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Receipt of Addiction Treatment as a Consequence of a Brief Intervention for Drug Use in Primary Care: A Randomized Trial

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Abstract

Background and aims—Screening, brief intervention and 'referral to treatment' programs have been widely promoted as US federal policy. Little is known about the efficacy of the RT component (referral to treatment) of brief intervention for motivating patients with unhealthy drug use identified by screening to use addiction treatment. This study aimed to compare receipt of addiction treatment following two types of brief intervention for drug use vs a no-intervention control group among primary care patients screening positive for drug use.

Design—Secondary analyses from a single-site randomized controlled trial.

Setting—Massachusetts, USA

Participants—528 adults with Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) drug specific scores ≥4.

Interventions—Random assignment to: (1) a 10-15 minute brief negotiated interview (BNI) conducted by health educators (n=174), (2) a 30-45 minute adaptation of motivational interviewing by Masters-level counselors (MOTIV) (n=177), or 3) no BI (n=177). All received a list of treatment and mutual help resources; both intervention protocols included dedicated staff for treatment referrals.

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Measurements—Receipt of any addiction treatment within 6 months after study entry, assessed in a statewide database and hospital electronic medical record linked to trial data

Findings—Among 528 participants, the main drugs used were marijuana (63%), cocaine (19%), and opioids (17%); 46% met past-year drug dependence criteria (short form Composite International Diagnostic Interview); and 10% of MOTIV, 18% of BNI, and 17% of control participants had any addiction treatment receipt within 6 months after study entry. There was no significant difference in addiction treatment receipt for BNI vs control (AOR 1.11; 95%CI 0.57, 2.15, Hochberg adjusted p=0.76). The MOTIV group had lower odds of linking to treatment (AOR 0.36, 95%CI: 0.17, 0.78, Hochberg adjusted p=0.02) compared with the no BI group.

Conclusion—Brief intervention delivered in primary care for screen-identified drug use did not significantly increase addiction treatment receipt; a motivational interviewing approach appeared to be counterproductive.

Keywords

health services research; drug use; primary care

Introduction

Unhealthy alcohol and other drug use, ranging from risk of harmful consequences to diagnosis of substance use disorder (SUD), is not adequately addressed in health care settings. Brief interventions for drugs in primary care settings have no or at best modest effect[1,2,3] and for those who have a disorder, approaches rely on referral to treatment.[4,5] Few people with SUDs (11.6%) receive treatment.[6] Furthermore, referral from medical care settings is not a common source for such treatment.[6]

Although brief intervention (BI) may be inadequate as a stand-alone intervention, it is possible that BI is effective for facilitating linkage to addiction treatment for those with more severe drug use. To date, there has been relatively little in the way of randomized controlled trials (RCT) of BI for drug use on addiction treatment entry in primary care. This despite the widespread implementation of Screening, Brief Intervention, and Referral to Treatment (SBIRT programs) to screen and conduct BI for patients with unhealthy drug use and refer those with SUDs to treatment.[5] The few studies investigating treatment receipt after BI for drug use have had mixed results ranging from greater addiction treatment access in an observational study[7] to no effect on treatment entry in 2 randomized trials, one of which was in urgent care.[2,8] Glass et al. found in a systematic review that unhealthy alcohol use had no effect on receipt of treatment, although BIs in almost half of the RCTs did not include any referral specific processes.[9] Another limitation is the exclusion of patients with more severe drug use who might benefit from specialty treatment.[1] The absence of objectively assessed treatment entry as an outcome and insufficient data on primary care patients are other limitations. Along with studies of the effectiveness of BI with referral-specific efforts for drug use on treatment entry,[10] a better understanding is needed of who with screen-identified substance use in primary care is likely to receive addiction treatment to support coordination of primary care with substance use and mental health care.[11,12,13]

The primary objective of the current study was 1) to compare addiction treatment receipt following two different types of motivational BIs for drug use versus a no-intervention control group, among primary care patients with drug use identified by screening. Both interventions included referral to treatment (RT) when appropriate. Given the gaps in what is known about treatment utilization among primary care patients with screen-identified drug use, an exploratory aim was 2) to identify patient-level factors associated with addiction treatment receipt.

Methods

Study design

We present a pre-specified secondary analysis of treatment receipt from the Assessing Screening Plus Brief Intervention's Resulting Efficacy to stop drug use (ASPIRE) study, a randomized controlled trial (RCT) of two types of BI in primary care for screen-identified unhealthy drug use (clinicaltrials.gov Identifier: NCT00876941). Previous analyses showed no reductions by intervention group in drug use or drug-associated consequences.[3] The primary objective of the current study was to test whether addiction treatment receipt differed across study arms. We also conducted exploratory analyses examining potential associations between patient-level factors and treatment receipt. The study was approved by the Institutional Review Boards of the Boston University Medical Campus and the Massachusetts Department of Public Health.

Participants

Recruitment occurred in the waiting room of an urban, hospital-based primary care practice. ASPIRE study participants, described in greater detail in Saitz et al.,[3] were adults presenting for an appointment with a primary care clinician (PCC) with recent (i.e. past- 3 month) unhealthy drug use. Screening for unhealthy drug use was conducted by a health educator employed by the hospital (Boston Medical Center) or a research assistant trained in the same role. Eligibility criteria included a drug-specific Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) score of 4 or greater, indicating weekly or more drug use (including prescription misuse) or less frequent use with a consequence.[14] Patients were excluded if they did not speak English or Spanish, planned to leave the Boston area that would prevent research participation, could not provide contact information for tracking purposes, or were pregnant.

Randomization and Intervention

After study enrollment, ASPIRE participants were randomly assigned to receive: 1) a single 15-minute Brief Negotiated Interview (BNI) by a health educator;[8] 2) 30-45 minute in-person motivational interviewing (MOTIV) with an offered booster session (in-person or by telephone) conducted by Masters-degree level counselors; or 3) no BI. Participants were randomly assigned to treatment arms using a stratified permuted block randomization procedure to balance random assignment by past-year drug dependence (short form Composite International Diagnostic Interview[15] [CIDI-SF]) and main drug (self-identified drug of most concern at enrollment). All received printed information about treatment resources including phone numbers/web addresses for mutual help groups, the hospital

behavioral health clinic and emergency department (ED), city SUD triage and a state treatment locator line. Brief Treatment (BT) -- 12 sessions of motivational interviewing/ cognitive behavioral therapy -- by a primary care-based social worker was available. RT for BNI participants was made by health educators and for MOTIV participants, the BT specialist.

Referrals were made based on an assessment of severity (e.g. ASSIST score, past-year drug dependence [CIDI-SF], inability to abstain or cut down) and motivation. Participant interest in a referral and plans were communicated to the PCC in the electronic medical record (EMR). Participants could be referred to BT, an Office-based Opioid Treatment (OBOT) Program (also located in primary care), or outside treatment programs (via Boston Medical Center [BMC] treatment referral specialists available by phone or in-person in the ED). Participants were accompanied by counselors/educators to BT or OBOT for a “warm handoff.” All participants had access to the same treatment resources.

Both types of interventions were audio-recorded and coded using the Motivational Interviewing Treatment Integrity (MITI) scale and a study-developed instrument measuring study fidelity.[3] Both interventions had scores consistent with proficiency.

Measures

Outcome: receipt of addiction treatment—We linked two data sources to the standardized in-person research interviews: 1) BMC EMR and 2) Massachusetts Bureau of Substance Abuse Services (BSAS) treatment data, which includes discharge data from all specialty programs that contract with the state for public funding. This dataset includes utilization in programs receiving Medicaid-reimbursed care or block grant funds for treatment resources not reimbursed by Medicaid. ASPIRE enrollees were matched to BSAS admission and discharge records on birthdate, gender, first and last name initials, and social security number.

The outcome, addiction treatment receipt within a 6-month period after study enrollment was identified in the BSAS and BMC EMR data. Modalities captured in the BSAS data included detoxification, outpatient treatment, residential treatment, medication-assisted treatment, transitional services, and a range of support services.[16] Treatment services provided at BMC included addiction pharmacotherapy, ascertained by computerized search of participants' medication lists in the EMR.

Main independent variables and covariates—For the primary analysis, randomization group was the main independent variable. The covariates were past treatment utilization (6-months prior to study entry) and randomization stratification factors were (past-year drug dependence (CIDI-SF) and main drug).

To select main independent variables for the exploratory analysis of predictors of addiction treatment receipt, we used the Behavioral Model for Vulnerable Populations,[17] which characterizes healthcare utilization as a function of (1) need for care; (2) predisposing sociodemographic vulnerabilities that influence access to care; and (3) enabling factors that facilitate or impede receipt of care.

We examined the following need factors: main drug type, drug-related consequences (Short Inventory of Problems-Drug),[18] alcohol-specific ASSIST score ≥27 (alcohol use risk score consistent with dependence), drug-specific ASSIST score ≥27 (drug use risk score consistent with drug dependence), and severity of total substance involvement (Global ASSIST for drugs).[14]

Predisposing factors included: age, sex, race/ethnicity, living with children, employment, homelessness (any night in shelter/street in the past 3 months), criminal justice involvement, depressive symptoms (Patient Health Questionnaire (PHQ-9),[19] overall health status (EuroQol),[20] and severe pain (average level of ≥7 on 1 to 10 scale over the past 3 months).

Enabling factors included: primary language, health insurance, substance use within peer-group, past addiction treatment receipt, and ED utilization (past 3 months).

Statistical analysis

To describe the cohort, we calculated proportions, means, standard deviations, medians, and interquartile ranges as appropriate for all variables.

For the RCT analysis, the two main comparisons of interest were between each BI vs. control. Analyses were conducted using the intention-to-treat principle, analyzing participants according to randomized group. There were no missing values for intervention status, covariates, or outcomes.

This primary analysis of treatment receipt used multivariable logistic regression models, adjusted for the randomization stratification factors stated above. To assess the degree of confounding by addiction treatment receipt before study entry, we report “partially” adjusted models in which past addiction treatment receipt was not included in regression models. As in the main trial results, we corrected for multiple comparisons within outcome using the Hochberg procedure.[21]

To explore potential effect modification, we tested a series of interactions between randomization group and four separate factors: main drug, past-year drug dependence (CIDI-SF), past addiction treatment, and main drug-specific ASSIST score of ≥27. Our original data analysis plan was to conduct subsequent stratified analyses for interactions with $p<0.15$ in order to describe how intervention effects appeared to differ across groups. As a result of peer review, we conducted post-hoc subgroup analyses among those with: 1) ASSIST score ≥27 and 2) ASSIST score ≥27 whose main drug was not marijuana.

For the exploratory analysis identifying predictors of addiction treatment receipt, we used separate logistic regression models for each main independent variable of interest with the following covariates in models where the variable was not the main predictor: age, sex, race/ethnicity, primary language, depressive symptoms, main drug, and past treatment utilization. No pair of covariates and main independent variables had correlation greater than 0.40.

Additional confirmatory analyses adjusted for randomization group and health insurance in models where the main independent variable was significant at $p<0.05$. Finally, a single logistic regression model was fit with all significantly associated patient-level factors and

core covariates. The full model did not include Global ASSIST score due to correlation with main drug (rho=0.51). We did not adjust for multiple comparisons due to the hypothesis-generating nature of the analysis. All analyses were completed using SAS/STAT software, Version 9.3 (SAS Institute).

Results

Study participants

Table 1 shows the characteristics of the study sample overall and by randomization group. The most common main drug was marijuana (63%) followed by cocaine (19%), and opioids (17%). Almost half had past-year drug dependence (46%) based on the CIDI-SF, but only 18% had a current ASSIST drug risk score consistent with dependence. Randomization arms were balanced for all variables including past addiction treatment receipt. Addiction treatment receipt for the cohort was 14% (73/528) within a 6-month period before study entry and 15% (78/528) within 6 months after study entry.

Intervention effects on addiction treatment receipt

There were no significant differences in addiction treatment receipt between the BNI and control groups in the partially or fully adjusted models: BNI vs control (AOR 1.11, 95% CI: 0.57, 2.15, Hochberg adjusted p-value 0.76). Participants in the MOTIV group had lower odds of receiving treatment in the partially and fully adjusted models compared to those in the control group (AOR 0.36, 95% CI: 0.17, 0.78, Hochberg adjusted p-value 0.02) (Table 2).

We identified potential interactions between intervention group and (CIDI-SF-assessed) drug dependence and prior addiction treatment. Stratified analyses suggested that among those with past-year drug dependence, the MOTIV intervention results in significantly lower odds of receiving treatment (AOR 0.21, 95% CI: 0.08, 0.54). In contrast, for those without past-year drug dependence, the MOTIV intervention appeared to increase the odds of receiving treatment (AOR 1.41, 95%CI: 0.35, 5.76), although the results were not statistically significant.

For those with prior treatment experience, the MOTIV intervention resulted in significantly lower odds of receiving addiction treatment (AOR 0.15, 95%CI: 0.03, 0.64), whereas among those without prior treatment experience, the magnitude of effect appeared smaller and not statistically significant (AOR 0.67, 95%CI: 0.26, 1.70).

Subgroup analyses of participants with ASSIST scores of ≥27 (n=97), and those with ASSIST scores of ≥27 for drugs other than marijuana (n=70), did not support the hypothesis that BI was associated with increased treatment utilization.

Patient-level factors associated with receipt of addiction treatment

In adjusted analyses of need characteristics (Table 3), the odds of addiction treatment receipt were lower for those with marijuana as the main drug and higher for those with an alcohol-specific ASSIST score ≥27. Greater severity of total substance involvement (Global ASSIST score), but not the drug-specific ASSIST score for the main drug was significantly

associated with higher odds of treatment receipt although the effect size was small (AOR 1.14 95%CI 1.06, 1.22 per 5-unit increase in Global ASSIST score).

Older age was significantly associated with lower odds of addiction treatment (AOR 0.83 per 5-year increase, 95%CI: 0.72, 0.96) (Table 4). We did not detect differences for other predisposing characteristics including sex, race/ethnicity, employment, housing status, criminal justice involvement, depression, overall health status, or chronic pain.

Past addiction treatment was the only enabling characteristic significantly associated with treatment receipt after baseline (AOR 5.77, 95%CI: 2.94, 11.34) (Table 5). Models that included health insurance status and intervention arm as well as a full regression model with statistically significant factors were not materially different (in magnitude, direction, or statistical significance).

Discussion

In this cohort of primary care patients with screen-identified drug use, neither BI method resulted in greater addiction treatment receipt compared to no intervention. MOTIV, the enhanced BI, resulted in *lower* odds of addiction treatment receipt. Stratified analyses suggested that the negative effect of MOTIV was among those with past-year drug dependence and those with previous addiction treatment utilization.

This study is one of the very few randomized trials of BI for screen-identified drug use in primary care on treatment receipt. Both BI protocols had fairly robust referral to treatment services that included active efforts by interventionists to link participants to treatment and dedicated staff for treatment referrals, unlike other studies of BI on treatment receipt.[9] We examined referral to treatment in an environment in which health insurance was largely not a factor in obtaining some exposure to specialty treatment because treatment entry is funded, when necessary, through contracts with the Massachusetts Bureau of Substance Abuse Services. The lack of a positive effect of BI found in this study is aligned with results of two RCTs of drug use screening and BI that found no effect on specialty treatment utilization.[2,8] An observational study in primary care found that SBIRT was associated with more referrals to addiction treatment, but not actual treatment receipt.[22] These studies call into question reliance on BI as the sole method of ensuring addiction treatment receipt by patients in primary care settings.

Our study's results may reflect the fact that accessing treatment is a challenging process in primary care.[12] Typically the patient is presenting for another reason, has drug use identified by screening (i.e., is not raising drug use as a concern), may not be motivated to change, and has no expectation that the clinician will address drug use. Referrals are time-consuming (e.g., identifying treatment resources, calling treatment programs, obtaining insurance approval, coordinating concrete needs such as transportation) and treatment capacity is often inadequate.[23, 24] It is possible that BI helped patients to realize *why* they might seek treatment, but not *how* to access treatment or help them feel empowered to seek treatment.

The study's null findings are not likely to have been affected by provision of information about treatment services to control participants, given that the simple provision of phone

numbers is not thought to have large effects on treatment receipt and overall rates were very low in all groups. Lack of effects may be due to the study design, in that there were no exclusions for heavy drinking, multiple drug use, or other comorbidities. However, these high-risk characteristics are the norm in other primary care samples, and thus would be the proper group to study rather than exclude. Although we cannot rule out the potential effect of assessment reactivity on control participants, these “high-risk” characteristics make it unlikely that assessment effects would have had a strong influence on treatment receipt for the control group. Furthermore, since treatment receipt did not increase in any group compared to the period before study entry, it is difficult to postulate any significant assessment reactivity.

Although the differential effect of BI on those with and without drug dependence is intriguing, and the decreased likelihood of treatment receipt for the MOTIV group unexpected, the finding should be interpreted with caution. It is possible that treatment receipt was related to the semi-structured format of the MOTIV intervention. As motivational interviewing is a collaborative approach to change, the intervention structure was guided by patient responses and may not have emphasized specialty treatment in each BI. Another possible factor is that in the BNI arm, the health educator, located in primary care, conducted screening, BNI, made referrals to treatment and was available to see participants on subsequent primary care visits. The MOTIV interventionist was not part of the primary care practice and referred participants interested in addiction treatment to the BT counselor. Having one person perform these tasks may be beneficial for treatment access.[7,8]

An exploratory objective beyond the RCT was to identify patient-level factors associated with addiction treatment receipt for primary care patients with drug use identified by screening. Older age was a negative factor, as in other studies.[25] The odds of treatment receipt were higher for those with likely alcohol dependence, and lower for those with marijuana as the main drug. Patients and clinicians may perceive marijuana use disorder to be less severe than other SUDs, even when objective signs of severity (e.g., disorder criteria, ASSIST scores) are similar.

The study results should be interpreted with the following limitations. Although referral was part of the BI, it was not mandated for all, and although a motivational intervention was used for referral, there was not a singular focus on an intensive referral. Addiction treatment utilization was not available from Veterans Affairs institutions, private facilities that never receive state funds, or programs out of state, although these were unlikely sources of care for our population. Additionally, we did not have data from psychiatric settings that do not contract with the state of Massachusetts as addiction treatment facilities or data from 12-step mutual help groups; our aim was addiction treatment receipt.

We did not evaluate treatment adequacy or clinical outcomes of treatment, though only a minority received any. Moreover, this study's findings may not extend to study samples with a higher prevalence of severe SUDs or more use of drugs such as cocaine or opioids (although these were the main drugs for almost 40% of the study sample). It is notable that more people received treatment in the U.S. for marijuana than for any other substance.[6]

Drug type was defined as self-reported drug of most concern at enrollment. Patients may not have been concerned about a drug with clinically more serious implications that would enhance likelihood of a treatment admission. However, 93% of participants reported their drug of main concern to be the one for which they scored highest on the ASSIST. Moreover, main drug type was entered as a covariate, not as an independent predictor.

Finally, generalizability of results from an urban academic center with a diverse but largely low-income population may be limited. On the other hand, results are likely applicable to similar centers, of which there are many in the US. We did not find, however, that homelessness, overall health status or depression symptoms, factors that could vary by setting, were associated with treatment receipt. Findings could also differ based on access and quality of treatments that were available locally.

In addition to being one of the few RCT's of BI for drug use in primary care on addiction treatment entry, there are several other study strengths. Two types of BI were examined: one offered in routine clinical care and an “enhanced” BI intended to address efficacy considerations. Patients with more severe drug use who might benefit from specialty treatment were not excluded and random assignment was balanced by drug dependence and main drug. Treatment receipt was assessed objectively.

This study's findings add to the growing number of studies that suggest that the “RT” component of SBIRT does not increase receipt of addiction treatment. The RCT results presented here apply to both the most commonly implemented modes of BI in US federally-supported SBIRT programs, as well as to more intensive and more difficult to implement motivational interviewing based BI. The cohort analysis presented here suggest that particular attention may be needed for older patients, those with marijuana use as their main drug, and those without concomitant alcohol use disorders. The findings suggest that one should not rely on RT in the context of SBIRT as a sole method of addressing SUDs and that research is needed on better ways to increase treatment receipt with referral and to increase treatment receipt *regardless of* referral (e.g. in medical settings). Both of these will likely require greater effort and new methods that are not part of the current SBIRT dissemination.

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Table 1

Characteristics of primary care patients with unhealthy drug use identified by screening enrolled in a randomized trial of 2 types of brief interventions[a]

Characteristic, n (%)	Overall n=528	BNI n=174	MOTIV n=177	No BI n=177
Age, mean years (STD)	41 (12)	40 (12)	43 (12)	41 (13)
Male sex	369 (70%)	124 (71%)	126 (71%)	119 (67%)
Race/ethnicity, non-white	423 (80%)	142 (82%)	140 (79%)	141 (80%)
Currently employed	145 (27%)	51 (29%)	41 (23%)	53 (30%)
Homeless [b]	88 (17%)	24 (14%)	32 (18%)	32 (18%)
Criminal justice involvement				
Incarceration	23 (4%)	6 (3%)	5 (3%)	12 (7%)
Probation/parole	36 (7%)	12 (7%)	9 (5%)	15 (8%)
None	469 (89%)	156 (90%)	163 (92%)	150 (85%)
Depressive symptoms (PHQ-9 ≥ 10) [c]	189 (36%)	63 (36%)	66 (37%)	60 (34%)
Health insurance				
Medicaid/Medicare	429 (81%)	138 (79%)	153 (86%)	138 (78%)
Private/Commercial	69 (13%)	24 (14%)	18 (10%)	27 (15%)
None	30 (6%)	12 (7%)	6 (3%)	12 (7%)
Primary Language				
Not English	40 (8%)	11 (6%)	9 (5%)	20 (11%)
English	488 (92%)	163 (94%)	168 (95%)	157 (89%)
Emergency Department visit past 3 months	189 (36%)	65 (37%)	59 (33%)	65 (37%)
Main drug [d]				
Cocaine	98 (19%)	32 (18%)	33 (19%)	33 (19%)
Opioids	90 (17%)	31 (18%)	28 (16%)	31 (18%)
Marijuana	331 (63%)	109 (63%)	111 (63%)	111 (63%)
Other (sedative, amphetamine)	9 (2%)	2 (1%)	5 (3%)	2 (1%)
Past year drug dependence (CIDI-SF) [e]	245 (46%)	80 (46%)	83 (47%)	82 (46%)
Drug-specific ASSIST score ≥ 27 [f]	97 (18%)	29 (17%)	28 (16%)	40 (23%)
Alcohol ASSIST score ≥ 27 [f]	55 (10%)	14 (8%)	20 (11%)	21 (12%)
Past addiction treatment [g]	73 (14%)	22 (13%)	26 (15%)	25 (14%)
Addiction treatment receipt within 6 months after study entry	78 (15%)	31 (18%)	17 (10%)	30 (17%)

[a] Two different brief interventions: MOTIV, a 30-45 minute adaptation of motivational interviewing conducted by Masters-degree level counselors and a 15 minute Brief Negotiated Interview (BNI) by a health educator. All characteristics assessed at baseline except where indicated.

[b] Any night in the past 3 months in a shelter or on the street

[c] Patient Health Questionnaire; higher scores indicate worse depressive symptoms (over past 2 weeks)

[d] Main drug was drug of most concern in past month, as determined by participant

[e] Composite International Diagnostic Interview Short Form

[f] Alcohol, Smoking, and Substance Involvement Screening Test score for the main drug (or alcohol): Substance-specific scores range from 0-39; 27+ indicates likely severe use disorder

[g]Past addiction treatment defined as any addiction treatment in the 6 months before study entry.

Table 2

Multivariable logistic regression analyses evaluating the effect of 2 types of brief interventions for drug use on addiction treatment receipt

	MOTIV vs no BI AOR (95%CI)	p-value[l]	BNI vs no BI AOR (95%CI)	p-value[j]
Overall analysis				
Unadjusted [a]	0.52 (0.28, 0.98)	0.09	1.06 (0.61, 1.85)	0.83
Partially adjusted [b]	0.46 (0.23, 0.91)	0.05	1.08 (0.58, 2.00)	0.82
Fully adjusted [c]	0.36 (0.17, 0.78)	0.02	1.11 (0.57, 2.15)	0.76
Stratified by drug dependence [d]				
Yes [e]	0.21 (0.08, 0.54)	0.003	0.97 (0.43, 2.18)	0.94
No [f]	1.41 (0.35, 5.76)	0.63	1.64 (0.43, 6.30)	0.63
Stratified by past addiction treatment [g]				
Yes [h]	0.15 (0.03, 0.64)	0.01	0.93 (0.19, 4.40)	1.00
No [i]	0.67 (0.26, 1.70)	0.69	1.18 (0.52, 2.70)	0.69
Subgroup analyses				
Main drug with ASSIST 27+ [j]				
Unadjusted	0.57 (0.22, 1.66)	0.55	1.35 (0.51, 3.56)	0.55
Adjusted for past addiction treatment	0.25 (0.07, 0.95)	0.08	0.85 (0.26, 2.76)	0.79
Main drug other than marijuana with ASSIST 27+ [k]				
Unadjusted	0.45 (0.14, 1.45)	0.36	1.38 (0.44, 4.37)	0.58
Adjusted for past addiction treatment	0.28 (0.07, 1.05)	0.12	0.93 (0.26, 3.36)	0.92

[a] Logistic regression models examining the effect of enhanced brief intervention (MOTIV) vs no brief intervention (BI) and a structured brief negotiated interview (BNI) vs no BI on addiction treatment receipt.

[b] Partially adjusted model includes main drug type and past year drug dependence (Composite International Diagnostic Interview short form)

[c] Fully adjusted model includes main drug type, past year drug dependence and any past addiction treatment in the 6 months before study entry

[d] Stratified by past-year drug dependence, adjusted for main drug type and past addiction treatment

[e] N=245. Significant covariates: past addiction treatment AOR (95%CI) 8.88 (4.01, 19.67)

[f] N=283 Significant covariates: past addiction treatment AOR (95%CI) 9.05 (1.71, 48.02)

[g] Past addiction treatment defined as any addiction treatment in the 6 months before study entry. Models adjusted for main drug type and past year drug dependence

[h] N=73. No significant covariates

[i] N=455, Significant covariates: main drug type, marijuana vs benzo/amphet AOR (95%CI) 0.14 (0.02, 0.77)

[j] Analytic sample restricted to participants with a main drug ASSIST score of 27 or greater (n=97)

[k] Analytic sample restricted to participants with a main drug that was not marijuana with an ASSIST score of 27 or greater (n=70)

[l] Adjusted for multiple comparisons using the Hochberg procedure

Table 3

Need factors associated with addiction treatment [a]

Predictor	Received addiction treatment			
	Yes (n=78)	No (n=450)	AOR (95% CI)	p-value
Main drug[b]				
Cocaine	21 (27%)	77 (17%)	3.90 (1.69, 8.99)	0.001
Opioids	37 (47%)	53 (12%)	6.84 (3.13, 14.95)	<.001
Other (sedative, amphetamine) [c]	3 (4%)	6 (1%)	11.73 (2.14, 64.24)	0.005
Marijuana	17 (22%)	314 (70%)	1	--
SIP-Drug (tertiles)[d]				
Highest	48 (62%)	128 (29%)	1.20 (0.43, 3.32)	0.73
Middle	21 (27%)	164 (37%)	1.77 (0.71, 4.38)	0.22
Lowest	8 (10%)	156 (35%)	1	--
Alcohol ASSIST score				
Greater than or equal to 27 [e]	19 (24%)	36 (8%)	2.71 (1.21, 6.05)	0.02
Less than 27	59 (76%)	414 (92%)	1	--
Drug specific ASSIST score [f]				
Greater than or equal to 27	35 (45%)	62 (14%)	1.33 (0.66, 2.67)	0.42
Less than 27	43 (55%)	388 (86%)	1	--
Global ASSIST for Drugs, median (IQR) [g]	33 (19, 52)	15 (10, 24)	1.14 (1.06, 1.22)	<0.001

[a] Addiction treatment receipt between baseline and 6 months. Separate logistic regression models for each independent variable of interest The following variables were included as covariates in models where the variable was not the main predictor: age, sex, race/ethnicity, primary language, depressive symptoms, baseline past addiction treatment receipt, and main drug type.

[b] Main drug used in the past month

[c] Results for cocaine, opioid, and marijuana were similar in models that did not include the small number of participants with sedative/ampheamine as the main drug

[d] Drug use consequences

[e] Alcohol, Smoking, and Substance Involvement Screening Test Substance-specific scores range from 0-39; 27+ indicates likely substance use disorder

[f] Measure of severity of total drug use involvement. Global scores range from 0-273. Higher scores indicate riskier use/greater severity.

[g] Severity of total drug involvement

Table 4

Predisposing factors associated with receipt of addiction treatment[a]

	Received addiction treatment			
Predictor	**Yes (n=78)**	**No (n=450)**	**AOR 95%CI**	**p-value**
Age (mean, STD) [b]	38 (11)	42 (13)	0.83 (0.72, 0.96)	0.01
Sex				
Female	23 (29%)	136 (30%)	0.77 (0.40, 1.50)	0.44
Male	55 (71%)	314 (70%)	1	
Race/ethnicity				
Non-white	46 (59%)	377 (84%)	0.80 (0.40, 1.61)	0.54
White	32 (41%)	73 (16%)	1	
Living with children				
Yes	6 (8%)	109 (24%)	0.41 (0.15, 1.13)	0.09
No	72 (92%)	341 (76%)	1	--
Currently employed	13 (17%)	132 (29%)	0.60 (0.28, 1.27)	0.18
Homeless, past 3 months	27 (35%)	61 (14%)	1.87 (0.91, 3.80)	0.09
Criminal justice involvement:				
Incarceration	8 (10%)	15 (3%)	2.16 (0.72, 6.52)	0.17
Probation/Parole	12 (15%)	24 (5%)	1.50 (0.56, 4.05)	0.42
None	58 (75%)	411 (91%)	1	
Depressive symptoms[c]				
PHQ9 score > =10	40 (51%)	149 (33%)	1.35 (0.74, 2.46)	0.33
PHQ9 score < 10	38 (49%)	301 (67%)	1	--
Overall health status (EUROQOL)				
Lowest tertile	27 (35%)	146 (32%)	0.59 (0.26, 1.35)	0.21
Middle tertile	31 (40%)	171 (38%)	0.90 (0.42, 1.91)	0.78
Highest tertile	20 (26%)	133 (30%)	1	
Severe pain [d]				
Yes	38 (49%)	220 (49%)	0.99 (0.54, 1.82)	0.97
No	40 (51%)	230 (51%)	1	--

[a] Addiction treatment receipt between baseline and 6 months. Separate logistic regression models for each independent variable of interest The following variables were included as covariates in models where the variable was not the main predictor: age, sex, race/ethnicity, primary language, depressive symptoms, baseline past addiction treatment receipt, and main drug type.

[b] Per 5-year increase

[c] Patient Health Questionnaire, questions reference past 2 weeks

[d] Pain (average in past 3 months, 7 -10 vs less than 7)

Table 5

Enabling factors associated with receipt of addiction treatment[a]

Predictor	Received addiction treatment N=78	No addiction treatment receipt N=450	AOR 95%CI	p-value
Primary language				
Other Language	3 (4%)	37 (8%)	0.33 (0.08, 1.30)	0.11
English	75 (96%)	413 (92%)	1	--
Health insurance				
Medicaid/Medicare	69 (89%)	360 (80%)	0.96 (0.37, 2.51)	0.93
None vs Private	2 (3%)	28 (6%)	0.33 (0.05, 2.15)	0.25
Private/Commercial	7 (9%)	62 (14%)	1	
Number of peers problem substance users				
Half or more	41 (53%)	144 (32%)	1.31 (0.71, 2.42)	0.39
None to a few	37 (47%)	306 (68%)	1	--
Past addiction treatment				
Yes	41 (53%)	32 (7%)	5.77 (2.94, 11.34)	<.001
No	37 (47%)	418 (93%)	1	--
ED visit, past 3 months				
Yes	33 (42%)	156 (35%)	1.05 (0.57, 1.92)	0.88
No	45 (58%)	294 (65%)	1	--

[a]Addiction treatment receipt between baseline and 6 months. Separate logistic regression models for each independent variable of interest The following variables were included as covariates in models where the variable was not the main predictor: age, sex, race/ethnicity, primary language, depressive symptoms, baseline past addiction treatment receipt, and main drug type.