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Substance use disorder treatment and technology access among people who use drugs in rural areas of the United States: A cross-sectional survey

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Abstract

Purpose: To evaluate how technology access affected substance use disorder (SUD) treatment prior to COVID-19 for people who use drugs in rural areas.

Methods: The Rural Opioid Initiative (January 2018-March 2020) was a cross-sectional study of people with prior 30-day injection drug or nonprescribed opioid use from rural areas of 10 states. Using multivariable mixed-effect regression models, we examined associations between participant technology access and SUD treatment.

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CONFLICTS OF INTEREST
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SUPPORTING INFORMATION
Additional supporting information can be found online in the Supporting Information section at the end of this article.

Findings: Of 3,026 participants, 71% used heroin and 76% used methamphetamine. Thirty-five percent had no cell phone and 10% had no prior 30-day internet use. Having both a cell phone and the internet was associated with increased days of medication for opioid use disorder (MOUD) use (aIRR 1.29 [95% CI 1.11–1.52]) and a higher likelihood of SUD counseling in the prior 30 days (aOR 1.28 [95% CI 1.05–1.57]). Lack of cell phone was associated with decreased days of MOUD (aIRR 0.77 [95% CI 0.66–0.91]) and a lower likelihood of prior 30-day SUD counseling (aOR 0.77 [95% CI 0.62–0.94]).

Conclusions: Expanding US rural SUD treatment engagement via telemedicine may require increased cell phone and mobile network access.

Keywords

addiction; opioids; rural health; telemedicine

INTRODUCTION

The COVID-19 pandemic prompted a sudden expansion in the amount of health care delivered through telemedicine versus in-person clinic visits.[1] Yet, vulnerable populations, such as persons with substance use disorders (SUDs), may not have equal access to the technology required for such a shift. This gap in access may be worse in rural areas which face disparities in access to technology used to support telemedicine.

Residents of rural areas worldwide lack access to key components of telehealth infrastructure.[2–6] Studies across the globe identify inconsistent electricity[7,8] and broadband inaccessibility[7–10] as important contributors to telemedicine adoption shortfalls in rural communities. As of 2019, 55% of the world was using the internet,[5] and smartphone ownership varied drastically between high-, middle-, and low-income countries.[6] In the United States, people who reside in rural areas are 2–3 times less likely to have access to a smartphone with a data plan, compared with residents from urban areas.[10] Additionally, rural areas are disproportionately economically disadvantaged, have high proportions of injury-prone jobs, and are more vulnerable to economic shifts which can influence health insurance access, housing, and the affordability of cell phones and internet.[2]

Rates of opioid overdose and opioid use disorder are similar among rural and urban areas, though rural communities have fewer points of access to SUD treatment.[2,3] People with SUD experience houselessness at higher rates than those without SUD,[11,12] and lack of stable housing is associated with high rates of cell phone turnover and limited technology access.[13] Residents from rural areas with SUD live at the intersection of these disparities which may compound their ability to effectively access telemedicine.[2,3,10,14]

Telemedicine expansion has helped mitigate SUD care delivery during the COVID-19 pandemic for those who can access medical treatment through digital sources.[1] However, increased reliance on telemedicine may further exacerbate the “digital divide” and worsen existing rural-urban disparities.[15] Understanding the relationship between access to technology and SUD treatment prior to the pandemic is essential to developing evidence-based investments in telemedicine services and infrastructure that will affect rural regions in the future. Building equitable access to telemedicine systems for people with SUD in rural areas requires understanding if access to technology was associated with the receipt of SUD treatment.

The objectives of this study were to (1) examine factors associated with internet and cell phone access and (2) evaluate associations between access to cell phone and internet use and engagement in SUD treatment among individuals who use drugs in rural communities in the United States.

METHODS

Study design, participants, and setting

This study is a cross-sectional analysis of the Rural Opioid Initiative (ROI). Details about the ROI have been previously published.[16] Briefly, recruitment occurred at 8 study sites which included 10 different states (Illinois, Kentucky, Massachusetts, New Hampshire, North Carolina, Ohio, Oregon, Vermont, West Virginia, and Wisconsin) from January 2018 to March 2020. Rurality was defined using the US Census Bureau definition (ie, not an urban area).[17] Eligible participants reported using opioids “to get high” or had injected any drug in the prior 30 days, except Wisconsin which was limited to injection use only. Participants were 18 years or older, except for 2 sites (Illinois and Wisconsin) where the minimum age was 15 years. Participants were recruited through modified chain-referral sampling, a recruitment method similar to respondent-driven sampling.[16,18] To initiate recruitment, each study site enrolled between 42 and 279 “seeds” who represented the demographics of the population of interest and who were given up to 6 coupons to recruit within their peer network. In turn, each “seed” could then recruit up to 5 additional peers. Incentives included $40–$60 for study participation and $10–$20 per peer recruited. All study procedures were approved by each site’s IRB.

Consent and data collection

Following written consent, surveys were administered via computer through varied data collection software and were completed in 1 setting.[16] The ROI data coordinating center collected, standardized, and distributed collated data for analyses.

Harmonized survey domains included: drug use networks; socioeconomic status; types of drugs used and modes of use; drug use practices; access to supplies for injecting drugs; criminal legal involvement; access to health care; and SUD treatment.

Measures

This study evaluated 4 outcomes related to receiving recent SUD treatment: (1) any outpatient SUD counseling from a clinician or program in the prior 30 days; (2) the number of days of outpatient SUD counseling reported within the prior 6 months; (3) any medication for opioid use disorder (MOUD), including buprenorphine, methadone, or naltrexone within the prior 30 days; and (4) the number of days of self-reported MOUD use within the prior 6 months. Methadone and buprenorphine were assumed to be dosed at least daily, while buprenorphine injection and naltrexone were assumed to be dosed monthly; the number of reported buprenorphine and naltrexone injections were multiplied by 30 to give days of MOUD coverage. The number of days of use of methadone, buprenorphine, buprenorphine injection, and naltrexone injection reported were summed to give the days of MOUD coverage over the prior 6 months. Participant responses that exceeded 180 MOUD days were truncated at 180 days (n = 338 participants, 12.8%). Analyses examining MOUD were restricted to participants who reported opioid use.

The primary exposure variables were developed from 2 survey items related to cell phone and internet access. If a participant answered "Yes" to "Do you have a cell phone with active service now?" then they were recorded as having cell phone access. If a participant answered anything other than "Never" to the question "In the last 30 days, how often did you use the internet?" (ie, at least several times per month) then they were recorded as having internet access. These answers were used to create 4 primary exposure variables: (1) both cell phone and internet; (2) no cell phone; (3) no internet; and (4) neither cell phone nor internet access.

Potential covariates/confounders based on a priori literature review and team discussions included participant demographics, access to social services, and substance use behaviors.[2–4,10,11,13] Binary covariates included: gender (male, female), high school graduate or GED; married; houseless in the prior 6 months; health insurance; receipt of general health care in the prior 6 months; Supplemental Nutrition Assistance Program (SNAP) benefits; history of incarceration in the prior 6 months; any overdose in the prior 30 days; use of heroin, methamphetamine, cocaine, or heavy alcohol use (≥4 drinks/day for women; ≥5 drinks/day for men) within the prior 30 days; and ethnicity (Hispanic, not-Hispanic). Categorical covariates included race (Native American, Black, White, or Other) and frequency of injection drug use (daily, weekly, monthly, or never).

Data analyses

Four separate multivariate models assessed (1) both cell phone and internet (compared to those without both); (2) no cell phone (compared to those with a cell phone); (3) no internet (compared to those with recent internet use); and (4) neither cell phone nor internet (compared to those with either a cell phone or internet).

Selecting covariates associated with technology access groups

Three different variable selection techniques were used to select a subset of covariates that were associated with each technology access group. Covariates that were selected in 2 of the 3 selection techniques were used as confounders in multivariate models (Table S1). First, we retained covariates associated with technology access groups at $P < .10$ in bivariate logistic regression. In a second modeling approach, we used Least Absolute Shrinkage and Selector Operator (LASSO) regression and retained covariates with nonzero coefficients.[19] In the third covariate selection technique, we used Random Forests Boruta algorithms to identify important covariates.[20] Using parallel strategies with biases that are largely orthogonal provides multiple vantages to assess associations and mitigate the inherent biases associated with each method. Covariates selected by at least 2 of the 3 modeling techniques were included in the models assessing recent addiction treatment in the past 30 days and the past 6 months (Table S1).[21,22] Age, gender, ethnicity, race, and study site were retained in multivariable models assessing SUD treatment utilization, regardless of covariate selection technique.

The association of technology access groups on recent SUD treatment

Three separate mixed-effects multivariable logistic regression models were used to assess the adjusted associations of cell phone and internet, no cell phone, no internet, and neither cell phone nor internet on past 30-day receipt of outpatient SUD counseling and MOUD exposure. Mixed-effect multivariable negative binomial models were used to assess the adjusted associations of cell phone and internet, no cell phone, no internet, and neither cell phone nor internet on the total days of outpatient SUD counseling and of MOUD exposure reported in the past 6 months. The study site was included in all models as a random effect, while all other variables were treated as fixed effects.[23] There were 45 (1.5%) participants with missing data for the question “do you have an active cell phone?” and 89 (2.9%) participants with missing data for the question “how often did you use the internet in the past 30 days?” Participants with missing data for these questions were dropped from the final models and the 22 (0.7%) participants with missing data for both questions were dropped from summary statistics. All analyses were conducted in R.[24]

RESULTS

Participant characteristics

Of the 3,048 individuals enrolled in the ROI, 3,026 (99.3%) responded to items regarding cell phone access and internet use in the past 30 days (Table 1). Participants were primarily male (57.3%), White (84.8%), non-Hispanic (96.3%), and not married (87.7%) with a mean age of 36.1 (SD 10.3) years. More than half (53.7%) had been houseless in the past 6 months and 41.4% had a history of incarceration. There were 1,774 (58.6%) with both cell phone and internet, 1,061 (35.3%) without a cell phone, 293 (9.9%) who had not used the internet in the prior 30 days, and 167 (5.6%) with neither cell phone nor recent internet use.

Overall, 588 (20.7%) participants reported receiving outpatient SUD counseling within 30 days. Prior 30-day SUD counseling was less common for those without cell phones (17.8%), those without recent internet use (19.3%), and those with neither cell phone nor internet (13.9%). The mean reported days of outpatient SUD counseling within the prior 6 months among all participants was 9.6 (SD 27.0) days. Prior 6-month SUD counseling was common for participants with neither cell phone nor internet (5.3 [SD 16.1]), no cell phone (8.0 [SD 24.2]), and no internet (7.1 [SD 22.6]). Those with both a cell phone and recent internet use reported an average 10.7 (SD 28.5) days of outpatient SUD counseling in the past 6 months.

There were 492 (17.9%) participants who reported receiving MOUD within the past 30 days. Prior 30-day MOUD receipt was lower for those without cell phones (16.0%), those with no recent internet use (17.4%), and those with neither cell phone nor internet (14.8%). The mean reported days of MOUD exposure within the prior 6 months among all participants was 30.7 days (SD 62.5). Prior 6-month mean days of MOUD exposure was lower for participants without cell phones (25.4 days [SD 57.3]), no recent internet use (25.3 days [SD 56.2]), and neither cell phone nor internet (21.9 days [SD 51.2]). Those with both a cell phone and recent internet use reported a mean 34.4 (SD 65.7) days of MOUD exposure.

Covariate selection

The covariates associated with both cell and internet, no cell, no internet, and neither cell nor internet by bivariate logistic regression, LASSO regression, and Random Forest modeling are displayed in Table S1. Both gender and education level were selected among all technology access groups as important covariates.

Additional covariates selected for both cell and internet access included age, prior 6-month houselessness, health insurance, prior 6-month general health care receipt, and prior 30-day cocaine use. For no cell, additional covariates selected were prior 6-month houselessness, health insurance, prior 6-month general health care receipt, history of incarceration, and prior 30-day cocaine use. For no internet, additional selected covariates included age, prior 30-day overdose, prior 30-day methamphetamine, and heavy alcohol use. Additional covariates associated with neither cell nor internet included age, prior 6-month history of incarceration, and prior 30-day methamphetamine use and heavy alcohol use.

Associations of technology access with SUD treatment

The unadjusted and adjusted associations of each technology access category with prior 30-day outpatient SUD counseling and MOUD use, and the number of days of each over the past 6 months are reported in Table 2.

In adjusted analyses, having both a cell phone and the internet was positively associated with outpatient SUD counseling in the prior 30 days compared to those without (aOR 1.28 [95% CI 1.05–1.57]). Having both a cell phone and the internet access was associated with more days of outpatient SUD counseling (incidence rate ratio [aIRR] 1.44 [95% CI 1.10–1.89]) and more days of MOUD exposure (aIRR 1.29 [95% CI 1.11–1.52]) in the past 6 months compared to no access.

Participants without a cell phone had lower odds of reporting outpatient SUD counseling in the past 30 days compared to those with a cell phone (aOR 0.77 [95% CI 0.62–0.94]) but similar receipt of MOUD in the past 30 days (aOR 0.86 [95% CI 0.69–1.07]). Similarly, those without cell phone access reported fewer days of outpatient SUD counseling (aIRR 0.66 [95% CI 0.50–0.88]) and days of MOUD coverage (aIRR 0.77 [95% CI 0.66–0.91]) in the prior 6 months.

No internet, compared to prior-30 day internet use, was not associated with outpatient SUD counseling (aOR 0.87 [95% CI 0.64–1.17]) or use of MOUD (aOR 0.91 [95% CI 0.64–1.29]) in the past 30 days. Similarly, there was no association between internet use and the number of days of outpatient SUD counseling (aIRR 0.82 [95% CI 0.53–1.28]) or use of MOUD (aIRR 0.84 [95% CI 0.65–1.08]) in the past 6 months.

DISCUSSION

People who use drugs in rural areas of 10 US states had limited technology access prior to the beginning of COVID-19-related telemedicine expansion—fewer than 60% had recent access to both a cell phone and the internet and 35% had no cell phone. This is well below the 2021 rates of cell phone (94%) and smartphone (80%) ownership among rural Americans.[25] Though high-speed broadband internet is only available to 78% of rural America, 81% of participants in this study accessed the internet in the past 30 days.[26] After adjusting for confounders, recent combined cell phone and internet access was associated with increased receipt of outpatient SUD counseling and increased days of MOUD received. Conversely, the lack of a cell phone, but not the lack of recent internet use, was associated with decreased SUD treatment access. These findings demonstrate the importance of technology in accessing SUD treatment services prior to the COVID-19 pandemic and have important implications for telemedicine policy.

SUD treatment services delivery rapidly shifted toward telemedicine care delivery during the COVID-19 pandemic. In 2020, prior to the spread of COVID-19, telemedicine accounted for 0.1% of SUD treatment encounters and only 27% of SUD treatment facilities had telehealth capabilities in the United States.[27] This lack of services likely stemmed from restrictive policies that required in-person visits prior to the initial prescribing of MOUD and limited telemedicine to video visits conducted outside of the home.[27] Despite these restrictions, our findings suggest that having both a cell phone and the internet availability was associated with SUD treatment services engagement. These restrictions may explain the negative effect of not having a cell phone, but not lack of internet, on prepandemic SUD treatment services in our analysis; cell phones could be easily utilized for follow-up visits, whereas the internet would mostly be useful for video visits conducted outside of the home. Previous research among veterans with experiences of homelessness demonstrated that those with SUDs were significantly less likely to use secure messaging via online portals to engage in care.[28] Though not measured, low rates of secure, online messaging among our study population may in part explain the lack of effect of internet access on SUD treatment. Policy changes have since relaxed restrictions on telemedicine for SUD treatment services which may have increased access to SUD treatment via telemedicine, overall. Without closing the technology gap, however, disparities may worsen for those without a cell phone or internet access.

Globally, policy changes sought to increase the utility of telemedicine during COVID-19. In the United States, SUD treatment policy changes included: waiving requirements for in-person initial buprenorphine prescribing, increasing the number of take-home methadone doses dispensed, and allowing the use of nonpublic facing (but not yet government-approved in terms of privacy) technologies for telemedicine.[29] Similar policy changes have occurred around the globe with the rapid expansion of telemedicine use for many sectors of medical care in various stages of development.[13] In 1 study, individuals living in the rural United States were 2–3 times more likely to lack access to a smartphone with a data plan for wireless internet compared to those living in metropolitan areas,[10] consistent with our finding that over one-third of participants did not have a cell phone with active service. People with SUDs residing in rural areas without consistent technology access may not have benefitted from relaxed telemedicine policies for SUD treatment during the pandemic. Given the potential cost-benefit value of SUD treatment via telemedicine,[30,31] future development should pair policy in telemedicine for rural SUD treatment with programs that seek to expand access to cell phones and other needed infrastructure. Importantly, our findings suggest that investing in rural cell phone accessibility may have a greater benefit than broadband expansion, though rising technology use[32] and rates of OUD[33] among younger generations warrant continued research in this area.

Reimbursement for telemedicine SUD services should also be considered. Current telemedicine reimbursement policy in the United States is highly variable depending on the state and in many cases is not permanent. As of October 2021, only 11 state Medicaid programs were reimbursed for all telemedicine modalities (audio-only, remote monitoring, live video, store-and-forward) and only 22 were reimbursed for audio-only encounters.[34] Our study population had subgroups without recent access to the internet (9.9%), cell phones (35.3%), or both (5.6%). These findings suggest that flexible reimbursement systems that take video, audio-only, and other forms of digital communication into account will be necessary for telemedicine delivery to people with SUD in rural America.

The technology access gap among those experiencing homelessness or unstably housed warrants special consideration given the high rate of SUD and frequent cell phone turnover in this marginalized population.[11–13] Housing instability was prevalent in our study and associated with the lack of a cell phone. Additionally, those experiencing homelessness do not have reliable access to a landline telephone or internet. Policies that aim to expand telemedicine for rural SUD treatment must consider this population. Potential investments to help improve technology access for this population could include the creation or repurposing of safe, centrally located public facilities that can be used for private medical visits, providing free Wi-Fi internet in central areas of town, creating low-barrier options for enrolling in federal services that provide cell phones, and providing reimbursement for cell phones that can be given to patients in need.

Regardless of access to technology, a small percentage of participants received outpatient addiction counseling or MOUD within the past month (20.7% and 17.9%, respectively). An analysis of data from the 2019 National Survey on Drug Use and Health in the United States found that over 1 year 42.4% of participants from rural communities with a need for OUD treatment received any substance use treatment and only 27.8% received any MOUD.[35] Though these data represent different lengths of time (the past year vs the past month) and slightly different populations (OUD vs injection drug use in the past year), they together reinforce a need for rural expansion of SUD services.

Limitations and future directions

There are several limitations related to our findings. Our cross-sectional study design limits causal inferences. However, this analysis was designed to provide a prepandemic snapshot of rural technology access and SUD services. Because participants could not be randomized, we used 3 techniques to evaluate potential confounders which were then adjusted for in the final statistical models. Self-reported participant data may have been subject to recall bias, and we did not assess DSM-5 criteria for SUD. While highly correlated with severe use disorder, injection drug use alone would not confer a need for MOUD. Participants were not asked if any of their SUD care was via telemedicine. Future work should reassess the relationship between technology and SUD treatment services access, especially given that these data were collected prior to the COVID-19 pandemic and the subsequent policy changes related to telemedicine. We believe that this study provides a baseline for future investigations. Our analysis of technology related to SUD treatment services access was limited to active cell phone use and recent internet use. Nuances of technology use, such as having a cell phone with video capabilities, having a cell phone that only functions when Wi-Fi is available, where someone accessed the internet (public vs private environment), and the perceived usefulness of having a cell phone or available internet in interacting with services, were not assessed. Future evaluations should consider these aspects in order to help shape policy regarding telemedicine for SUD treatment.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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TABLE 1

Rural Opioid Initiative (ROI) participant characteristics by access to technology, United States, 2018–2020

	Access to technology n (%)				
	All = 3,026 (100%)	Both cell and internet = 1,774 (58.6%)	No cell = 1,061 (35.3%)	No internet = 293 (9.9%)	Neither cell nor internet = 167 (5.6%)
Age, mean (sd)	36.1 (10.3)	35.7 (10.0)	36.2 (10.3)	43.3 (11.5)	43.8 (11.2)
Gender(%)					
Male	1,725 (57.3)	954 (54.0)	647 (61.3)	192 (65.8)	110 (65.9)
Female	1,285 (42.7)	812 (46.0)	408 (38.7)	100 (34.2)	57 (34.1)
Race(%)					
Native American	222 (7.3)	127 (7.2)	85 (8.0)	18 (6.1)	11 (6.6)
Black	97 (3.2)	56 (3.2)	32 (3.0)	16 (5.4)	10 (6.0)
Other	142 (4.7)	88 (5.0)	41 (3.9)	13 (4.4)	4 (2.4)
White	2,562 (84.8)	1,500 (84.7)	903 (85.1)	246 (84.0)	142 (85.0)
Hispanic Ethnicity (%)	112 (3.7)	70 (4.0)	35 (3.3)	10 (3.5)	5 (3.1)
High school graduate or GED (%)	2,342 (77.5)	1,423 (80.3)	783 (73.9)	185 (63.4)	102 (61.4)
Married (%)	354 (12.3)	216 (12.7)	112 (11.2)	36 (13.1)	20 (12.8)
Houseless[a] (%)	1,610 (53.7)	874 (49.5)	654 (62.5)	144 (49.7)	88 (53.7)
Has health insurance (%)	2,240 (76.2)	1,361 (78.3)	740 (72.4)	221 (78.1)	123 (76.4)
Has accessed medical care[a] (%)	2,451 (82.1)	1,462 (83.5)	838 (79.8)	239 (83.9)	135 (83.3)
Has SNAP benefits (%)	1,735 (57.5)	1,038 (58.6)	595 (56.3)	168 (57.7)	92 (55.4)
History of incarceration (%)	1,142 (41.4)	668 (40.5)	417 (44.2)	75 (30.5)	45 (32.6)
History of overdose[b] (%)	169 (5.6)	89 (5.0)	68 (6.4)	18 (6.1)	9 (5.4)
Region (%)					
Illinois	173 (5.7)	102 (5.7)	54 (5.1)	26 (8.9)	11 (6.6)
Kentucky	338 (11.2)	182 (10.3)	114 (10.7)	25 (8.5)	17 (10.2)
North Carolina	350 (11.6)	218 (12.3)	115 (10.8)	29 (9.9)	14 (8.4)
New England[c]	589 (19.5)	331 (18.7)	214 (20.2)	80 (27.3)	40 (24.0)
Ohio	258 (8.5)	137 (7.7)	104 (9.8)	34 (11.6)	20 (12.0)
Oregon	174 (5.8)	95 (5.4)	74 (7.0)	17 (5.8)	13 (7.8)
Wisconsin	969 (32.0)	626 (35.3)	308 (29.0)	48 (16.4)	30 (18.0)

	Access to technology n (%)				
	All = 3,026 (100%)	**Both cell and internet = 1,774 (58.6%)**	**No cell = 1,061 (35.3%)**	**No internet = 293 (9.9%)**	**Neither cell nor internet = 167 (5.6%)**
West Virginia	175 (5.8)	83 (4.7)	78 (7.4)	34 (11.6)	22 (13.2)
Substances used[b] (%)					
Heroin	2,090 (71.0)	1,217 (70.3)	748 (72.2)	201 (71.0)	115 (71.0)
Methamphetamine	2,249 (76.1)	1,313 (75.8)	801 (77.2)	188 (65.5)	107 (65.2)
Cocaine	1,316 (45.0)	738 (43.1)	492 (47.7)	137 (47.7)	73 (44.2)
Heavy alcohol use (≥4 drinks/day for women; ≥5 drinks/day for men)	570 (19.6)	345 (20.3)	194 (18.8)	44 (15.3)	24 (14.5)
Frequency of injection drug use (%)					
Daily	1,727 (57.5)	996 (56.6)	635 (60.2)	162 (56.1)	94 (56.7)
Weekly	490 (16.3)	282 (16.0)	175 (16.6)	40 (13.8)	22 (13.3)
Monthly	374 (12.4)	232 (13.2)	123 (11.7)	36 (12.5)	25 (15.2)
Never	411 (13.7)	996 (56.6)	121 (11.5)	51 (17.6)	24 (14.5)
Received outpatient addiction counseling[b] (%) (n = 2,847)	588 (20.7)	377 (22.3)	175 (17.8)	50 (19.3)	23 (15.9)
Received MOUD[b] (%) (n = 2,747)[d]	492 (17.9)	313 (19.1)	150 (16.0)	43 (17.4)	20 (14.8)
Days of outpatient addiction treatment[a] mean (SD)	9.6 (27.0)	10.7 (28.5)	8.0 (24.2)	7.1 (22.6)	5.3 (16.1)
Days of MOUD exposure[a] mean (SD)[d]	30.7 (62.5)	34.4 (65.7)	25.4 (57.3)	25.3 (56.2)	21.9 (51.2)

[a] Reference period: prior 6 months.

[b] Reference period: prior 30 days.

[c] New England included 3 states: Massachusetts, New Hampshire, and Vermont.

[d] Participants who had never used opioids to get high were excluded (n = 98).

TABLE 2

Unadjusted and adjusted effect of technology access on outpatient and MOUD access within the past 30 days, and the number of days received within the past 6 months, United States, 2018–2020

	Received outpatient addiction counseling within past 30 days (OR)	Received any MOUD within past 30 days (OR)	Days of outpatient addiction counseling in the past 6 months (IRR)	Days of MOUD exposure in the past 6 months (IRR)
Cell and internet				
Unadjusted	1.28 (1.07–1.53), $P = .0072$	1.22 (1.01–1.48), $P = .036$	1.27 (0.99–1.62), $P = .059$	1.33 (1.15–1.53), $P < .001$
Adjusted	1.28 (1.05–1.57), $P = .014$	1.16 (0.94–1.44), $P = .16$	1.44 (1.10–1.89), $P = .0077$	1.29 (1.11–1.52), $P = .0014$
No cell				
Unadjusted	0.78 (0.65–0.94), $P = .011$	0.83 (0.68–1.004), $P = .057$	0.80 (0.62–1.03), $P = .077$	0.78 (0.67–0.90), $P < .001$
Adjusted	0.77 (0.62–0.94), $P = .013$	0.86 (0.69–1.07), $P = .19$	0.66 (0.50–0.88), $P = .0040$	0.77 (0.66–0.91), $P = .0021$
No internet				
Unadjusted	0.87 (0.64–1.17), $P = .36$	1.01 (0.74–1.37), $P = .94$	0.82 (0.56–1.26), $P = .34$	0.84 (0.67–1.07), $P = .15$
Adjusted	0.80 (0.57–1.12), $P = .19$	0.91 (0.64–1.29), $P = .61$	0.82 (0.53–1.28), $P = .39$	0.84 (0.65–1.08), $P = .18$
No cell nor internet				
Unadjusted	0.71 (0.46–1.06), $P = .11$	0.92 (0.60–1.37), $P = .71$	0.68 (0.41–1.20), $P = .15$	0.78 (0.58–1.08), $P = .12$
Adjusted	0.63 (0.40–0.99), $P = .046$	0.83 (0.53–1.31), $P = .42$	0.64 (0.37–1.13), $P = .13$	0.71 (0.51–0.98), $P = .039$