The effect of employment-based contingency on treatment enrollment, retention, and long-term abstinence among individuals with substance use disorder: A systematic review

Abstract

Background and Objective:
Substance use disorders (SUD) remain a major public health concern and represent a significant cause of morbidity and mortality. Our goal in this study is to explore and determine the effect(s) of employment-based contingency (EBC) on enrolling SUD individuals into treatment, the rate of treatment adherence, and the rate of post-treatment abstinence.

Methods:
PubMed and Google Scholar search was conducted using the search terms ((substance use disorder) AND (unemployment)) OR (therapeutic workplace)), for randomized controlled trials (RCT) published between 2012 and 2022, reporting on participants between ages 18 and 65 years who use opioids, cocaine or alcohol.

Result:
Seven RCT which met the criteria and addressed the study objectives had a total of 389 participants. Three RCT of the seven with 203 participants found EBC to positively impact the rate of enrollment to treatment with 100%, 92%, and 100% enrollment rates in the respective studies. Three articles with 172 participants found a higher rate of treatment adherence and retention to treatment among EBC participants compared to the control group. There was more naltrexone-positive urine in the EBC group compared to control (72% vs. 21%, with a p-value of .01), and 74% (EBC) vs 26% (control) participants completed treatment. Four articles with 238 participants found that EBC improved the rate of abstinence by over 50%, which is double the rate among the control group without EBC.

Conclusion:
EBC is effective in improving SUD treatment enrollment, treatment adherence, and post-treatment abstinence, however, the efficacy may be dependent on how much is earned as an incentive.

Key Words: Mortality,Employment-based contingency, Major public health, Morbidity

Introduction

Substance use disorders (SUD) remain a major public health concern and represent a significant cause of morbidity and mortality. Our World in Data has reported that approximately 11.8 million people die each year as a direct or indirect effect of substances such as tobacco, alcohol, and illicit drugs (1). Globally, SUD has been shown to contribute significantly to the disease burden, with alcohol use, opioid use, and cannabis use dependence accounting for approximately 100.4 million, 26.8 million and 22.1 million SUD cases, respectively (2). During the recent COVID-19 pandemic, there was a significant increase in the rate of substance use among new and prior users (3). According to SAMHSA data obtained between October 2020 and December 2020, an estimated 25.9 million past-year alcohol users and 10.9 million past-year drug users reported a significant increase in use from the onset of COVID-19 outbreak (4). Despite advances in the treatment of individuals with SUD (5), the burden of morbidity and mortality associated with SUD continues to rise, with a significant risk of acquiring communicable diseases such as HIV/AIDS and hepatitis B and C among users who engage in risky behaviors such as needle sharing and unprotected sexual activities (6).

Given the growing need for our society to address this issue of SUD, we must seek effective solutions to the problems this crisis is posing to people's lives, health, and socioeconomic well-being. These social welfare issues are particularly affecting minority populations who face disproportionately high levels of marginalization and disparities in healthcare (7). According to a publication by S. Galea et al., social factors play a significant role in determining the quality of health, such as poor education, unemployment, limited healthcare resources, and poor access to social welfare systems. Therefore, addressing some of these social determinants of health could be a positive step towards tackling this issue of SUD (7). While proposing these measures, we are not unaware of the challenges and complexities in care, particularly among individuals experiencing these unfortunate challenges. For example, studies have shown that people with SUD experience great difficulties in finding and keeping jobs, which compounds their disease burden and further worsens their substance use (8,9).

In this study, we would like to explore employment-based contingency (EBC) as a means of addressing SUD, which simply means providing employment as a reward to the participant for participating in measures to address SUD. Several studies previously conducted to determine the effect of employment as a contingent measure in treating SUD have shown that EBC is effective in improving treatment outcome among individuals with SUD (10–13). However, none of these studies have explored at what stage of treatment these measures tend to be more effective in the management of SUD individuals. With that question in mind, our goal in this study is to explore and determine the effect(s) of EBC on enrolling SUD individuals into treatment, its impact on treatment adherence among participants with SUD who are receiving treatment, and the rate of abstinence from substances after treatment.

Method

To achieve our goal, this study was reported by the Protocol for Systematic Reviews and Meta-Analyses (PRISMA).

Search strategy
A PubMed and Google Scholar search was conducted for articles published between 2012 and 2022, using the search terms ((substance use disorder) AND (unemployment)) OR (therapeutic workplace)) and 3,910 articles were found on PubMed and 15,800 on Google Scholar. Using the inclusion and exclusion criteria stated below, relevant articles were sorted for our study.

Inclusion criteria
i. Articles conducted on human subjects.
ii. Study participants between age 18 and 65 years.
iii. Studies written in English language.
iv. Randomized Controlled Trial (RCT) studies published between 2012 and 2022

Exclusion criteria
i. Articles conducted on non-human subjects.
ii. Articles written in languages other than English.
iii. Study participants less than 18 years and older than 65 years.
iv. Articles other than RCT, such as review articles, case reports, editorials, etc.
v. Articles published before 2012 or after 2022.

Articles synthesis and analysis
Initially, 3,910 articles were found on PubMed. 353 articles were excluded after removing articles on non-human subjects and articles in languages other than English. 1474 articles were then excluded when we narrowed our search by age (18-65 years). We identified 239 articles after excluding all articles that were not randomized controlled trials (RCT). We identified 236 publications by including complete articles and abstracts related to our study topic. The 236 publications were meticulously analyzed by five authors (NH, IF, NO, OA, GA) independently to identify articles that addressed our research population and the aim of our study, and 4 studies were identified, which were included in this study.

On Google Scholar, an initial search yielded 15,800 publications published between 2012 and 2022. We identified 10,850 articles after eliminating articles that were not randomized controlled trials. 178 articles were then identified after reviewing the study titles and included complete articles and abstracts with study topics relevant to our study. The 178 articles were meticulously and independently reviewed by all authors, and we identified 7 studies that addressed our research population and study objective(s).

A total of 11 articles met all our inclusion criteria and addressed our study objectives (4 PubMed and 7 Google Scholar articles). However, 4 duplicate articles were identified, and the duplicates were removed. The remaining 7 Randomized Controlled Trial articles were included in this study. All authors were responsible for reviewing and discussing major identified themes in the study.

Flow chart 1. Protocol for Systematic Reviews and Meta-Analyses (PRISMA)

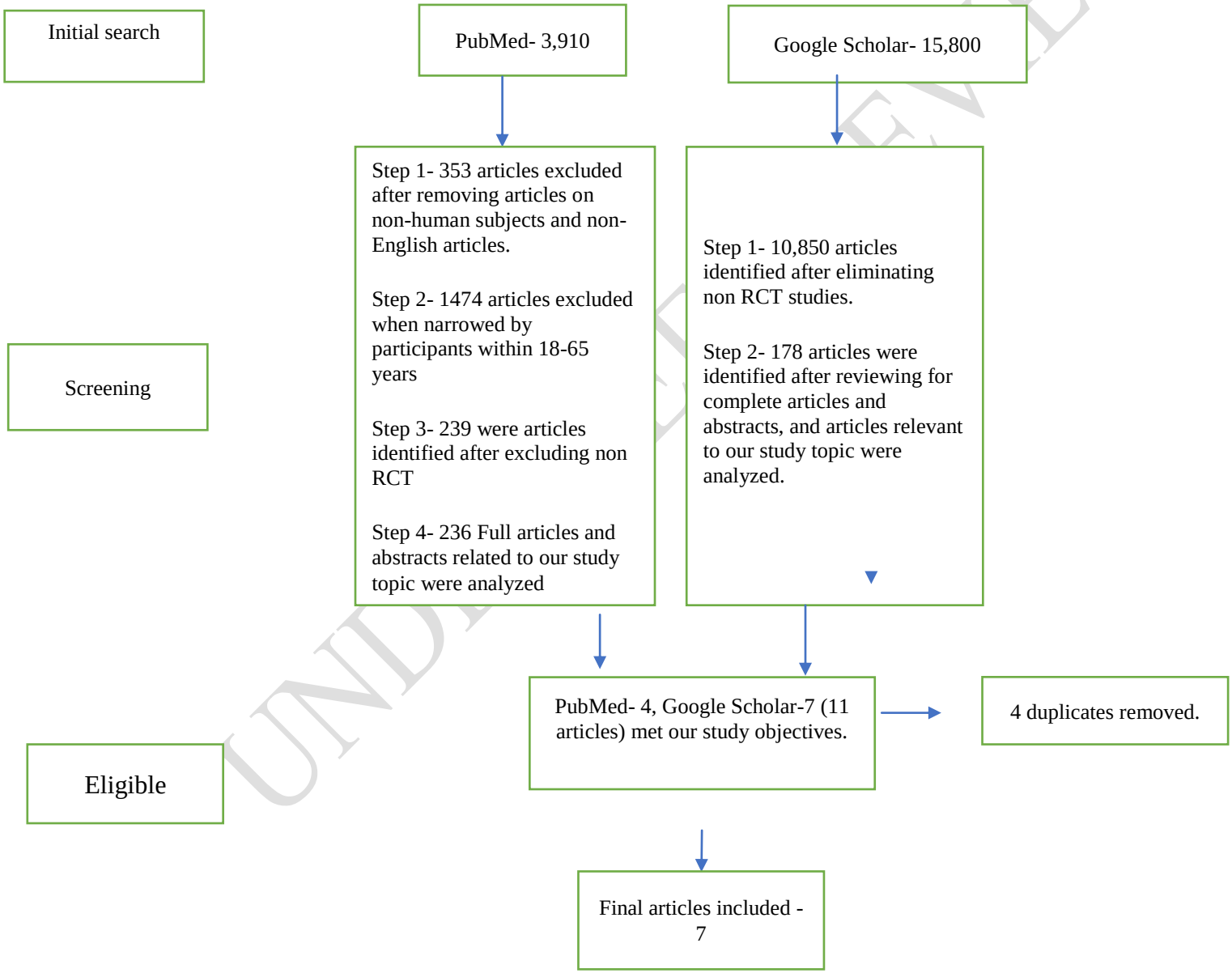

Table 1: Relevant articles included in the review.

S/N	Study	Country	Study design	Sample size	Participants characteristics	Substance(s) abused	Treatment type	Intervention	Effect of EBC on Treatment Enrollment	Effect of EBC on Treatment adherence and retention	Effect of EBC on Abstinence from Substance
1.	Aklin WM, et.al 2014 (14)	USA	RCT	40	-Pregnant and post-partum substance-dependent women. -Age- 18-50 -Unemployed -100% women	Opiates and Cocaine		EBAR contingent on negative drug urine results. Control group - Allowed to work regardless of urine result, Intervention group - Hired and allowed to work contingent on skill acquisition and negative urine test.			Over 50% of participants in the intervention group were abstinent from cocaine and opiates, almost twice the rate in the control group.
2.	Dunn KE, et.al, 2013 (15)	USA	RCT	67	-Age- 18-65 -Unemployed -IDU -Average 39% women and 61% men. -91% Black race.	Cocaine and Opiates	- Oral Naltrexone	Individuals in the control group could work and earn vouchers regardless of naltrexone treatment, and/or drug use; however, contingency participants could only work if naltrexone use was objectively validated.	EBC encouraged enrollment in treatment. 100% of initial participants enrolled in the trial.	When compared to the control group, contingency individuals produced considerably more urine samples that were positive for naltrexone (72% vs. 21%, p.01).	Contingency individuals were considerably more likely to finish naltrexone therapy and stay abstinent from drugs than control participants (54 percent vs. 16 percent), p.01, 95 percent CI.

3.	Holtyn AF, et.al, 2014 (11)	USA	RCT	98	-Age-18 or older. -Unemployed -Average 34% women and 66% men. -Were not receiving substance abuse treatment, -Reported injecting heroin (opioid). -69% Black race.	Opiates	Methadone	Participants were invited to the therapeutic workplace during induction and asked if they were interested in methadone therapy. Interested participants were then randomly allocated to one of three conditions: work reinforcement, methadone and work reinforcement, or opiate abstinence, methadone, and work reinforcement.	Methadone enrollment was quite high. 92% of all participants were enrolled in methadone treatment.		The Abstinence, Methadone, and Work Reinforcement group had considerably more urine samples that were negative for opiates than the Work Reinforcement group.
4.	DeFulio A, et.al, 2012 (16)	USA	RCT	38	-Age 18-65 -Unemployed -58% women and 42% men. -84% Black race.	Opiates and cocaine.	Oral naltrexone	Participants were expected to complete opioid detoxification before being allowed to the therapeutic workplace for oral naltrexone induction. To obtain entry to the workplace after detoxification, participants were required to provide opioid negative urine tests and take scheduled oral naltrexone doses	Individuals in the contingency group received significantly more naltrexone injections than participants in the control group. The first planned injection was received by 84 percent of control participants and 100 percent of contingency participants.	Retention in treatment was much higher in the contingency group than in the control group. 74 percent of contingency participants finished the whole course of treatment, compared to 26 percent of control participa nts.	

								throughout oral naltrexone induction.			
5.	Dunn KE, et.al, 2014 (17)	USA	RCT	46	-Age 18-65 -HIV-positive IDU-78% men, 22% women -89% Black race.	Opiates, alcohol, and cocaine	Post-detoxification treatment	Participants were randomly allocated to one of three groups: abstinence and work (n=16), work-only (n=15), or no-voucher (n=15). The abstinence & work group was asked to submit biochemical proof of opioid, cocaine, and alcohol abstinence to obtain access into the workplace.			There was no significant difference in the rate of abstinence among the groups.
6.	Dunn KE, et.al, 2015 (18)	USA	RCT	67	-Age- 18-65 -Unemployed -IDU -Average: 39% women and 61% men. -91% Black race.	Opiates and cocaine	Relapse prevention with oral naltrexone	The control group received take-home naltrexone and access to the workplace without monitored intake, but the contingent group was obliged to take naltrexone while being observed by staff to gain entrance into a therapeutic workplace.		Contingent participants who were required to take naltrexone to work and maintain maximum pay ingested naltrexone consistently and considerably more frequently than control participa nts who were not compelled to take naltrexone to work.	There were no significant differences between-group in the percentage of participants who provided a urine sample that tested positive for naltrexone, negative for opioids, or cocaine after 12 months, with 37 percent and 51 percent testing negative for opioids and cocaine, respectively.

7.	Holtyn AF, et.al, 2014 (12)	USA	RCT (secondary analysis)	33	-Age 18 and above. - 45% female and 55% male -Reported injection drug use in the past 30 days and has visible track marks -Unemployed. -73% black race	Opiates and cocaine	Methadone	Participants only had to work to earn money during a four-week induction period. Access to the workplace after induction was contingent on enrollment in methadone treatment.	There was a slight increase in the percentage of opiate-negative urine before the contingencies were introduced.		EBAR can promote opiate and cocaine abstinence among unemployed and out-of-treatment IDU.

USA- United States of America; RCT- Randomized Controlled Trial; EBC- Employment-Based Contingency; EBAR- Employment-Based Abstinence Reinforcement; IDU- Injection(or injectable) drug users.

Result

All seven RCT studies included in this study were conducted in the United States of America. There were a total of 389 study participants in all the studies (S/N 1-7 in Table 1): 40, 67, 98, 38, 46, 67 and 33, respectively. All participants were between the ages of 18 and 65 years, substance users (opiates, cocaine, and/or alcohol), unemployed, and an average of 48% of them were women in the articles (except the study by Akin WM, et.al 2014, of 40 participants, where all participants were 100% women) (14). All six articles that reported on the race of the participants had an average of 83% of all study participants of black race (91%, 69%, 84%, 89%, 91%, and 73%, respectively) (11,12,15–18). Among five studies that reported on the types of treatment participants received, participants in three studies (15,16,18) received naltrexone while participants in two studies (11,12) were reported to have received methadone.

Among the seven studies in Table 1, studies by Dunn KE, et.al 2013, Holtyn AF, et.al 2014, and DeFulio A, et.al 2012, found that EBC positively impacted the rate of enrollment to treatment among participants who used substances compared to the participants who did not have EBC, with 100%, 92%, and 100% enrollment rate reported, respectively (11,15,16).

Studies by Dunn KE, et.al 2013, DeFulio A, et.al 2012, and Dunn KE, et.al 2015 which examined the effect of EBC on treatment adherence and retention of participants in treatment found that participants who were in the EBC group had a higher rate of treatment adherence and retention to treatment compared to the control group who did not have EBC as a contingency (15,16,18). The study by Dunn KE, et.al 2013 reported that compared to the control group, contingency group individuals produced considerably more urine samples that were positive for naltrexone (72% vs. 21%, with a p-value of .01) (15). The contingency group participants who were

required to take naltrexone to work and maintain maximum pay in the study by Dunn KE, et.al, 2015 took naltrexone consistently and considerably more frequently than control participants who were not compelled to take naltrexone to be eligible to work (18). A study by DeFulio A, et.al 2012 which examined the effect of EBC on treatment retention also found that participants with EBC were more likely to stay in treatment and complete the treatment course than participants without EBC, and 74% of the contingency group participants completed the entire course of treatment, compared to 26% of the control participants (16).

Among studies reporting on the rate of abstinence from substances, articles by Aklin WM, et.al 2014, Dunn KE, et.al 2013, Holtyn AF, et.al 2014, and Holtyn AF, et.al, 2014, found that EBC improved the rate of abstinence from substances among contingency group participants compared to control group, with over 50% of participants in the EBC group remaining abstinent from cocaine and opiates even after treatment, which is almost double the rate of abstinence in the control group (14). However, studies by Dunn KE, et.al, 2014 and Dunn KE, et.al, 2015, reported no significant changes in the rate of abstinence between control participants and participants who had EBC in their respective studies (11,12,14,15,17,18).

Discussion

In this review study, we evaluated the effect of EBC on the rate of enrollment into treatment programs among SUD individuals, how EBC affects the individual's retention in treatment, and how the EBC affects SUD individuals' abstinence from substances after treatment.

Effect of EBC on treatment enrollment

All the studies reviewed reported over 90% enrollment rate among SUD individuals who received EBC. The studies by Dunn KE, et.al 2013 and DeFulio A, et.al 2012 reported 100 % enrollment rate (15,16). Similar findings have been reported in other studies, such as studies by Nancy M. Petry, 2005 and Nancy M. Petry, 2011, where study participants had an increased rate of enrollment into the treatment group and expressed positive morale (19,20). However, in Joseph G. et al, 2020 article, the efficacy of EBC treatment was heavily dependent on how much money participants would earn from the employment. They found that participants who received a higher pay were more encouraged to enroll in the program compared to participants who received a lower pay (21).

Effect of EBC on treatment adherence

EBC was found by multiple studies in this review to increase the treatment adherence of individuals receiving treatment for SUD. For example, a study by Dunn KE, et.al, 2013 reported that compared to the control group, contingency group individuals produced considerably more urine samples that were positive for naltrexone (72% vs. 21%, with a p-value of .01) (15). The RCT by Dunn KE,

et.al, 2015 also reported that contingent participants who were required to take naltrexone to be eligible to work and maintain maximum pay took naltrexone consistently and considerably more frequently than the control group participants who were not required to take naltrexone to be eligible to work (18). The study by DeFulio A, et.al, 2012 also evaluated the effect of EBC on treatment retention and found the participants with EBC were more likely to stay in treatment and complete the treatment course (74% completed the treatment), than participants without EBC (only 26% completed the treatment) (16). These outcomes were similar to those found in the study by Jeffery J.E, et.al, 2011, which evaluated participants who were inducted into naltrexone treatment and assigned to either a contingency group or a control group (13). Participants in the contingency group were required to take naltrexone injections to retain access to a workplace while the control group could work regardless of whether they received treatment or not. Over 80% of participants in the contingency group were adherent to their treatment compared to 42% among those who were in the control group (13).

Effect of EBC on Abstinence

Articles by Aklin et al 2014, Dunn et al 2012, Holtyn et al 2014, and Holtyn et al 2014 found that EBC improved the rate of abstinence from substances among EBC participants compared to their control group, with over 50% of participants in the EBC group remaining abstinent from cocaine and opiates even after treatment, which is almost double the rate of abstinence in the control group (11,12,14,15). Several individual articles have also shown similar results, including studies by Kenneth et al.2007, Kenneth et al 2016,Holtyn et al 2020, Novak et al 2022, and Defulio et al 2011, which applied EBC measures to the individuals who used various substances and found that the effect of EBC can be seen even in polysubstance use individuals (10,22–25). EBC participants in Dunn et al 2013 study also had a higher abstinence rate (54%) compared to control participants (16%), (p-value = 0.01 and 95% CI) (15).

However, studies by Dunn et al. 2014 and Dunn et al. 2015 reported that there were no significant changes in the rate of abstinence between the EBC and control participants (17,18). Although study participants in Dunn et al 2014 provided urine samples that tested positive for naltrexone and negative for opioids, or cocaine during the active phase, at the 12th month post-intervention follow-up, participants showed no significant differences between groups testing negative for opioids and cocaine (17). This suggests that EBC could promote treatment adherence in the treatment phase but may not significantly impact long-term abstinence. A recent randomized control trial by Novak et al 2022 also found that during the intervention (active phase), EBC participants provided significantly more opiate and cocaine-negative urine samples than the control participants and EBC participants were also significantly more likely to remain employed and live out of poverty during the intervention period (24). However, EBC participants and control groups exhibited an equal rate of drug abstinence during the post-intervention period, further suggesting no significant difference in the rate of abstinence between the groups.

Limitation and strength

There were limitations in the approaches utilized by the various studies included in this review study. For example, nonstandard procedures were used to implement EBC in the controlled trials studies reviewed in this article. Some RCTs started the contingencies before the recruitment phase, whereas others were initiated after research participants were already enrolled in the workplace. Secondly, generalization of the findings in this study should be done with caution given the fact that articles reviewed in these studies mainly reported on people of the black race, while some studies have reported that non-Hispanic whites account for people with the most substance use problems (26,27). Despite these stated limitations, this study highlights how EBC can be a useful tool in combating the scourge of SUD.

Conclusion

This review study shows that EBC can be effective in improving enrollment into SUD treatment, treatment adherence, and abstinence from substances after treatment. However, its effectiveness may be dependent on how much a participant earns as an incentive during the employment. Given the severity of SUD's detrimental impact, continued effort in the development and implementation of EBC is certainly required, which will help combat this condition and in addition, address one of the social determinants of health among SUD individuals. This policy will likely be successful with the strong support of employers in both the private and public sectors and the provision of support such as funding for businesses willing to implement these measures in their workplace for individuals with SUD.

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