

Short Report

Delivering information about medication assisted treatment to individuals who misuse opioids through a mobile app: a pilot study

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ABSTRACT

Background Digital therapeutic tools (e.g. mobile applications) can be accessible, low-cost interventions that counter misconceptions about medication assisted treatment (MAT) and/or improve deficits in MAT knowledge that are common barriers to treatment entry among individuals with opioid dependence. The purpose of this pilot study was to examine the preliminary effectiveness of a mobile application, ‘uMAT-R’, that includes health information about OUD recovery supported by science and MAT benefits.

Methods Twenty-six adult participants with OUD recruited via social media completed all modules and pre/post-assessments within uMAT-R. McNemar’s test was used to compare interest in treatment before and after completing the app, and paired *t* tests were used to compare MAT attitude scores before and after completing the modules within uMAT-R.

Results Before viewing uMAT-R, 32% agreed/strongly agreed that they were interested in starting treatment to recover from opioid misuse, compared to 48% after completing uMAT-R. The average scores on the MAT attitudes scale and its Aid to Behavior Change subscale improved from before to after viewing uMAT-R. Among the participants, 88% felt that uMAT-R would be useful to consult when making decisions about recovery.

Conclusions Our encouraging pilot findings support the use of uMAT-R to help address the current opioid epidemic.

Keywords buprenorphine, methadone, opiate substitution treatment, opioid dependence, telemedicine

Introduction

Approximately 16 million citizens worldwide suffer from opioid use disorder (OUD).¹ Currently, medication assisted treatment (MAT; i.e. the use of methadone, buprenorphine or naltrexone along with behavioral therapy) is supported by the Substance Abuse Mental Health Services Administration (SAMHSA) and the World Health Organization as an effective strategy for OUD treatment,^{2,3} yet individuals struggling with OUD may lack awareness about MAT and/or underestimate or misjudge the benefits of MAT.^{4–6} Common misperceptions about MAT include concerns that it substitutes one addiction for another, as well as beliefs that complete

abstinence works better than MAT and that MAT is ineffective because it does not immediately cure opioid dependence.^{4,7,8} Because these types of perceptions create barriers to

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seeking MAT, one first step toward encouraging treatment entry is to address and overcome these misconceptions.

Digital therapeutic tools (e.g. mobile applications) can be accessible and low-cost interventions to counter MAT misconceptions. Health information about recovery options that are supported by science and the benefits of MAT for individuals with OUD is compiled by SAMHSA and is available online.⁹ For this pilot study, we adapted this content for use within a mobile application that we developed ('uMAT-R' to represent that notion that participants' engagement in **M**edication **A**ssisted **T**reatment can facilitate **R**ecovery) and then disseminated it to individuals with OUD identified via social media and not engaged in MAT to test the utility of this tool in improving attitudes toward MAT. While apps do exist that are designed to supplement MAT to improve recovery,¹⁰ to our knowledge there are no other apps available that aim to provide MAT education to individuals with OUD who are not already engaged in MAT. We hypothesized that participants would (i) have an increased interest in OUD recovery and (ii) have improved attitudes toward MAT after using the app.

Methods

Content of the uMAT-R mobile application

To educate individuals about recovery options for OUD via uMAT-R, we derived content for our mobile app from the online handbook 'Decisions in Recovery: Treatment for Opioid Use Disorders' developed by SAMHSA⁹ that is designed to educate on the treatment options for OUD including costs, latest research findings, and the potential side effects of buprenorphine, methadone, and naltrexone. Video testimonials from individuals who have had success with MAT are included. The handbook content was broken into modules that delivered content across text, audio or video formats. There were a total of five modules, each divided into 2–13 lessons. There were 15 text-based lessons (with an average of 3 pages of text per lesson), 9 of which had an audio and/or video alternative. Additionally there were 13 video lessons and 6 worksheets. An appendix was also included that provided a glossary and list of resources. uMAT-R was built and hosted by iTether, LLC (itetherllc.com), a mobile health software development company.

Participants

In September 2017, individuals socially networking about opioids on three opioid-focused subreddits (topic-centered forums) were invited to take an online survey (developed and hosted using Qualtrics survey software, Qualtrics,

Provo, UT¹¹) via a recruitment post on the subreddits. Survey eligibility included US residence, fluent in English, ≥15 years old [parental waiver of consent], and had ever misused opioids. We used Captcha to thwart machine responses and a Qualtrics option to help prevent people from taking the survey more than once; we also considered response time and illogical/suspicious data, which left 381 survey participants. A subsample of 161 adult participants was eligible to pilot uMAT-R (≥18 years old, past-month opioid misuse, not using MAT) and provided enough information to set up an account for them in the iTether platform. Among the 161 participants who were invited to pilot uMAT-R, 44 downloaded the app and logged in. Participants received a \$15 Amazon gift card upon completion of the initial online survey and another \$15 Amazon gift card upon completion of all uMAT-R modules. This study was reviewed and approved by the Washington University Institutional Review Board.

Because we wanted to assess changes in attitudes pre/post-use of uMAT-R, this report focuses on the 26 participants who completed all of the modules (described above) as well as all of the pre/post-assessments (described below). These 26 participants did not significantly differ from those who did not complete the app ($n = 135$) by gender, race/ethnicity, age, type of opioid misused, meeting criteria for opioid dependence, prior MAT experience, engagement in treatment for opioid misuse in the past 6 months, and prior experience with the use of an app to help quit opioid misuse (all $P > 0.05$).

Measures

Self-reported baseline measures included demographic characteristics (age, gender, race/ethnicity and employment status), participants' misuse of various opioids within the past 30 days, a brief measure to assess opioid dependence (Rapid Opioid Dependence Screen),¹² whether the participant had heard of or ever used the three main types of medication for the treatment of opioid misuse (broadly defined as buprenorphine, methadone and naltrexone), whether the participant had recently (in the past 6 months) received treatment for opioid misuse, and whether the participant had prior experience using an app to help quit their opioid misuse.

Before and immediately after viewing the modules within uMAT-R, participants reported on their attitudes toward MAT and interest in starting treatment via surveys within the app. Attitudes toward MAT were assessed using a 28-item tool modified from the Attitudes of Methadone Scale,¹³ which includes five Likert scale responses for each item ranging from 1 = 'Strongly disagree' to 5 = 'Strongly agree'. This scale also includes one 8-item subscale to assess

MAT as an ‘Aid to Behavior Change’ (i.e. participants’ acknowledgement of the potential of MAT as an aid to change behavior; e.g. ‘With MAT you can eventually get off drugs if you want to.’ and ‘MAT allows ex-addicts to lead a normal life.’), with the same Likert scale responses. The full Attitudes toward MAT scale includes this subscale plus items assessing beliefs about MAT side effects, efficacy and safety. For each participant, Likert scale scores were averaged across all 28 items for an overall attitudes score, and across the 8 items in the subscale to create an ‘Aid to Behavior Change’ score. Before and after using uMAT-R, participants were also asked to what extent they were interested in starting any kind of treatment to recover from opioids misuse (MAT was not specified), with responses ranging from ‘Strongly disagree’ to ‘Strongly agree’; we dichotomized responses to contrast those who agreed or strongly agreed versus all other responses. Participants also provided feedback on the app’s usefulness (using items adapted from the e-Health Impact Questionnaire)¹⁴ and specific additional features to include in the app, based on a list of features from studies of other addiction apps.¹⁵

Statistical analysis

Descriptive statistics were used to describe participants’ demographics and their feedback regarding the usefulness and suggested features for uMAT-R. Paired *t* tests were used to compare MAT attitude scores, including the Aid to Behavior Change subscale, before and after the participants completed the app modules. McNemar’s test was used to compare interest in treatment before and after completing the modules in uMAT-R. Tests were two-tailed with $P < 0.05$ considered statistically significant. All analyses were performed using SAS version 9.4 for Windows (SAS Institute, Inc., Cary, NC).

Results

A total of 161 users were invited to use the app. Among these, 44 downloaded the app and logged in, and 26 completed all app modules. Among the 26 participants who completed all uMAT-R modules, 65% were males, 88% were non-Hispanic White, 54% were not employed, and the median age was 28 years (range 18–46 years). All had misused opioids within the past 30 days, with the most common being morphine (55%), heroin (52%), hydrocodone (48%) and oxycodone (38%). Almost all misused more than one type of opioid (96%) and met the criteria for opioid dependence (96%). None were taking medication to treat their opioid addiction; however, all had heard of buprenorphine and methadone, and 81% had heard of naltrexone. Approximately 58% had ever

tried some form of MAT (50% tried buprenorphine, 7% tried methadone, 12% tried naltrexone). Only 12% had received treatment for their opioid misuse in the past 6 months. None had ever used an app to help them stop using opioids.

Results from pre- and post-app assessments regarding interest in treatment and attitudes toward MAT are shown in Table 1. Participants took an average of 4.9 days (standard deviation 5.7) to complete all of the modules in uMAT-R (time from pre-app assessment to post-app assessment). Before viewing uMAT-R content, 32% agreed or strongly agreed that they were interested in starting treatment to recover from opioid misuse; following completion of uMAT-R content, this percentage significantly increased to 48% (McNemar’s test $S(1) = 4.0$, $P = 0.046$). Likewise, attitudes toward MAT also improved following completion of the app content. The average score across items on the MAT attitudes scale (range 1 = strongly disagree to 1 = strongly agree) before viewing the uMAT-R content was 3.31 (sd 0.46), and this increased to 3.46 (sd 0.52) following completion of the content ($t(25) = 2.12$, $P = 0.044$; Cohen’s $d_z = 0.42$). When examining the Aid to Behavior Change subscale of the MAT attitude questionnaire (same Likert scale responses), the average score across items increased from 3.78 (sd 0.71) pre-app to 4.11 (sd 0.54) post-app completion ($t(25) = 2.81$, $P = 0.010$; Cohen’s $d_z = 0.55$).

Feedback from the survey participants about the usefulness of uMAT-R is presented in Table 2. Most participants agreed or strongly agreed that the app was useful for them; $\geq 84\%$ of participants felt that uMAT-R provided useful tips on how to make life better, had a positive outlook, taught them something new, helped them have a better understanding of recovery options, and would be useful to consult when making decisions about their recovery. Additional features to add to uMAT-R included an option to network/communicate with others who are using the app (88%), access to critical helplines and treatment locations (88%), a system to track sobriety progress (76%), direct communication with coaches within the app (68%) and advice on dealing with triggers (68%).

Discussion

Main finding of this study

Our study represents one of the first of its kind to empirically test a mobile app that connects validated health information about OUD recovery options and MAT benefits to adults with OUD who are not already engaged in MAT. In addition, our recruiting methods highlight the potential for using social media to engage with participants in need who are otherwise hard-to-reach, and to link them with a mobile

Table 1 Pre- and post-app assessments on interest in treatment and MAT attitudes ($N = 26$)

Measure	Pre-app	Post-app	P
Interested in starting treatment to recover from opioid misuse ^a , n (%)	8 (32%)	12 (48%)	0.046
MAT attitude scale ^{b,c} , mean (sd)	3.31 (0.46)	3.46 (0.52)	0.044
Aid to Behavior Change subscale ^{b,d,e} , mean (sd)	3.78 (0.71)	4.11 (0.54)	0.010

^a $N = 25$; one participant did not answer the questions about interest in starting treatment.

^bLikert scale responses, range 1 = strongly disagree to 5 = strongly agree.

^cCohen's $d_z = 0.42$.

^dEight-item subscale of the MAT attitude scale.

^eCohen's $d_z = 0.55$.

Table 2 Participant feedback about uMAT-R ($N = 25$)^a

App usefulness	n (%) who agreed/strongly agreed
The app includes useful tips on how to make life better	23 (92)
The app has a positive outlook	22 (88)
I would consult the app if I had to make a decision about my recovery	22 (88)
The app helps me to have a better understanding of options for recovery	21 (84)
I have learned something new from the app	21 (84)
The app encourages me to take actions that could be beneficial to my health	20 (80)
On the whole, I find the app reassuring	20 (80)
The app encourages me to play a more active role in my recovery	20 (80)
I feel more inclined to seek out treatment after completing the app	10 (40)
<i>Additional app features that would be useful</i>	<i>n</i> (%)
Option to network and communicate with others using the app	22 (88)
Access to critical helplines and treatment locations	22 (88)
A tracking system that records your progress	19 (76)
Direct communication with coaches (i.e. private chatting)	17 (68)
Advice on how to deal with triggers and what to do when warning signs appear	17 (68)
Option to create to-do lists, reminders, and/or daily planners that you can use to help keep you sober	16 (64)
Features to enhance motivation, such as inspirational quotes, prayers, recovery stories, etc.	14 (56)
Videos for relaxation or stress reduction	13 (52)
Information on addiction and addiction recovery	12 (48)
In-app calendar to keep recovery-related events exclusively inside the app	10 (40)

^aAmong the 26 participants who completed pre-/post-app assessments shown in Table 1, one did not complete this feedback survey.

health intervention. To this end, the results of this pilot show promise with using social media and mobile health technology to shift attitudes toward OUD recovery and MAT among a population that can be difficult to engage in traditional treatment delivery systems.

What is already known on this topic

Individuals who seek recovery from OUD will have their best chance for recovery through engagement with MAT, but MAT

uptake remains limited. This is due, in part, to misinformation and/or negative attitudes about MAT that are common and derail treatment efforts.^{13,16} Moreover, willingness to initiate treatment for OUD often relies on how knowledgeable an individual is about treatment benefits and/or how familiar he/she feels about the various OUD recovery options.¹⁷ Research findings further suggest that individuals, even those already engaged with treatment, express relief upon learning about the safety of medications to treat OUD.¹⁶

What this study adds

Our study suggests that social media recruitment and digital therapeutics could help educate individuals who misuse opioids and are not treatment engaged about the benefits of MAT for recovery. This pilot study of uMAT-R showed improvements in MAT attitudes and increased interest in treatment among a small number of individuals who were socially networking about their opioid misuse. Participants provided suggestions for supplemental features to be added our prototype app, such as a networking option within the app and a self-monitoring component. These findings lend precedence to individuals' feedback during mobile app development to improve acceptability and satisfaction with the tool. Nevertheless, findings following the use of uMAT-R, even in its prototype version, do signal significant public health implications for helping to shift individuals with OUD toward recovery and MAT initiation.

Limitations of this study

This is a pilot study, therefore the results are limited by its small sample size, and the use of a convenience sample limits the generalizability of the findings. Moreover, attrition in our study was relatively high but primarily occurred prior to participants' initiating use of our app. In addition, our attrition rates are comparable to those cited in studies that similarly examine digital therapeutic tools to address substance misuse behaviors.¹⁸ The uMAT-R prototype solely included health information about OUD recovery options; it is possible that the inclusion of additional features, desired by our participants, could improve or lessen its effectiveness. Additionally, because only participants with interest took part in this study, this could have introduced selection bias to our sample. Finally, in assessing interest in treatment before and after the intervention, we assessed interest in treatment for opioid misuse in general rather than interest in MAT; thus, we do not know the specific modality of OUD treatment in which participants have interest.

Despite these limitations, our pilot findings highlight the potential of leveraging social media to connect hard-to-reach individuals with OUD to a digital therapeutic tool that improves MAT attitudes and nudges them toward OUD recovery. Participants in this study further endorsed uMAT-R's utility as a tool to turn to when contemplating recovery decisions. Our findings are encouraging and support the continued development of targeted and efficacious recovery-focused mobile apps to help combat the current opioid epidemic.

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