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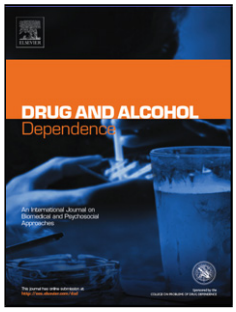

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Inpatient Link to Peer Recovery Coaching: Results from a Pilot Randomized Control Trial

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Highlights

- The study tested the efficacy of an inpatient link to long-term recovery coaching.
- The design entailed a six-month prospective randomized controlled trial.
- The recovery coaching (RC) intervention improved engagement in recovery services.
- Inpatient link to RC can be an effective 'care redesign' of SUD treatment.

Abstract

Background: Few individuals hospitalized with Substance Use Disorder (SUD) complications participate in recovery support services after discharge. Peer recovery coaching represents one potential new method for promoting recovery.

Methods: A six-month prospective randomized controlled trial compared outcomes between the standard of care and a physician-initiated recovery coaching intervention. The primary outcome measure was engagement in recovery support services, and the secondary outcome measures were substance use frequency and self-reported physical and mental health using the SF-12 survey. Participants (N=98) were eligible if they were identified by a healthcare provider as having a SUD and were hospitalized due to SUD complications.

Results: Engagement rate over the six-month post-discharge time period was higher for participants in the recovery coaching intervention (84%, 95% CI: 78% to 91%) compared to the standard of care control condition (34%, 95% CI: 25% to 44%), log OR=28.59, p<.001. No overall group differences in substance use frequency (p=.80), self-reported physical (p=.69) or mental (p=.89) health were observed.

Conclusion: An inpatient linkage to recovery coaching services improves engagement rates and can feasibly be implemented in a single-center inpatient service. This intervention is promising for promoting both short-term and long-term engagement in recovery support services.

Keywords: Substance Use Disorder; Recovery Coaching; Randomized Controlled Trial; Engagement; Long-term follow-up

1. Introduction

Substance use Disorder (SUD) is among the most prevalent mental disorders, affecting 8.4% of Americans (Hedden, 2015), and an estimated 15-17% of hospitalized patients suffering from SUD (Trowbridge et al., 2017; Walley et al., 2012). Access to recovery resources during hospitalization is often limited. Thus, the need for identifying methods that promote long-term SUD recovery are critical for improving patient health outcomes. One potential effective approach is recovery coaching services.

The current standard of care for SUDs in hospitals entails screening for SUDs, a brief intervention, and referral for addiction treatment (SBIRT; Agerwala & McCance-Katz, 2012; SAMHSA, 2013). Previous research has demonstrated that this model of care is effective in reducing substance use frequency and severity in at-risk users at a three-month follow-up, but has no significant effects in substance use in drug dependent individuals (Academic ED SBIRT Research Collaborative, 2007; 2010; Bogenschutz et al., 2014; Daeppen et al., 2007; Roy-Byrne et al., 2014; Saitz et al., 2014), and relapse rates are high (Bassuk et al., 2016). Many patients suffer from medical complications due to substance misuse and are particularly vulnerable to repeat substance usage (Epstein, Jha, & Orav, 2011; McLellan et al., 2000). Given the limitations of the current standard of care, there is a clear need for more effective SUD recovery approaches. Recent emergency department (ED) programs have begun to incorporate patient navigators in long-term recovery into the SBIRT process and have shown early success. By establishing rapid access to medication-assisted treatment (MAT) and engaging in motivational peer interviewing, such programs have observed that nearly 60% of ED patients with Opioid Use Disorder maintain their treatment plan a month later (Bogan et al., 2020). These emergent findings suggest that in-hospital linkage to care and peer support may be a promising avenue for SUD care.

One type of peer support is recovery coaching, a new continual model of care tailored to a patient's specific needs, recovery stage, and personal challenges (Bassuk et al., 2016). Recovery coaches can help address many barriers including financial difficulties, stigma, legal issues, housing instability, challenges navigating a complex healthcare system, and other psychosocial factors (Jack et al., 2018). These coaches also have lived experience—they have been through the recovery process themselves (Eddie et al., 2019). They use assertive engagement techniques to help patients overcome personal challenges and maintain ongoing support and accountability. This recovery-oriented approach is unique in that this model of care supports multiple tools for overcoming SUD depending on a patient's needs, including MAT, mutual aid meetings, and psychological counseling (Bassuk et al., 2016).

While recovery coaching services are currently in their early stages, recent reviews have provided preliminary conclusions to support the effectiveness of peer-based recovery services (Bassuk et al., 2016; Eddie et al., 2019; Reif et al., 2014). This work suggests that recovery coaching is associated with reduced rates of relapse and re-admission, increased social support, and increased retention in mutual-help groups. However, numerous limitations of the prior studies included in the reviews have been noted. In particular, the exact nature of the recovery service delivered and the training protocols that coaches receive have rarely been specified (Bassuk et al., 2016; Eddie et al., 2019). Additionally, a lack of appropriate comparison groups and definitive

outcomes have been identified as other key methodological drawbacks (Reif et al., 2014). Consequently, the present study seeks to overcome these limitations.

In evaluating the effectiveness of recovery coaching, one important outcome is active engagement in recovery support services, which includes mutual-help groups like Alcoholics Anonymous (AA), community support organizations, and addiction counseling. Long-term engagement is associated with increased drug and alcohol abstinence at one-year follow-ups (Moos & Moos, 2003; Ouimette, Moos, & Finney, 1998; Ritscher et al., 2002) and has been identified as the most important predictor of abstinence, over other factors such as addiction severity and personal motivation (Schaefer, Cronkite, & Hu, 2011). Engagement in SUD treatment, including residential, inpatient, and medication-assisted treatment, is also associated with reduced substance use severity, overdose rates, and all-cause mortality (Englander et al., 2019). SUD patients tend to maintain engagement when providers are perceived as supportive (Harris et al., 2006). Thus, engagement is a critical component to achieving recovery success, and providing an inpatient link to recovery coaching may provide a means to promote engagement.

Previous work demonstrates that a one-time SUD consultation during hospitalization was associated with significantly greater engagement (38.9%) in SUD treatment within 34 days of discharge than controls (23.3%; Englander et al., 2019). Those that received inpatient SUD consultation demonstrated a greater reduction in substance use at 30 days post-discharge (Wakeman et al., 2017). In both of these prior studies, the consultation service was carried out by a team of addiction medicine physicians, nurse practitioners, social workers, and peer support specialists. Many hospitals are unable to implement addiction teams however, and there has been limited work examining the effectiveness of inpatient recovery coaching alone on SUD recovery.

One recent study examined the effectiveness of life skills and illness management training with or without an invitation to a peer-led mutual support group to patients with co-occurring SUD and psychosis during hospitalization (O'Connell et al., 2020). The results demonstrated that the addition of peer-led support was associated with fewer days of alcohol use at nine-months post-discharge compared to the standard of care, which suggests that an inpatient link to peer recovery support may help to reduce substance use in this population (O'Connell et al., 2020). It is unclear whether such findings extend beyond alcohol use to engagement in recovery support services, to populations without psychosis, or to other types of substances like opioids or methamphetamine. Indeed, prior research has shown that treatment retention and utilization of recovery support services may differ by SUD type (Kelly et al., 2017; Weisner et al., 2003). Thus, research is needed to elucidate not only whether an inpatient link to long-term recovery coaching can be effective, but also which SUD types benefit most from such intervention. Collectively, however, these findings underscore the importance of intervening at a crucial, yet vulnerable, phase of the disease.

1.1 Current Study

The present investigation was designed to compare the effectiveness of an inpatient link to recovery coaching services to the current standard of care (SOC) among patients hospitalized due to SUD complications. This pilot study will demonstrate the feasibility of connecting hospitalized patients with SUD complications with a recovery coach prior to discharge. The results may inform the design of a larger, more extensive trial that can examine the preliminary findings in more detail.

Given that those abstinent for six months are twice as likely to be abstinent at five years (Weisner et al., 2003), this study follows patient outcomes over a six-month period. The primary outcome measure is engagement in recovery support services over the prior 30 days. The secondary outcome measures are substance use frequency and self-reported health. We predicted that compared to the current SOC, providing patients with a physician-initiated link to SUD recovery coaching would lead to increased engagement in recovery support services, reduced substance use frequency, and improved self-reported physical and mental health.

2. Method

2.1. Study Design

This six-month prospective randomized controlled trial compared outcomes of SUD patients linked in the hospital with a recovery coach (intervention condition) to SUD patients to those given the current SOC, which entails a referral to treatment (control condition) in which it is the patient's responsibility to call a treatment facility or group on the list. The physician may counsel the patient on the dangers of substance use, but the extent of counseling is variable and dependent on the individual physician. The study was approved by the institutional review board at Prisma Health before procedures were implemented.

A statistical power analysis for a mixed-effects linear model for the repeatedly measured categorical engagement outcome with four post-baseline timepoints was computed using GLIMMPSE software (Kreidler et al., 2013) to determine the study sample size. Based on the treatment engagement rates from an addiction consultation observed in previous research (Englander et al., 2019), it was estimated that engagement rates would be approximately twice as high in participants in the intervention than the control condition (*SD*=30%). A sample size of at least 36 participants in each condition is required for 80% power to detect a medium effect size (f^2=.15). To account for a high level of expected attrition in our study, our goal was to consent 100 total participants (n=50 per condition). This study was preregistered on clinicaltrials.gov (Identifier: NCT04098601).

2.2. Study Setting

This study was conducted at Prisma Health-Greenville Memorial Hospital (GMH), a large teaching hospital in South Carolina. SUD complications at GMH are the second leading cause of inpatient admissions, exceeded only by congestive heart failure (Roache et al., 2017).

2.3. Participants

The target population was patients who were hospitalized due to complications from SUD (e.g., severe alcohol withdrawal, pancreatitis, endocarditis, hepatitis, etc.). Patients were eligible for the study if they were admitted as an inpatient to a general hospitalist, infectious disease, or medical teaching services unit between May 2018 and May 2019 and were identified by a healthcare provider as having a SUD. Thus, SUD diagnosis was made through clinician determination. Potential participants were identified by the study physician who systematically screened all charts from these three inpatient units on a weekly basis. Patients were excluded if they were younger than 18 years of age, were unable to provide informed consent (due to intubation, confusion, etc.), were admitted for marijuana use only, did not speak English, or were pregnant. Approximately 10 patients were not invited to participate because of this exclusion criteria, and approximately 40% of eligible patients declined participation.

The average length of stay (LOS) for patients that consented was 14 days (*SD*=14.07 days). Typically, participants consented about halfway through their LOS (*M* = 7.66 days; 55%.). Overall, patients were consented when clinically able and willing to engage in the next steps to improve their health. Specifically, they no longer had altered mental status, pain was controlled, and patient conditions were no longer critical.

2.4. Study Conditions

2.4.1. Recovery Coaching Intervention. In this study, a physician initiated an introduction to a recovery coach while the patient was hospitalized. Recovery coaches are defined as individuals who have firsthand experience in successful recovery and are trained in using recovery-oriented tools to help others overcome SUD. Greenville Memorial Hospital partnered with Faces and Voices of Recovery (FAVOR)–Greenville, who provided the recovery coaching service. FAVOR–Greenville is accredited by the Council on the Accreditation of Peer Recovery Support Services, and all coaches must be in active recovery for at least one year before beginning the training certification process. All FAVOR recovery coaches are trained as both Certified Peer Support Specialists (CPSS) and Certified Assertive Community Engagement Specialists under the National Association of Alcohol and Drug Abuse Counselors (NAADAC). Given that the study population involved hospitalized patients with medical complications from SUD, this particular study utilized three highly experienced Caucasian female recovery coaches (M_{age}= 52 years, $M_{education}$= 16 years) with a background in nursing or social work.

Recovery coaches offer immediate access to a personal coach, a local center, and assistance to off-site intervention and recovery resources in the community. The recovery coach consistently initiates contact to participants 1 – 2 times per week. On average, recovery coaching is delivered 1 - 2 times per week in sessions ranging from 10–120 minutes. However, the frequency and duration of coaching is ultimately determined by the participant depending on their needs and preferences. During these encounters, recovery coaches engage in motivational interviewing, provide coping strategies, and offer emotional, social, and familial support. They also impart practical support by connecting participants to transportation to their meetings and appointments, providing Narcan, delivering necessities to homeless participants, and connecting participants with legal support. Missed appointments and inconsistency are expected as part of the early stages of the recovery process. Therefore, the professional peer support coach assumes responsibility for the ongoing therapeutic relationship; phone calls, text messages, and community-based outreach are part of the service provided.

2.4.2. Standard-of-Care Control Condition. Individuals in the control condition were given the SOC, which entailed a social worker providing patients with a list of SUD resources, including FAVOR recovery coaching, in the community.

2.5. Outcome Measures

All outcome measures were taken at baseline, 30-days post-baseline, 60-days post-baseline, 90-days post-baseline, and 180-days post-baseline.

2.5.1. Engagement in Recovery Support Services. Engagement in recovery support services was defined as being actively involved in a recovery support program (AA, Narcotics Anonymous, SMART recovery®, etc.) or individual addiction counseling over the past month and was obtained

through self-report. Participants were asked, "In the past 30 days, have you been actively involved in a recovery program, such as AA, NA, meetings at FAVOR, counseling, or other types of recovery programs?". Because recovery coaching was the intervention, continuing contact with a recovery coach alone was not included in engagement. The context and frequency of engagement (e.g., weekly meetings versus meetings as part of intensive outpatient programs) were not distinguished, and exclusively engaging in medication-assisted treatment was not considered engagement in recovery support services.

2.5.2. Substance Use Frequency. To gauge substance use frequency, the 13-item Addiction Severity Index (ASI-Lite; Cacciola et al., 2007; McLellan, Cacciola, & Zanis, 1997) was administered at baseline and at each follow-up. In line with previous research (Roy-Byrne et al., 2014; Saitz et al., 2014), substance use frequency was measured using the number of days in the past month that participants used the substance(s) causing their SUD. For example, if a participant was diagnosed with SUD due to heroin and methamphetamine use, then only the number of days that the participant used heroin, methamphetamine, or other opiates was included in the substance use frequency outcome measure and the higher number of days for each substance was used for a maximum of 30 possible days. Specifically, if a participant used opioids 15 days out of the past month but used methamphetamine 20 days out of the past month, then 20 (the higher number of days) was used for this outcome.

2.5.3. Self-Reported Health. The 12-item Short Form Health Survey (SF-12; Ware, Kosinski, & Keller, 1996) was used to obtain self-report information on patients' physical and psychological aspects of their lives. The physical and mental health composite scores were used to operationalize self-reported health.

2.5.4. Baseline Demographic Measures. Information on patients' co-existing mental illnesses, including depression, bipolar disorder, schizophrenia, anxiety, and Post-Traumatic Stress Disorder was obtained from Chart reviews focusing on the problem list and past medical history. Baseline addiction severity was obtained using the 10-item Drug and Alcohol Screening Test (DAST-10; Skinner, 1982). Additionally, information on patient age, gender, level of education, duration of drug use, and type of addiction was obtained using self-report surveys.

2.6. Procedure

Eligible patients were approached by a study physician or trained medical student to inform them of the study. Interested patients were then screened to ensure they meet study criteria and asked to give written informed consent to participate. Following informed consent, medical students then administered all baseline surveys: demographics information, DAST-10, ASI-Lite, and the SF-12. Participants also provide contact information for their follow-ups, including either phone or email contacts. After this baseline assessment, participants were randomized into either the control or intervention condition using the RedCap software. Thus, a simple randomization procedure (computer-generated random numbers) was used to assign participants into study conditions. Participants randomized to the control group received the SOC; they received a list of resources, which included the FAVOR recovery coaching information, and the participant could choose to independently call the organizations listed through self-referral. Participants in the intervention group received an introduction to a recovery coach within 24 hours of completing the

baseline assessment while they were still an inpatient at the hospital. The medical student who conducted the baseline assessment or the study physician emailed the recovery coach and asked them to meet with the participant; thus, the participant did not need to take any action to receive the recovery coach. After this point, no further contact was made between the research team and the coach about the participant. The recovery coach then stayed in active contact with the participant every week for six months. Participants were compensated $20 for completing the baseline survey, and $10 for each follow-up.

The engagement in recovery services self-report item, SF-12, and ASI-Lite were given at baseline and all follow-up assessments. All enrolled participants were called and emailed to assess follow-up outcomes at 30, 60, 90-days, and 6-months post-baseline. The research team that conducted follow-up assessments was separate from the team that conducted baseline assessments. Those involved in follow-up data collection and outcome assessment were kept blind to the allocation, while physicians and participants were aware of the condition the participant was allocated to. Participants were contacted once per week for the entire post-baseline six-month period until successful contact was made, regardless of whether they responded on previous contacts. Participants were informed at baseline that the recovery coaching staff was completely separate from the research staff, and all responses to the follow-ups were kept confidential and would never be shared with anyone, including their coach. If patients did not respond initially, the study team contacted the patient weekly to complete their follow-ups.

2.7. Data Analysis

To examine the primary outcome measure of engagement in recovery services, a generalized mixed-effects model (GLMM) assuming a binomial outcome distribution and logit link function was applied, with Engagement (Not Engaged = 0; Engaged = 1) as the outcome variable. To examine the secondary outcome measures of Substance Use Frequency and Self-Reported Health, linear mixed-effects models (LMM) were applied. Outcomes were measured using the intention-to-treat analysis. Due to miscommunication between study and medical personnel four participants were mis-assigned to their condition; two participants received a recovery coach when they should have received the SOC, and two received the SOC when they were randomized to a coach. Post-hoc sensitivity analyses were conducted for each of the primary and secondary outcomes using an as-treated analysis. Primary findings for differences between conditions were virtually identical in terms of significance level for the as-treated analyses. Full results for this sensitivity analysis are reported in the supplementary materials.

Outcomes included measurements at 30-day, 60-day, 90-day, and 6-months. The key predictor was Condition (Intervention vs. Control) and linear time. Analyses were adjusted for baseline outcomes values and for SUD type (AUD only versus drug/drug and alcohol-related SUD). All models included a subject-specific random intercepts to account for correlated outcomes (Fitzmaurice, Laird, & Ware, 2012). Given that approximately 50% of participants in the study sample suffered exclusively from AUD, we conducted ancillary sub-group analyses to assess whether the type of drug causing participants' SUD could affect responsivity to long-term outcomes. This sub-group analysis allows for examining whether the intervention is particularly effective or ineffective for patients with specific types of SUD. Additional analyses for ASI-Lite composite scores are reported in the supplementary materials.

3. Results

3.1. Participant Characteristics

One hundred and three participants consented to the study, and 98 of those participants (M_{age}=42.22, SD_{age}=10.70, 40 females) completed the baseline study assessment (Figure 1). Of the participants who completed follow-up assessments (*N*=73), 53.85% had Alcohol Use Disorder (AUD) in the intervention condition and 47.06% had AUD in the control condition. None of the control participants initiated contact to FAVOR recovery coaching. Of participants with opioid-related SUD (*N*=37), 18.92% were prescribed buprenorphine or methadone upon discharge. No participants with AUD were prescribed a medication-assisted treatment (e.g., disulfiram, acamprosate) at discharge. Further details regarding participant characteristics are described in Table 1 and the supplementary material.

3.2. Primary Outcome

3.2.1. Engagement in Recovery Support Services

Overall engagement across all timepoints was 62% (*SD*=49%, 95% CI: 55% to 68%). Rates of engagement were significantly higher in the intervention (84%, *SD*=37%, 95% CI: 78% to 91%) compared to the control condition (34%, *SD*=48%, 95% CI: 25% to 44%). By the six-month timepoint, 80% of those in intervention were still actively engaged in recovery support services compared to only 24% of those in the control condition (Figure 2). The log OR based on GLMM was 28.59 (95% CI = 17.7 to 40.1, $p<.001$). This result supports the hypothesis that the inpatient link to recovery coaching would improve engagement in recovery services.

3.3. Secondary Outcomes

3.3.1. Substance Use Frequency

Across all post-baseline timepoints and conditions, participants used substances an average of 5.77 days per month (*SD*=10.06, 95% CI: 4.43 – 7.10 days). No significant difference in substance use between the intervention (*M*=4.93 days, *SD*=9.44, 95% CI: 3.23 – 6.63) and control condition (*M*=6.79 days, *SD*=10.73, 95% CI: 4.65 – 8.93) was observed (Figure 3). Adjusted regressions based on LMM found no significant between group differences (p=0.80) nor evidence of a time trend after the first month of follow-up (p=0.39).

3.3.2. Self-Reported Health

Participants in the intervention (*M*=37.85, *SD*=12.14, 95% CI: 35.66 – 40.03) did not have significantly different self-reported physical health than those in the control condition (*M*=35.30, *SD*=10.55, 95% CI: 33.20 – 37.41; Figure 4). Adjusted regressions found no significant between-group difference in self-reported physical health across post-baseline timepoints (p=.69) nor evidence of a time trend (p=0.10).

Self-reported mental health scores based on SF-12 MCS did not differ between the intervention (*M*=41.53, *SD*=13.62, 95% CI: 39.08 – 43.98) and control conditions (*M*=40.72, *SD*=13.07, 95% CI: 38.13 – 43.31; Figure 5). Adjusted regressions found no significant between-group difference in self-reported mental health across post-baseline timepoints (p=.89) nor evidence of a time trend (p=0.34). The findings of the SF-12 PCS and MCS analyses collectively suggest that the recovery coaching intervention did not significantly improve self-reported physical or mental health.

3.4. Sub-Group Analyses

Sub-group analyses adjusting for baseline values were conducted within each SUD Type group (AUD only vs. drug-related/drug-and-alcohol-related SUD) to determine whether the intervention was particularly effective for one SUD Type over another. For those with AUD only, Engagement (96% vs. 31%, p=.001) was higher in the intervention compared to the control. No significant differences in SF-12 PCS scores (p=.08), SF-12 MCS scores (p=.11) or Substance Use Frequency (p=.42) across all post-baseline timepoints was observed. However, for Substance Use Frequency, those with AUD in the intervention had significantly fewer days of alcohol consumption compared to the control at the 60-day (log OR=7.58, p=.03) and 90-day (log OR=8.25, p=.013) timepoints specifically (Figure 3B).

Among participants with drug-related SUD, Engagement was higher in the intervention than the control group (66% vs. 37%, p<.01). No other significant between-group differences were observed. These sub-group analyses show that Engagement was increased regardless of SUD type.

3.5. Quantifying Recovery Coaching Intervention

After meeting with the patient in the hospital, the recovery coach stayed in contact with the patient via phone calls, texts, or in-person visits for six-months. The number of times that recovery coaches initiated contact with patients per month ranged from 7 – 15 on average (M=9.685, SD=2.994). Table 2 shows the amount of attempted versus successful contacts per month by each contact modality (i.e., in-person versus phone, etc.).

4. Discussion

The goal of this study was to compare a physician-facilitated link to recovery coaching intervention to the current SOC, and it was predicted that the intervention would improve engagement and self-reported health while reducing substance use. The primary finding of this study showed that providing a recovery coach in the inpatient setting increased engagement in recovery support services from 30–180 days post-discharge compared to those that receive the SOC. However, there were no overall group differences in substance use and self-reported health.

Notably, information about the recovery coaching service was provided on a resource list to the control participants as part of the SOC. Thus, all participants had access to recovery coaches. Participants in the control receiving the SOC would need to independently initiate contact with the recovery coaching service and establish the connection on their own, yet none of the control participants in this study did so. In contrast, in the intervention, a study physician initiated contact, and the recovery coach appeared without the patient needing to take action. This linkage to recovery coaching allowed patients to begin their recovery with the recovery coach's guidance while still hospitalized. Linkage to recovery support services during hospitalization may facilitate the recovery process once patients are discharged by jumpstarting the recovery process and helping navigate the transition to outpatient care or community support services. Overall, the study findings provide evidence that a physician-initiated connection to long-term recovery coaching is effective in promoting engagement in such recovery support services.

One caveat of the present findings is that, despite no significant difference in self-reported mental or physical health between groups, substance use was reduced relative to baseline for both the intervention and control groups. Though unexpected, this finding is consistent with other work comparing inpatient interventions to the standard of care among patients hospitalized with SUD. Prior work has shown that both patients that received an inpatient addiction consultation and those who received the SOC experienced a decline in days of substance use in the 90-day post-discharge period relative to baseline, although the difference was magnified for the intervention group

(Wakeman et al., 2017). The experience of severe illness and detoxication during hospitalization may have driven the reduction in substance use across both groups. Continuing to use may exacerbate the symptoms of one's illness, leading to negative reinforcement from substance use. Physical health concerns during hospitalizations or major health events may also instill motivation to reduce one's substance use or prompt one to contemplate change (Bombardier et al., 1997; O'Toole et al., 2006). This observation underscores the importance of SUD-related hospitalizations as a crucial time to intervene and provide recovery resources.

Successful recovery involves more than abstinence; rather, it entails physical, psychological, and social transformation so individuals can rebuild their lives, and engagement is the first step in the recovery process. Collectively, we propose that the possible mechanism for the successful increased engagement in recovery services following discharge is threefold: (1) the vulnerability during hospitalization for an acute illness, (2) the assertive method that recovery coaches use, and (3) recovery coaches addressing comorbid psychosocial factors, barriers to care, and help navigate complex medical systems. However, future research is needed to identify the mechanisms, such as specific psychosocial factors, through which recovery coaching may influence the recovery process.

This study also supports the conclusions of previous reviews that identified moderate levels of evidence for recovery coaching effectiveness (Bassuk et al., 2016; Eddie et al., 2019; Reif et al., 2014). This work advances the reviews' conclusions by revealing that initiating peer recovery services while a patient is in the hospital can increase participation in recovery support services and reduce alcohol use. These prior reviews emphasized limitations in the studies they included. As a result, this study sought to overcome several of these limitations, including making efforts to detail and quantify the recovery coaching service and recovery coaching credentials, ensuring a sufficient sample size, and including a comparable control condition. The coaches in this study were highly trained and initiated contact 10 times per month on average through various means.

4.1 Limitations and Future Directions

Ancillary analyses provided some preliminary evidence that the intervention led to reductions in alcohol consumption at 60- and 90-days post-baseline among participants with AUD only. However, dividing the sample within each SUD group (AUD only versus drug-related SUD) and each timepoint limited statistical power, and a larger sample size is needed to better capture whether inpatient recovery coaching reduces alcohol consumption post-discharge.

Additionally, the drug-related SUD sub-group was comprised of a heterogenous group of substance users with few methamphetamine and cocaine users. Thus, it is possible that cocaine users or methamphetamine users may receive particular benefits from this intervention, but our sample did not capture them effectively. Furthermore, other SUD types, such as opioids, may benefit more from an inpatient link to MAT or a combination of both recovery coaching and MAT. Additional research investigating the effects of MAT and/or MAT-plus-recovery-coaching among those hospitalized with complications from opioids is needed to parse out these possibilities.

A further limitation in terms of study design is that the exact number of patients who were excluded from study participation or who declined participation was not systematically record as part of this pilot study. Consequently, patient demographics and reasons for declining are not available, nor is it possible to establish whether the racial distribution of the sample is representative of patients hospitalized with SUD complications in this geographic region. It should also be noted that, despite random assignment, the intervention group included a higher proportion

of patients employed full-time than the control group, which may reflect a greater level of financial stability among this group.

Furthermore, the measures in this study were obtained through self-report. While these measures are similar to those used in past research (e.g., Englander et al., 2019; O'Connell et al., 2020; Wakeman et a., 2017), future research should consider including drug testing and chart review for readmission rates to more precisely quantify the intervention effects. A further limitation is that few psychosocial factors were measured as part of this study. It is possible that recovery coaching may reduce loneliness or improve coping skills in this population, and further work is needed to assess the full range of benefits that inpatient linkage to recovery coaching can engender. Additionally, this study was limited by moderately high attrition rates due to factors such as homelessness and lack of effective contact information, and future research should consider implementing effective strategies to mitigate attrition.

In this study, recovery coaches were funded by research funding and the agency (FAVOR-Greenville)'s philanthropic efforts. Implementing this type of program in the hospital setting in the future may involve support from insurance or hospitals; future research on the cost-benefit ratio of hospital-based peer recovery coaching is needed.

5. Conclusion

SUD is a chronic, relapse-prone disease, and the most important factor for predicting improvement at five years post-discharge is on-going engagement (Weisner et al., 2003). This study demonstrates that inpatient linkage to recovery coaching services improves engagement rates and can feasibly be implemented in a single large hospital system. This intervention is promising for both short-term and long-term engagement in recovery support services.

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Contributors

Kaileigh A. Byrne: Co-PI who conducted statistical analyses and was the lead on manuscript writing; assisted with study design and setup

Prerana J. Roth: principal investigator of the study who conceptualized and designed the study, led the study team, set up the screening procedure in the hospital's electronic medical record system for participant eligibility, and performed approximately half of the informed consents

Krupa Merchant: performed approximately 1/3 of the informed consents and data collection

Bryana Baginski: performed data collection and assisted with manuscript writing

Katie Robinson, Katy Dumas, James Collie, Benjamin Ramsey, Jen Cull, Leah Cooper: obtained informed consent from remaining patients and assisted in data collection

Matthew Churitch: lead role on recovery coaching quantification; independently examined and organized all recovery coaching records and documentation of participant-coach interactions

Lior Rennert and Moonseong Heo: advised on and conducted statistical analyses

Richard Jones: community partner who provided the recovery coaching service; offered consulting on the implementation of the recovery coaches into the hospital system

Conflict of Interest Statement

Kaileigh A. Byrne, Prerana J. Roth, Krupa Merchant, Bryana Baginski, Katie Robinson, Katy Dumas, James Collie, Benjamin Ramsey, Jen Cull, Leah Cooper, & Matthew Churitch declare that they have no conflict of interest. Richard Jones is the CEO/COO of FAVOR-Greenville.

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Table 1

Demographics and Participant Characteristics at Baseline for the Overall Sample and by Condition

Demographic Variables	**Overall Sample (N = 98)**	**Intervention Condition (N = 51)**	**Control Condition (N=47)**
Gender	40 Females, 58 Males	19 Females, 32 Males	21 Females, 26 Males
Age	*M* = 42.22 (*SD* = 10.70)	*M* = 42.14 (*SD* = 10.72)	*M* = 42.30 (*SD* = 10.45)
Race			
Caucasian	80%	84.31%	70.21%
African American	16%	9.80%	23.41%

Hispanic	2%	1.96%	2.13%
Other	2%	3.93%	4.25%
Years of Education	*M* = 12.04 yrs (*SD* = 2.19)	*M* = 12.48 yrs (*SD* = 2.33)	*M* = 11.62 yrs (*SD* = 1.98)
Employment Status			
Full-Time	18.36%	25.49%	8.51%
Part-Time	6.12%	7.84%	4.26%
Unemployed	44.90%	37.25%	53.19%
Disabled	28.57%	27.46%	29.78%
Other	2.05%	1.96%	4.26%
History of Trauma or Abuse	65.30%	66.67%	61.70%
Comorbid Mental Health Conditions	58.16%	60.78%	53.19%
DAST-10 Severity			
Low Level	27.55%	31.37%	23.40%
Moderate Level	14.29%	13.73%	14.89%
Substantial/Severe Level	58.16%	54.90%	61.71%
Years of SUD	*M* = 15.19 (*SD* = 12.26)	*M* = 16.06 (*SD* = 11.98)	*M* = 14.26 (*SD* = 12.61)
SF-12 Physical Score	*M* = 36.04 (*SD* = 10.29)	*M* = 37.39 (*SD* = 11.38)	*M* = 34.49 (*SD* = 8.78)
SF-12 Mental Score	*M* = 33.82 (*SD* = 11.52)	*M* = 34.23 (*SD* = 12.60)	*M* = 33.35 (*SD* = 10.30)
Currently in Recovery Program	17.35%	17.65%	17.02%
Been to Short-Term or Long-term Rehab Previously	67.35%	64.41%	70.21%

Note. SUD refers to Substance Use Disorder; SF-12 refers to the Self-Reported Health Survey Physical and Mental Health Composite Scores.

*denotes a significant difference between the intervention and control groups at the $p<.05$ level.

† denotes *p*-value between .05 and .10.

Table 2

(a) Recovery Coach In-Person Interactions

Time	**0-30 days**	**30 - 60 days**	**60 - 90 days**	**90-180 days**
Average	1.761	0.391	0.174	0.311
Range	5 – 150 minutes	5 – 120 minutes	30 – 90 minutes	5 – 240 minutes

(b) Phone Call Interactions

Time	**0-30 days**	**30 - 60 days**	**60 - 90 days**	**90-180 days**

Average Phone Call Attempts	5.977		4.909		4.091		11.558	
	Success	**Failure**	**Success**	**Failure**	**Success**	**Failure**	**Success**	**Failure**
Average by Success vs. Failure	2.578	3.267	1.844	2.956	1.356	2.644	3.159	8.136

(c) Text Interactions

Time	**0-30 days**		**30 - 60 days**		**60 - 90 days**		**90-180 days**	
Average Text Attempts	4.289		4.067		4.289		11.275	
	Success	**Failure**	**Success**	**Failure**	**Success**	**Failure**	**Success**	**Failure**
Average by Success vs. Failure	1.622	2.667	1.600	2.467	1.533	2.756	3.500	9.568

(d) Percentage of Patients Successfully Contacted

Time	**0-30 days**	**30 - 60 days**	**60 - 90 days**	**90-180 days**
Percentage Contacted	95%	86%	70%	75%

Note. (a) The average number of post-baseline coach-patient in-person interactions during the specified time intervals. The time duration of interactions is also shown. (b) The average number of times that the recovery coach attempted to call the patient during the specified time intervals. The average number of successful (call answered) and unsuccessful (voicemail or unanswered call) calls for each time point are listed. (c) The average number of times that the recovery coach texted the patient during the specified time intervals. The average number of successful (text reply) and unsuccessful (no text reply) texts for each time point are listed. (d) The percentage of intervention condition patients that were successfully contacted at each time point. A significant decline in the percentage of patients successfully contacted was observed between Time 1 (0 – 30 days) and Time 3 (60 – 90 days) as well as Time 1 and Time 4 (90 – 180 days), $ps<.01$. No significant differences in the percentage of patients contacted between other time points were detected, $ps>.05$.

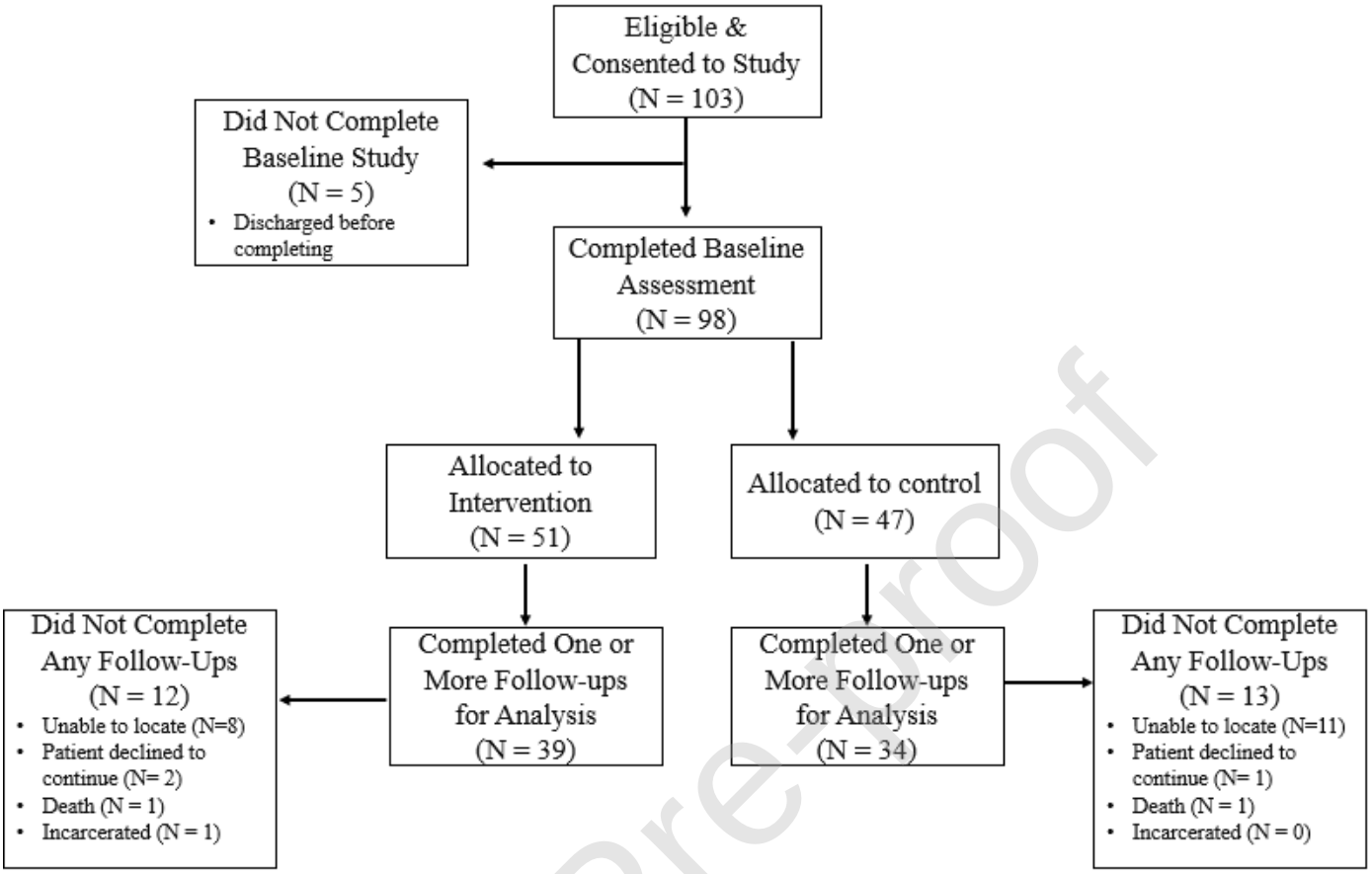
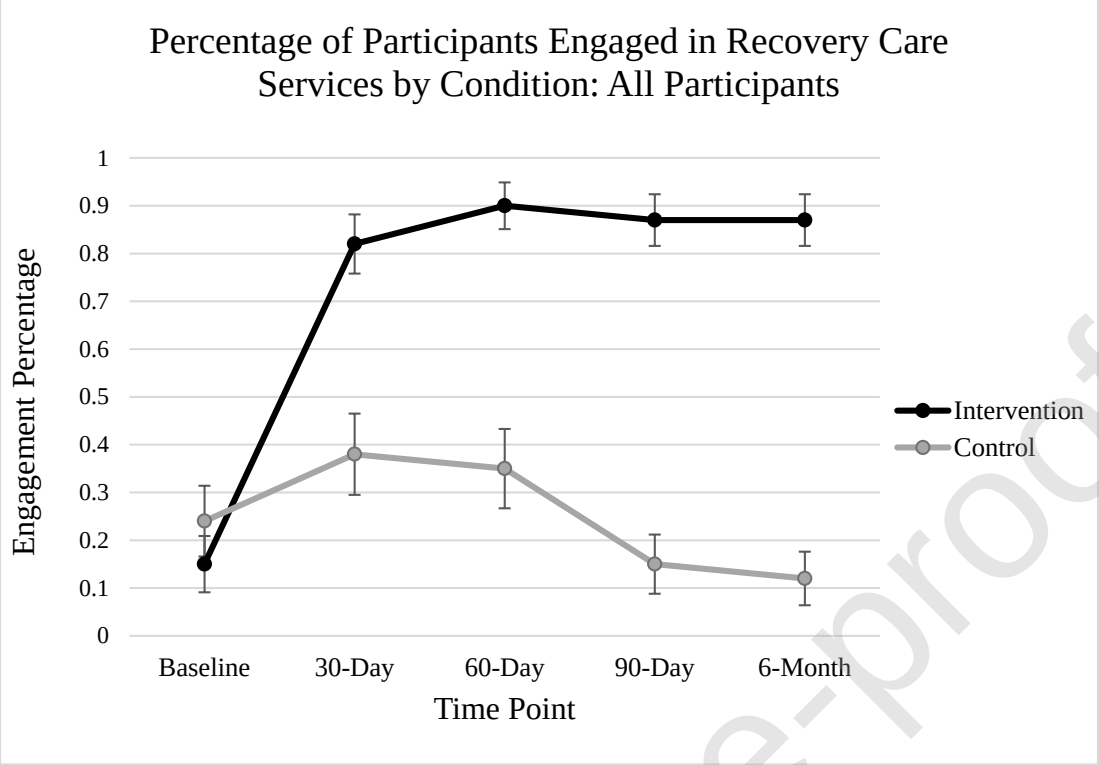
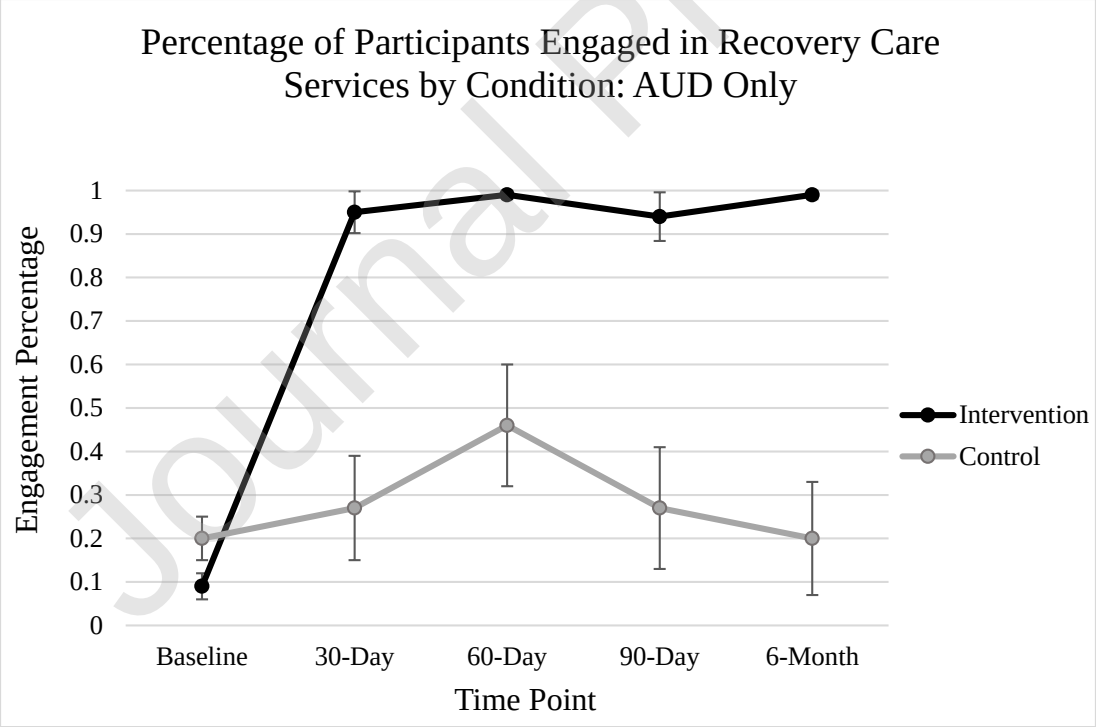


Figure 1. Participant flow diagram for the study.

A



B



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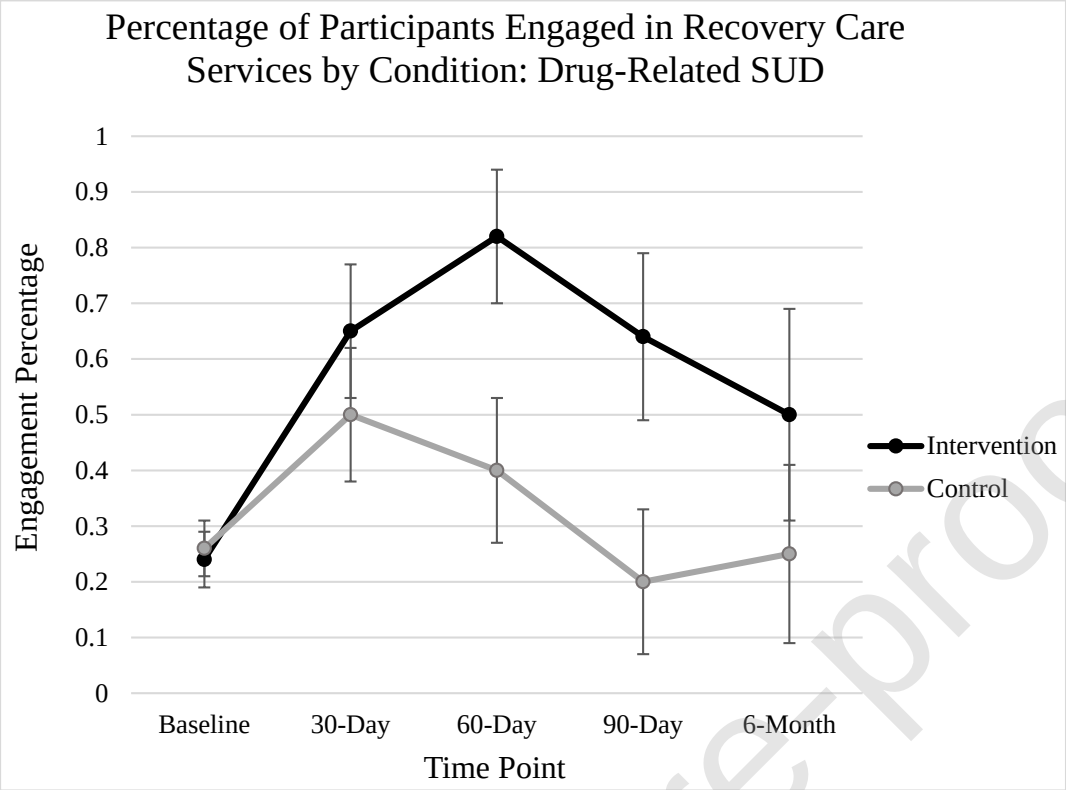
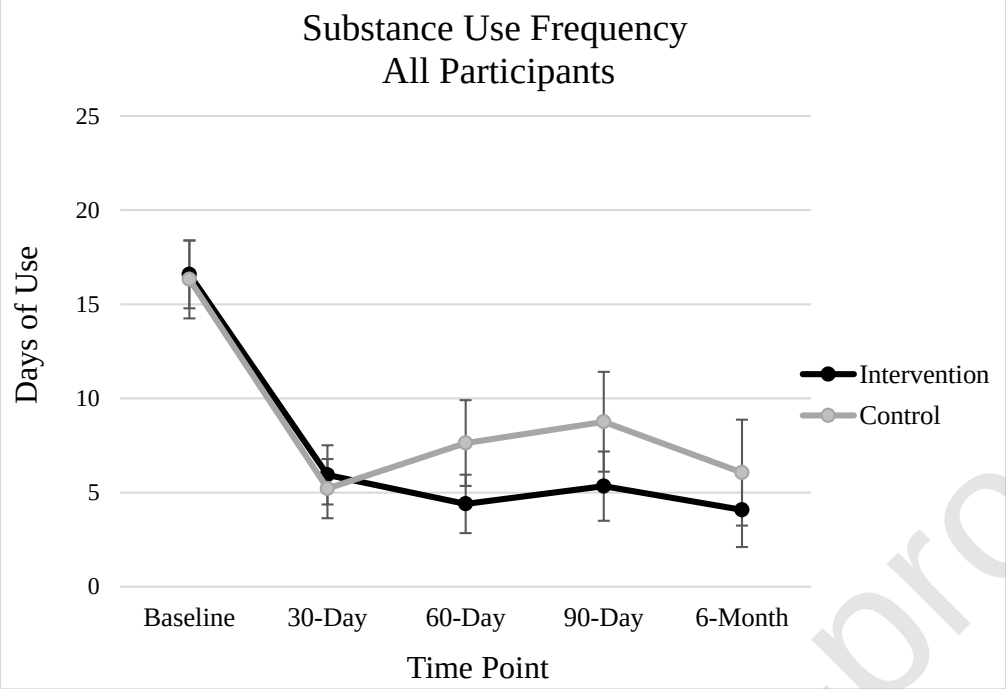


Figure 2. Percentage of participants in the intervention compared to the control condition who were engaged in recovery support services at each time point for (A) all participants, (B) participants with AUD only, and (C) participants with drug-related SUD. Error bars represent standard error of the mean.

A



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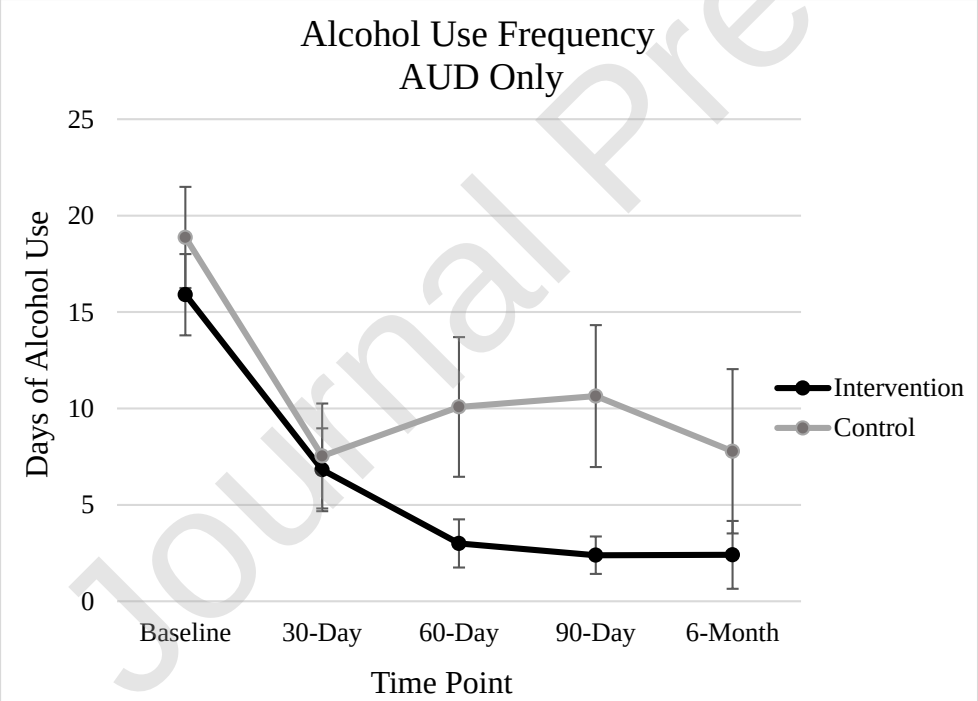

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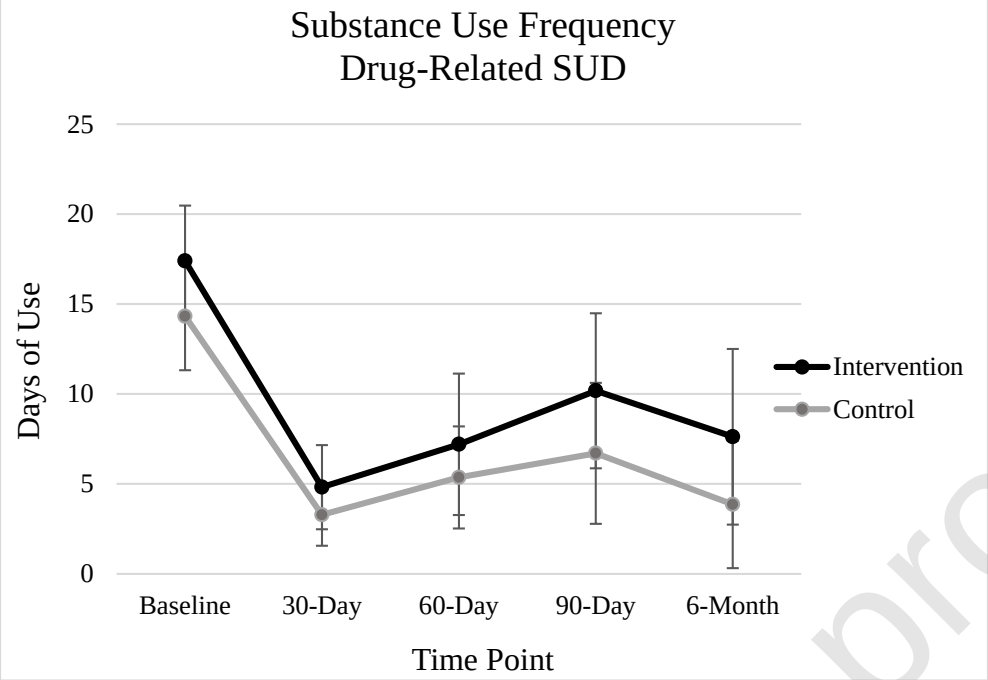

Figure 3. Average number of days in the past month at each time point that (A) all participants in the intervention compared to the control condition used the substance causing their SUD, (B) participants with only Alcohol Use Disorder (AUD) consumed alcohol by Condition, and (C) participants with drug-related SUD by Condition. Error bars represent standard error of the mean.

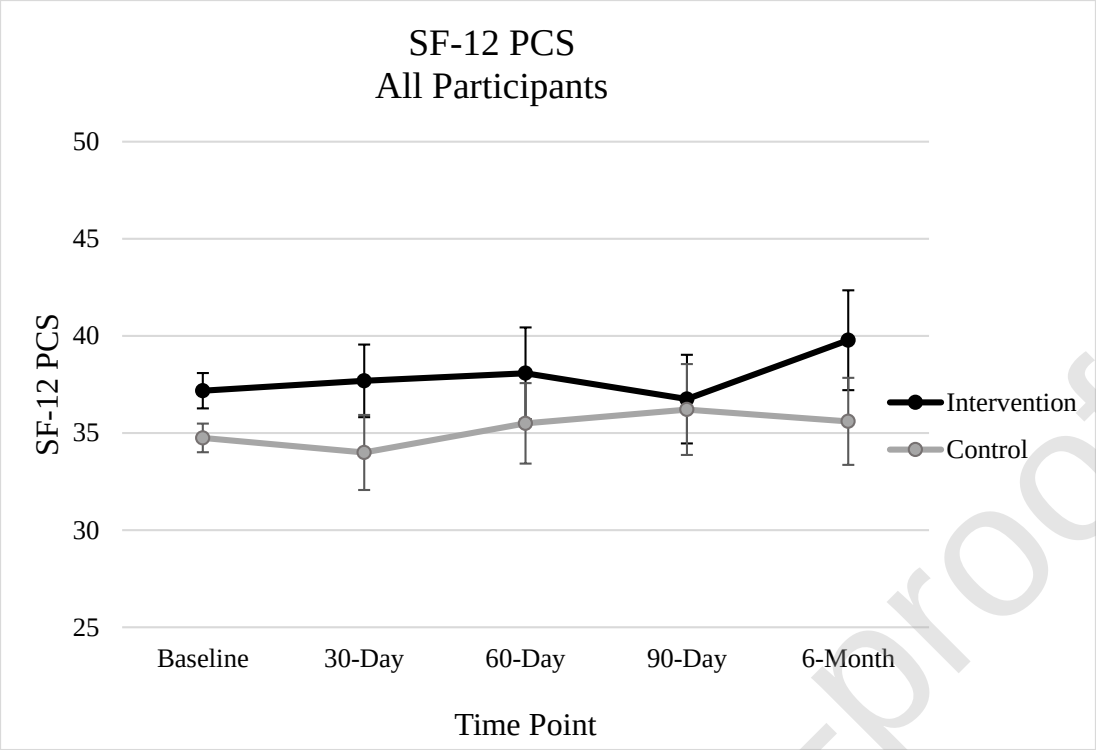

Figure 4. Self-reported physical health (SF-12 Physical Health Composite Score; PCS) at each time point for (A) all participants in the intervention compared to the control condition. Error bars represent standard error of the mean.

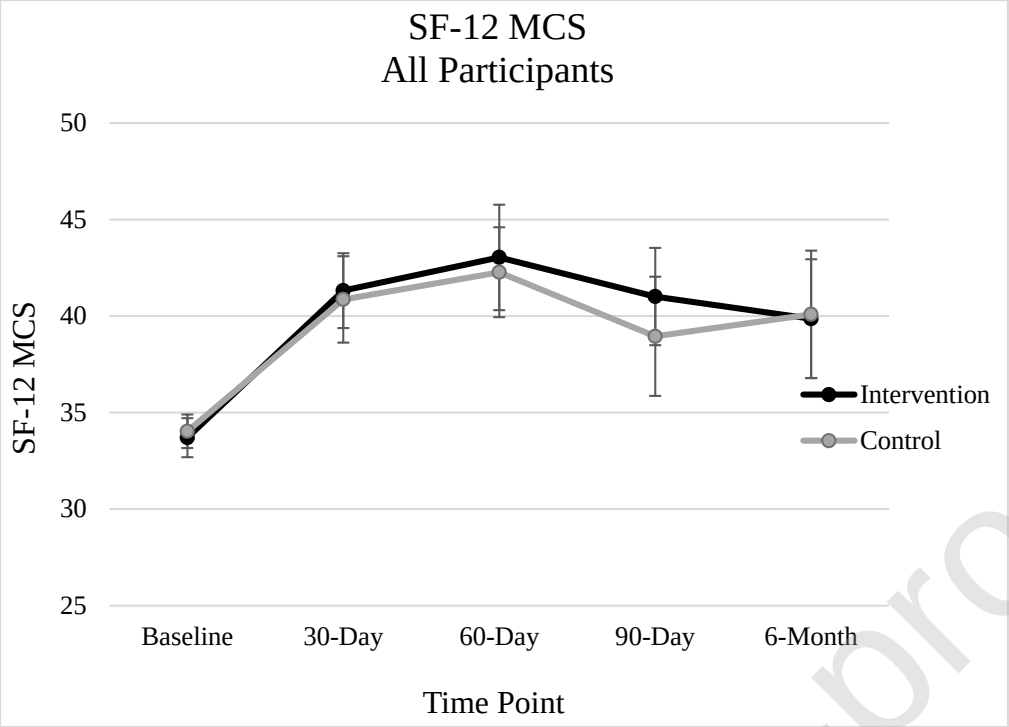

Figure 5. Self-reported mental health (SF-12 Mental Health Composite Score; MCS) at each time point for (A) all participants in the intervention compared to the control condition. Error bars represent standard error of the mean.