



Research



Evaluating the impact of CHES Health's Digital Health Solution on Clinical Outcomes in Oklahoma's Substance Use Disorder Population

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Introduction

Background

There are over 20 million people in the United States who meet criteria for Substance Use Disorder (SUD) but only 13% actually seek treatment ([SAMHSA, 2021](#)). For those who do pursue treatment, we see 40-60% return to substance use ([NIDA, 2018](#)). Among those who did not receive treatment but perceived a need for it cited barriers related to cost, access to the type of treatment they wanted, and/or concern that getting treatment might cause their neighbors or community to have a negative opinion of them ([SAMHSA, 2021](#)). Furthermore, we observed marked increases in substance use and adverse mental health events associated with the COVID-19 pandemic while there was an unfortunate inverse trend in the sheer availability of in-person addiction/recovery resources, leaving many SUD patients underserved ([Czeisler, 2020](#)). These are likely contributors to the 100,000 drug overdose deaths we saw in 2021, “an unthinkable milestone” ([Volkow, 2022](#)).

The Oklahoma Department of Mental Health and Substance Abuse Services (ODMHSAS) is acutely aware of the challenges associated with the addiction epidemic, reporting some of the highest rates for mental illness and substance use disorders in the nation ([ODMHSAS, 2020](#)). Though in recent years ODMHSAS has made significant strides to improve addiction prevalence and care in Oklahoma by reducing treatment wait time, developing a comprehensive approach to opioid prevention and treatment, deploying evidence-based services, utilizing peer support, and leveraging technology to improve patient access to supports they need (among other actions).

Peer support community programs have been shown to have a positive impact on recovery and reduce return to use ([Boisvert et al., 2008](#)). Furthermore, use of peers in conjunction with treatment has been shown to reduce the frequency of inpatient readmissions, improve treatment retention in the outpatient setting, and improve clinical outcomes for both patients with SUD and co-occurring mental health disorders ([Eddie et al., 2019](#)).

The vast majority of Americans – 97% – now own a cellphone of some kind and the share of Americans that own a smartphone is now at least 85% ([Pew Research Center, 2021](#)). More than ever, patients are taking an active role in the management of their health, and this is in large part because of mobile health (mHealth) apps.

In 2015, ODMHSAS first piloted the use of a smartphone app, then called ACHES, to support the recovery of individuals with SUD participating in a prison diversion program. In 2020 and 2021, access to the app, now known as Connections, was expanded to reach more Oklahomans. The app offers individuals (1) virtual evidence-based interventions, including digital cognitive behavioral therapy (CBT); (2) a 24/7 supportive peer community to reduce isolation, build motivation, and reinforce recovery skills, and (3) features to increase treatment and recovery plan adherence.

The purpose of the Connections App is to provide individuals in treatment and recovery with additional support to reduce the incidence and severity of return to substance use. For this purpose, the app is ideally given to individuals early in their recovery, typically either upon discharge from residential treatment or early in outpatient treatment.

Objective & Specific Aims

The goal of this project is to build upon the successful deployment of CHES Health services in the State of Oklahoma and develop a research collaborative, connecting investigators at ODMHSAS and CHES Health. The specific aims of this project include: (1) compare data on clinical outcomes for patients utilizing services provided by CHES Health compared to those engaged in treatment as usual; (2) translate outcome measures into actionable insights (aligned where possible among ODMHSAS, contracted providers, CHES Health, and the individuals we serve); (3) use measure outcomes to provide accountability and identify opportunities for improvement; and (4) implement performance improvement initiatives accordingly.

Methods

Inclusion and Exclusion Criteria

To be included in this review, individuals had to:

1. Be a resident in the state of Oklahoma
2. Own and have access to a smartphone
3. Were enrolled to use the CHES Health Connections app between January 2020 and November 2021
4. Receive behavioral health treatment at an ODMHSAS-contracted provider organization
5. Have Medicaid coverage or uninsured

Data Analysis

We completed a retrospective analysis on this cohort of individuals in Oklahoma to evaluate the impact of use of the Connections app and the effect on treatment utilization outcomes. We used CHES Health records and the ODMHSAS Integrated Client Information System (ICIS) database to capture demographic factors, Connections app engagement data, and treatment utilization history (ICIS' utilization data is essentially claims data – it is based on claims sent by providers to ODMHSAS for reimbursement for uninsured individuals). Demographic factors included age, race, and gender, while treatment utilization measures included service type, start and end dates for treatment episodes, level of care, and discharge disposition.

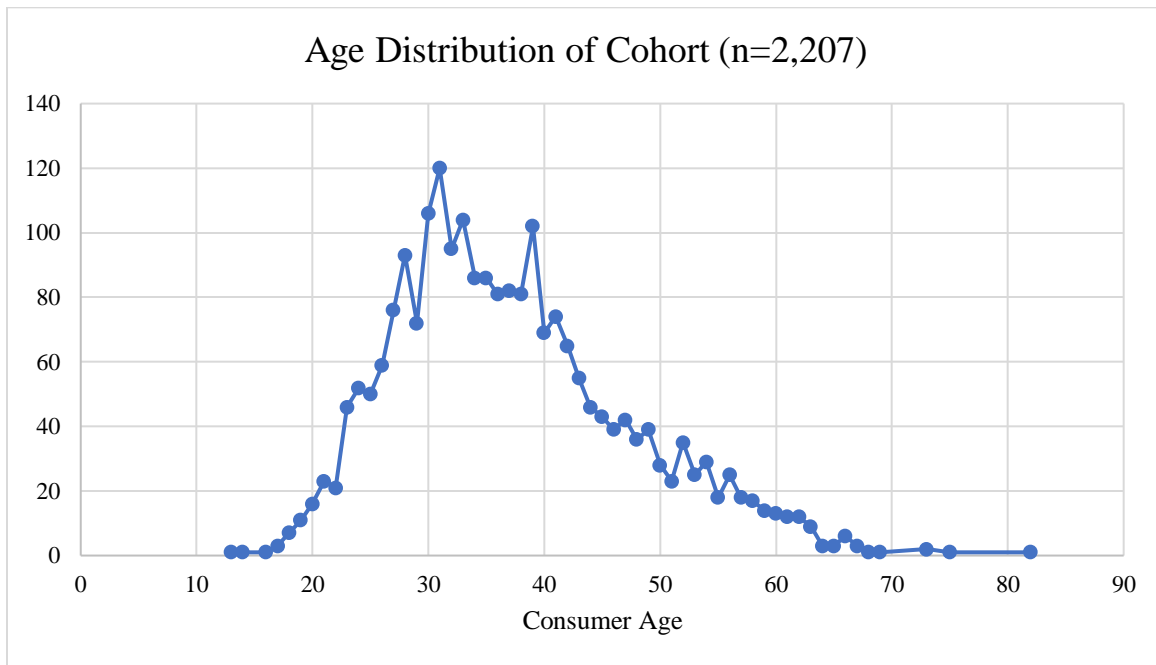
Behavioral health treatment service types for this analysis includes substance abuse, co-occurring, mental health, mental health court, drug court, and a few additional service types (e.g. gambling) with small representation which we have grouped together in an “other” category. Behavioral health treatment levels of care for this analysis includes community living/halfway house/residential care, community-based structured crisis, outpatient, inpatient, detox, and residential treatment. We evaluated each of the aforementioned services according to the American Society for Addiction Medicine Levels of Care Criteria. Based on this criteria, we grouped inpatient, detox, and residential treatment as “Level III or higher” ([ASAM, 2022](#)).

We defined the control arm as individuals who were enrolled to use the Connections app but never used the app, even once, and received behavioral health treatment. We defined the intervention arm as individuals who were enrolled and active in the Connections app (they used the app for at least one day) and received behavioral health treatment.

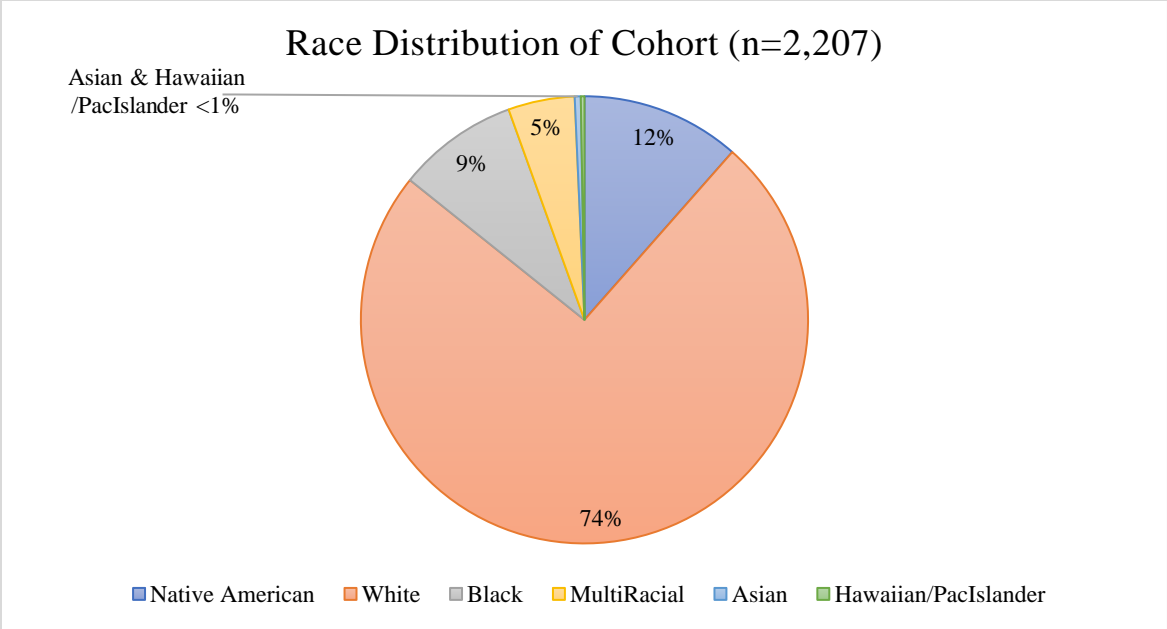
To compare the outcomes for the intervention arm versus the control arm, we examined the rate at which individuals, after being enrolled to receive the Connections App, incurred a return to a higher level of care (detox, residential SUD treatment, inpatient admission for SUD treatment), all of which would be considered a negative treatment outcome.

Profile of Individuals in the Study

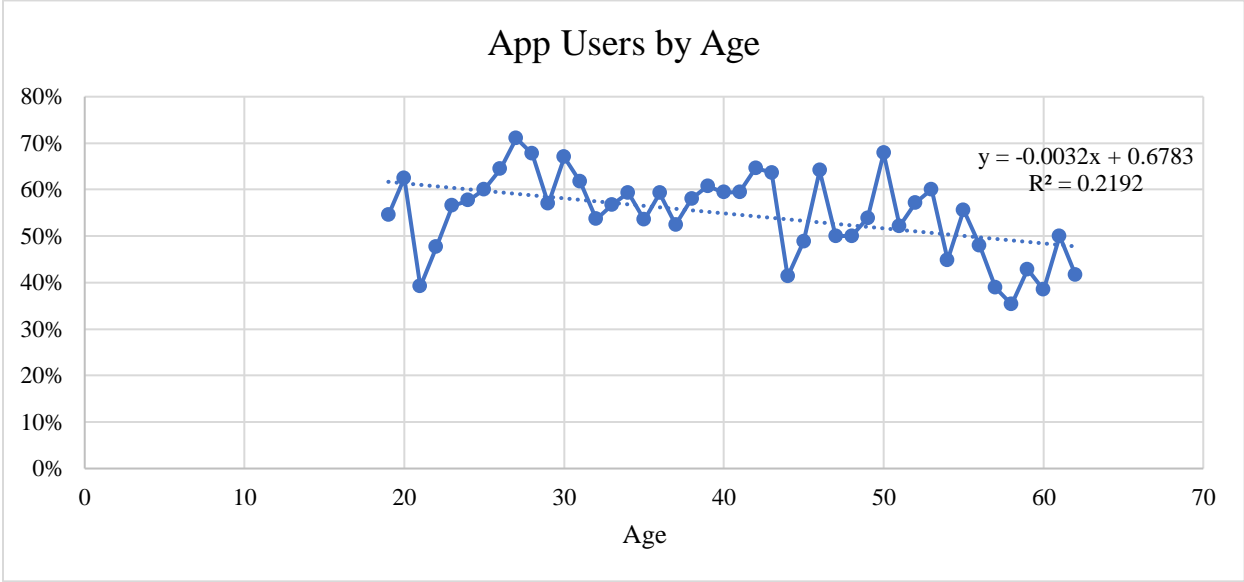
Of the 2,207 individuals in the analysis, 54% identified as female and 46% identified as male. The cohort ranged from 13-82 years of age (see chart xxx), mean age was 41 ($SD = 19$) years (median also 41 years).



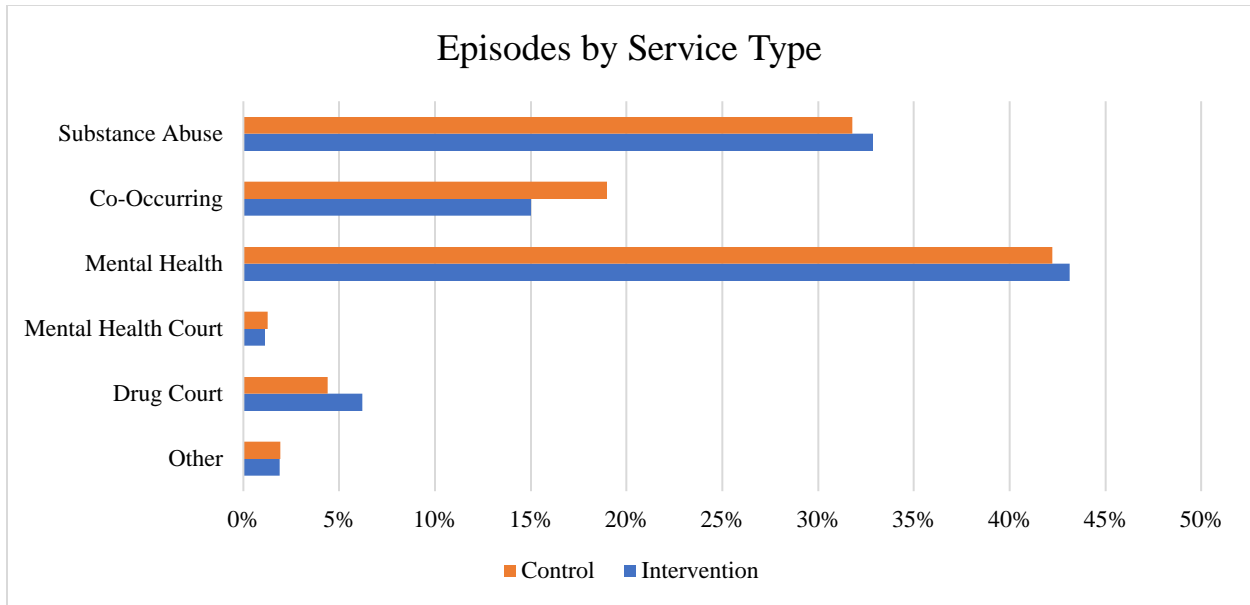
The cohort was largely made up of individuals identifying as White at 74%, followed by Native American at 12%, and Black at 9% (see complete distribution below, chart xxx).



While the race distribution of the intervention arm (n=1,232) remained consistent with cohort overall, there was a slight shift in gender representation, trending up for individuals identifying as female to 59% and down for those identifying as male to 41%. When evaluating the age distribution of the intervention arm, we only counted ages with at least 10 consumers in each year, rendering a representative sample from 19-62 years of age. We saw a downward trend of app use as age increased (see chart xxx).



The clinical profile of the intervention and control arms was comparable based on the historical treatment data for the individuals gathered from ICIS. As chart xxx illustrates, the analysis arms were comparable in their use of behavioral health services.



The control arm was comprised of 975 individuals and showed a total of 4,539 episodes of care in the ICIS, which equates to 4.66 episodes/individual. The control arm individuals incurred 65 episodes in community living/halfway house/residential care, 399 episodes in community-based structured crisis, 2,529 episodes at an outpatient level of care, and 1,546 in Level III and higher episodes of care (table xxx).

The intervention arm was comprised of 1,232 individuals and showed a total of 5,702 episodes in the ICIS, which equates to 4.34 episodes/individual. The intervention arm incurred 56 episodes in community living/halfway house/residential care, 485 episodes in community-based structured crisis, 3,729 episodes at an outpatient level of care, and 1,432 in Level III and higher episodes of care (table xxx).

Treatment Utilization by Study Arm

<u>Episode type</u>	<u>Control arm episodes (n=975)</u>	<u>Intervention arm episodes (n=1,313)</u>
Community Living/Halfway House/ResCare	65	56
Community-Based Structured Crisis	399	485
Outpatient	2529	3729
Detox	467	430
Inpatient	324	271
Residential Treatment	755	731
Grand Total	4539	5702

Results

Impact of Connections App on Return to Higher Level of Care

As discussed previously, the Connections App is introduced to individuals at the onset of, or early in the course, outpatient treatment, whether this outpatient treatment follows residential treatment or whether the individual's treatment starts at an outpatient level of care. Individuals in treatment for substance use disorder are at high-risk of failing to maintain their sobriety and being unsuccessful in treatment, resulting in a drop-out from treatment and, eventually, a future return to treatment. Thus, if an outpatient treatment episode is followed by a detox, residential, or inpatient treatment episode (all Level III episodes), then this is an indication the individual's outpatient episode was not successful since they apparently returned to a higher level of care.

On this basis, the analysis examined the frequency at which the individuals in the intervention arm returned to a Level III level of care after initiating use of the Connections App compared to the same frequency for the control group from the time they were enrolled to use the Connections App, but did not make use of it.

The analysis found 16% of the intervention arm had an episode that reflected a return to a Level III clinical setting (53 incurred a detox episode, 12 an inpatient episode, and 99 a residential episode) compared to 21% of the cohort group (51 incurred a detox episode, 22 an inpatient episode, and 103 a residential episode).

Return to Higher Level of Care: Detox

Description	Number	Detox Episode after Intervention	%
Intervention Arm	1,232	53	4.3%
Control Arm	975	51	5.2%
Difference: 17.8%			

Return to Higher Level of Care: Inpatient

Description	Number	Inpatient Episode after Intervention	%
Intervention Arm	1,232	12	1.0%
Control Arm	975	22	2.3%
Difference: 56.8%			

Return to Higher Level of Care: Residential

Description	Unique Patients	Residential Episode after Intervention	%
Intervention Arm	1,232	99	8.0%
Control Arm	975	103	10.6%
Difference: 23.9%			

We saw an inverse trend in outpatient treatment, where the average length of stay was higher for the intervention arm at 225 days vs. 188 days for the control arm. When the Connections app was used for > 30 days, the intervention group showed an increase in the average length of stay in outpatient treatment to 234 days and with app usage > 90 days, the average length of stay increased again to 259 days.

In reviewing discharge outcomes, of those individuals with a final disposition identified, 44% of those in the intervention arm completed their outpatient treatment program (defined as a discharge disposition code of “60” or “61”) while only 25% of the control arm completed treatment.

Discussion

Principal Findings

This analysis linked CHES Health data and treatment data to examine the effect of the Connections app on treatment utilization and outcome. The principal finding is individuals who used the Connections app were less likely to go from an outpatient level of care back to Level III treatment (16% compared to 21% for the control arm) and were more likely to stay and ultimately complete outpatient treatment (44% compared to 25% for the control arm).

Plans for Additional Analysis

The analysis identified differences in treatment episodes and outcomes between the intervention arm and the control arm; the value of these differences was not analyzed. One measure of the value of fewer instances of individuals returning to a Level III level of care would be the direct cost avoidance of these services. Another value point would be the indirect benefit on the individual's quality of life, their employment, housing, family and community impact. A future analysis could seek to measure this value impact.

The analysis looked at individuals who used the Connections App between January 2020 and November 2021. During this time, the functionality of the Connections App evolved and, more meaningfully, a 24/7 peer engagement service was added by the vendor, CHES Health. As a result, individuals using the app towards the end of the analysis period would have had access to more support and more engagement in the app than individuals earlier in the analysis period. A future analysis can assess the impact of these enhancements as well as enhancements planned for 2022, including gamification and support for contingency management.