1.39)	0.24 (−1.15, 1.64)	−1.47 (−6.23, 3.28)	1.81 (−1.75, 5.37)
3 months prior	−0.11 (−1.58, 1.36)	−0.17 (−1.41, 1.07)	−0.74 (−1.90, 0.42)	−0.09 (−3.36, 3.18)	1.39 (−1.51, 4.29)
2 months prior	1.54 (−1.21, 4.29)	0.88 (−0.58, 2.34)	0.40 (−0.81, 1.62)	3.89 (−0.94, 8.72)	2.25 (−1.34, 5.85)
1 month prior	0.28 (−1.21, 1.77)	0.25 (−0.91, 1.41)	0.66 (−0.08, 1.39)	−1.00 (−5.49, 3.49)	1.06 (−1.43, 3.55)
referent	-	-	-	-	-
1 month after	**−1.48 (−2.58, −0.39)**	**−0.78 (−1.51, −0.06)**	−0.25 (−0.90, 0.39)	**−2.91 (−4.77, −1.05)**	**−1.62 (−3.16, −0.08)**
2 months after	**−1.39 (−2.58, −0.21)**	−0.49 (−1.30, 0.32)	−0.31 (−1.34, 0.71)	**−2.67 (−4.68, −0.66)**	−0.60 (−2.34, 1.15)
3 months after	**−0.94 (−1.82, −0.06)**	−0.37 (−0.97, 0.22)	−0.24 (−1.56, 1.07)	−1.01 (−3.70, 1.67)	−0.86 (−2.07, 0.34)
4 months after	−0.73 (−1.55, 0.10)	−0.18 (−1.09, 0.74)	0.10 (−1.02, 1.23)	−2.14 (−5.06, 0.77)	0.46 (−0.85, 1.76)
5 months after	**−1.37 (−2.28, −0.45)**	**−1.04 (−1.96, −0.12)**	−0.68 (−1.99, 0.63)	**−3.76 (−6.20, −1.32)**	−0.84 (−2.08, 0.40)
6 months after	**−1.13 (−2.03, −0.24)**	−0.20 (−1.06, 0.66)	−0.19 (−1.50, 1.12)	−1.90 (−4.51, 0.71)	−0.16 (−2.76, 2.45)
7 months after	**−0.94 (−1.80, −0.08)**	−0.21 (−0.90, 0.48)	−0.36 (−1.08, 0.37)	−1.11 (−3.43, 1.22)	−0.53 (−2.02, 0.95)
8 months after	−1.16 (−2.39, 0.07)	−0.66 (−1.51, 0.18)	−0.44 (−1.50, 0.61)	−1.99 (−4.48, 0.50)	−0.57 (−2.20, 1.07)
9 months after	**−1.94 (−2.13, −0.75)**	−0.49 (−1.21, 0.22)	−0.23 (−1.27, 0.81)	**−3.34 (−5.71, −0.97)**	**−1.49 (−2.91, −0.07)**

Notes: Data on newly diagnosed HIV rates were collected from the Transformed Medicaid Statistical Information System (T-MSIS). Data on state syringe service program laws were collected from the Prescription Drug Abuse Policy System. Reported are the coefficient estimates and 95% confidence intervals from weighted least squares regression models that included the event study policy variables, controls for COVID-19 gathering bans and stay-at-home orders, state fixed effects, and time fixed effects. The models were weighted based on state Medicaid enrollment within subgroups and standard errors were clustered at the state-level.