

Peer Support for Opioid Use Disorders: Feasibility and Acceptability of a Moderated Text-Based Group Chat Application

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ABSTRACT

Purpose: To elucidate key elements surrounding acceptability/feasibility, usability, and features of a smartphone-based mobile peer support application for adults engaged in treatment for opioid use disorder.

Methods: We recruited adults engaged in treatment for opioid use disorder, during the course of usual care, at a hospital-affiliated outpatient clinic. Participants piloted a smartphone-based mobile peer support application for six weeks and completed semi-structured interviews exploring usability and acceptability of the mobile platform. Interviews were conducted by trained interviewers, audio-recorded, and transcribed verbatim. A coding structure was iteratively developed using Framework Analysis focusing on feasibility and acceptability of the app and recommendations for improvement.

Results: Saturation was reached after 20 interviews (mean age 43.1; 60% White; 15% Hispanic/Latinx; 55% late in recovery; 55% high engagement users). Qualitatively, participants articulated (1) Acceptability/feasibility themes: benefits, challenges, feature recommendations; and (2) Emergent themes: support and alternative treatment option. Quantitative measures indicated feasibility with a total of 2,436 messages sent over the study period.

Conclusion: Adults engaged in medication for opioid use disorder expressed high degree of user satisfaction about a smartphone-based mobile peer support application. Incorporating thematic results on participants' experiences and interactions with the peer support application and the application's role in recovery efforts can inform development of future mobile-peer support applications for adults engaged in medication for opioid use disorder. Concerns about activity in peer support groups may be addressed through structured support from a moderator or designated timeframes to go online.

Keywords

Opioid use disorder; Peer support; Technology; Application

Introduction

Digital peer support for opioid use disorders (OUDs) consists of live or automated technology-driven peer support such as recovery social networking sites, smartphone applications, web-based applications, and text messaging [1,2]. Using technology to augment peer-support may overcome patient-level barriers present in traditional treatment settings such as transportation and stigma. For instance, text communications between peers can be anonymized using a pseudonym with only the admin being aware of the patient's identity, thereby increasing a patient's comfort [3]. Newer applications also incorporate artificial intelligence (AI) and machine learning systems that are intended to reduce the need of 24/7 staff for monitoring of online conversations by enabling dynamic assessments of the group chat content for concerning sentiment (e.g., self-harm). For patients who experience high risk periods that occur outside of structured treatment settings (e.g., experiences of cravings or urges to use drugs), technology media may be a promising format to provide safe and accessible peer support, free from stigma.

While mobile applications are potentially important mediums to implement peer-based support, little is known about their feasibility and acceptability among adults engaged in

treatment for opioid use disorders (OUDs). In the absence of evidence-based platforms, millions of individuals use social networking applications to obtain peer support and health information about addiction and recovery. Unfortunately, many OUD-focused social networking applications—such as Facebook and Reddit—lack connection to clinical infrastructure or oversight and may trigger substance use cravings as a result of encountering sensitive drug-related information online [4].

For a novel mobile peer support application to be effective, it must have a strong theoretical underpinning in both its content and delivery mechanism (Riley, 2011; Ranney, 2014). Behavioral theory and related in-depth formative development work have

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determined the success of most traditional behavioral interventions [5-7]. To our knowledge, no machine-learning enabled mobile peer support application studies have been conducted with adults with OUD, and no formative research has been conducted exploring adults' preferences for and concerns about a mobile peer support application's content, structure, and features.

We conducted a pilot mixed-methods study of a novel platform to determine the feasibility of mobile peer-support in an outpatient setting for OUD. We examined process measures and performed qualitative analysis to determine the acceptability, usability, and features of a smartphone-based intervention.

Methods

Study design and overview

We conducted a single arm intervention study among patients in OUD recovery whereby consenting participants agreed to download and use a smartphone-based mobile peer-support application ("Marigold Health") for 6 weeks. Marigold Health is a text-based group chat application that offers peer support for individuals with depression and anxiety as well as OUD. The application is built using natural language processing (NLP), a subset of artificial intelligence (AI), to extract, classify, and label data to deliver automated "red flag" monitoring messages sensitive two types of content: (1) expressed or implied intent to harm self or others and (2) malicious conduct ("trolling"). Features of the Marigold application meet HIPAA, HITECH, and 42 CFR Part II standards.

Groups consist of about 10 peer users and a study moderator. For the purposes of the study and safety monitoring, the moderator was part of the research team and had experience in behavioral health and clinical psychology. Participants' personal information is only visible to group moderators; peer users only see a user-chose, pseudonym. The moderator initiates discussion with a greeting and a standard "ice breaker" prompt and regulates the flow of conversation with standard text language developed by the study team. Examples of icebreaker prompts include, "Who or what are you most grateful for?", "Why is recovery important for you?", and "If you feel comfortable, share a story of a time when someone helped you with your recovery journey."

Groups are overseen by the study moderator and the study clinicians in an organized on-call fashion. There are several layers of oversight: (1) "red flag" notifications that have already been honed to detect suicidal or homicidal intent using Marigold Health's current algorithms (2) active monitoring of text messages by the study moderator during daytime hours, and (3) daily text-message review by the study moderator. An established protocol is in place for spontaneously divulged suicidal or homicidal intent, in which the co-investigator who is "on call" will contact the participant, as per the study's crisis management plan.

Participants agree to maintain a minimum level of activity (>1 message per day) during the 6-week study period. The

moderator attempts to engage "inactive" users through standard follow-up procedures which first include a direct message through the application then a phone call. Participants who do not post at least one message during a 2-week period are deactivated from their assigned peer group chat. We then performed a quantitative (e.g., process measures) and qualitative evaluation of the feasibility and acceptability of the peer-support app.

Study setting and population

Participants were recruited from a hospital-affiliated outpatient clinic in the Northeastern United States that offers medications for opioid use disorder (MOUD; e.g., buprenorphine) and ancillary supports for patients with OUDs. The clinic serves a population that admits more than thirty new patients each month. Patients were eligible for enrollment if they were 18+ and met the Diagnostic and Statistical Manual of Mental Health Disorders (Fifth Edition) criteria for OUD per treating provider, at any stage of recovery. Patients were excluded if they were a non-English speaker, did not have a smartphone, pregnant, were incarcerated, or were unable to provide informed consent.

Study recruitment and participation

During a convenience sample of 33 shifts from October 2019 to December 2019, patients presenting to the clinic for medication and therapy appointments were approached by a trained Research Assistant (RA) to participate in the smartphone-based mobile peer support application. After written and informed consent, the RA administered a baseline assessment (e.g., socio-demographics) and then had the participant install and login to Marigold Health on their personal smartphone. After creating an anonymous ID (chosen by the participant), they were then placed in a queue to await placement in a peer group. Participants were placed in peer support groups of 9-11 participants based on chronological order and on a rolling basis. Groups were activated by the RA when at least four new participants were available to join a group. All participants were encouraged to continue with app use for the full six-week study intervention period following the last participant's entry of the group chat. Participants were told that the goal of the study was to develop the monitoring software by using a "test" version of the application, whereby their messages were to help develop the monitoring system to automatically monitor for safety, "trolling" (mean content), and signs of return to drug use. The participants were informed that the study team planned to collect information on how they use the application, the type of messages participants send, and then the study team will ask participants for feedback through interviews to understand how to improve the application. Participants were contacted by phone to complete a qualitative interview 1-2 weeks prior to the close of the 6-week study period. Interview participants were selected purposefully, to ensure equal numbers of each sex and to represent patients in various stages of change (e.g., new to treatment, in long-term recovery) and until thematic saturation was reached. Interviews were conducted at a time and place of the participant's choice. At baseline, participants received a \$40 reloadable gift card. For

each day active on the application during the 6-week intervention period, \$5 was added to the card. At the end of the study period, participants received up to \$250 for intervention participation and an additional \$40 for participation in a qualitative interview.

Interview protocol

Each one-on-one interview was conducted using a semi-structured interview guide created by physicians with expertise in technology-based behavioral health interventions, peer support, and OUDs (M.L.R., F.L.B.) and a psychologist with expertise in behavioral health and qualitative methodology (E.J.). Interviews were facilitated by either a co-investigator or a research assistant, both of whom were trained in qualitative interview facilitation. The interviews lasted approximately 45–60 minutes. Interviews were conducted face-to-face in a private research office, except one interview was conducted via telephone at the participant’s request. All interviews were audio recorded and transcribed verbatim.

The overarching goal of the interviews was to provide formative data regarding interactions with and key elements of a smartphone-based mobile peer support application among adults engaged in treatment for OUD. To elicit accurate information about potentially sensitive topics, the interviews began with an “ice breaker” section, regarding participants’ overall impressions of their experience and reactions to the application. It then explored participants’ experiences enrolling and participating in the Marigold Health application, and if there were any program barriers to implementation. The interviewer inquired about helpful and unhelpful topics of discussion in the peer-group chats; discussions of conversation content are not included in this analysis. Next, the interviewer asked participants about their recovery experience during app use. Finally, participants were asked to provide recommendations for app improvement and development of the monitoring software.

Data analysis

Using the Framework Analysis Method [8], all transcripts were reviewed and summarized according to the interview guide. An initial coding framework was developed from the core interview topics (e.g., things liked/disliked, suggested upgrades, recommendations). The framework developed was applied back to the transcripts and themes and sub-themes were refined. Research Assistant (C.S.) and Clinical Psychologist (E.J.) reviewed two transcripts independently, then met to develop the coding structure further based on the data collected. Once the framework was fully defined, each transcript was coded by Research Assistant (C.S.) and Clinical Psychologist (E.J.) independently; the coders then discussed each transcript to ensure comprehensiveness of coding. This process ensured credibility (the qualitative equivalent of “validity”) and transferability and dependability (the qualitative equivalent of “reliability”) of the analysis [9,10]. Thematic saturation of the data was reached at 20 interviews. The agreed-upon codes were then entered into Microsoft Excel, which helps to organize and link codes within electronic interview transcripts. Summaries were written describing the range of data in each code.

Using quantitative measures, we report enrollment, daily

use, and retention with descriptive statistics. A priori we determined that the app would be considered feasible if >85% of participants were active users and reported that the app was acceptable.

Results

Interview demographics, app use, and retention

Across 33 recruitment shifts, 112 patients were eligible to participate in the study. Of the 112 patients that were eligible for the study, 48 enrolled (43%), 51 were interested but not ready to consent (46%), and 12 refused (11%). One patient approached the study RA outside of recruiting hours to enroll in the study. In total, 49 patients enrolled in the study. Participants were divided into five groups, with 9–11 members in each group. Across the groups, 53% were male; 59.2% were White; 37% were in early recovery; and 20.4% Hispanic/Latinx. A total of 2,436 messages were sent over the study period, with the average participant sending ~50 messages in total. During the 6-week study period, 64% of the participants remained active, sending on average one message per day. Of the participants who were active, 26.5% classified as high users, sending more than two messages per day. Characteristics of high users were mostly White (69.2%) and non-Hispanic/Latinx (84.6%). Of those who were inactive, sending less than one message per day, 61.1% were non-White and 38.9% were Hispanic/Latinx. Ten participants (20.4%) were deactivated from their peer group chats after multiple attempts to contact from the study moderator (Table 1).

		N (%)
Interviews	Age (mean)	43.1
	18-35	5 (25)
	36-50	10 (50)
	51-65	5 (25)
	Ethnicity	
	Hispanic/Latino	3 (15)
	Non-Hispanic/Latino	17 (85)
	Race	
	White	13 (65)
	Black, African, Haitian, or Cape Verdean	3 (15)
	Mixed, bi-racial, or multi-racial	1 (5)
	American Indian or Alaska Native	1 (5)
	Other	2 (10)
	Sex	
	Male	9 (45)
	Female	11 (55)
	Time in Recovery	
	Early (<6 months in treatment)	9 (45)
	Late (>6 months in treatment)	11 (55)
	Engagement Level	
Low (< 2 messages per day)	11 (55)	
High (≥ 2 messages per day)	9 (45)	

	N (%)
Age (mean)	40.51
18-35	18 (36.7)
36-50	21 (42.9)
51-65	10 (20.4)
Ethnicity	
Hispanic/Latino	10 (20.4)
Non-Hispanic/Latino	39 (79.6)
Race	
White	29 (59.2)
Black, African, Haitian, or Cape Verdean	7 (14.3)
Mixed, bi-racial, or multi-racial	1 (2)
American Indian or Alaska Native	2 (4.1)
Other	10 (20.4)
Sex	
Male	26 (53.1)
Female	23 (46.9)
Time in Recovery	

Early (<6 months in treatment)	18 (36.7)
Late (>6 months in treatment)	31 (63.3)
Engagement Level	
Low (< 2 messages per day)	36 (73.5)
High (≥ 2 messages per day)	13 (26.5)

Table 1: Participant demographics

At baseline enrollment for the intervention study, 98% of the participants self-selected to be invited to complete semi-structured interviews (Figure 1). Twenty of these intervention participants were selected to participate in interviews and purposefully balanced on gender, time in recovery, and engagement level. Stage of change was assessed using electronic health record data. Of the participants who completed interviews, 55% were female, 55% were late in recovery, and 55% were low level app users. Three participants (15%) stopped using the application prior to the interview commencing. The average age of the interview participant was 43.1 years-old (Range=23-58) and identified as non-Hispanic/Latinx White (60%) followed by 15% non-Hispanic/Latinx Black, 15% Hispanic/Latinx descent, and 10% Other.

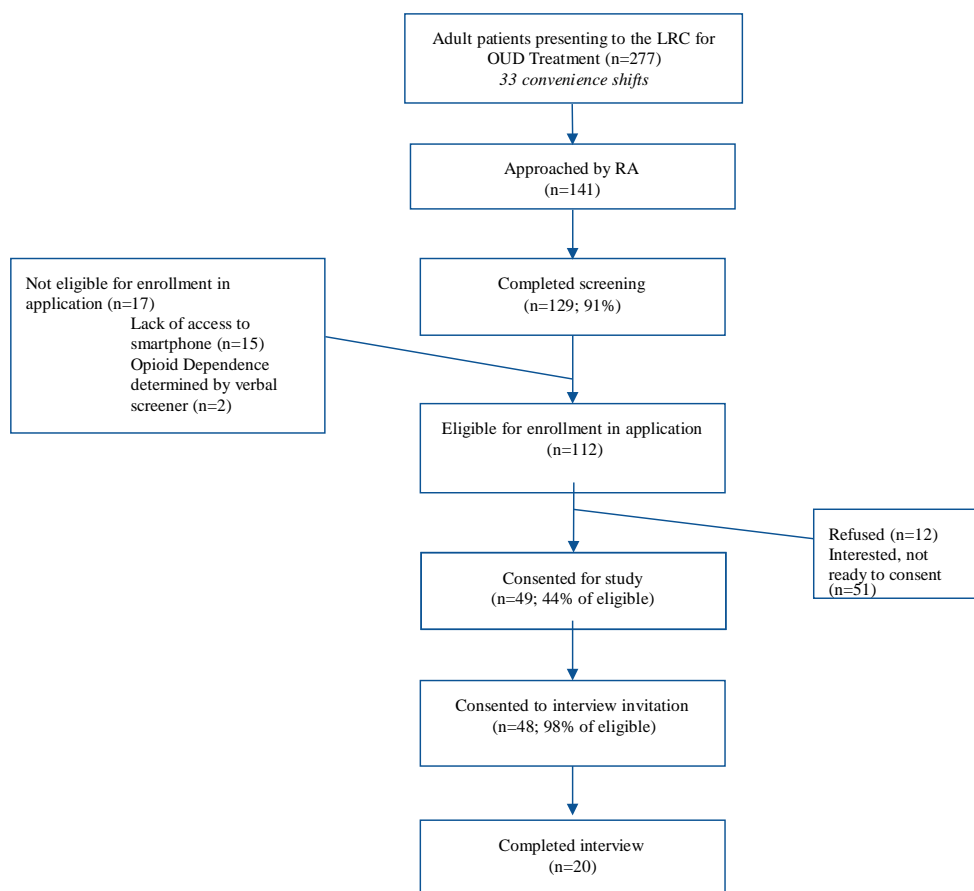


Figure 1: Participant Recruitment Diagram

Qualitative results

Participants provided feedback on the in-app including their usage experience and recommendations for improvement for people in a treatment setting. Five key themes developed from the coding and analysis. Three of these in the area of acceptability and feasibility (benefits, challenges, feature recommendations) were topics of the interview guide. The other two, support and alternative treatment option emerged from their discussion with the interviewer. In the discussion that follows, quotes from the interviews are used to illustrate participant comments that were used to develop each theme.

Theme 1: Benefits

When asked to summarize their experience with the app, interviewees noted that the app was helpful, positive, satisfying, enjoyable, amazing, wonderful, new, and useful and one person noted "inefficient". Overall interviewees noted that they liked having access to immediate feedback from other participants or the moderator. Additionally, interviewees at different stages in recovery noted increased motivation to be in treatment. They were appreciative of the information they received from each other about non-OUD-related resources (housing, employment, insurance and medical treatment issues). They felt they had a space to talk about their experiences openly without judgement. "Yeah, they gave you somethin' to talk about, you know. Whether it was how long, you know, have you been in recovery for, or what do you find that recovery has done for you, and so it was good, it was smart, you know." (participant 10). Finally, participants found the app easy to use. "You just put in your text and hit send" (participant 35).

Theme 2: Challenges

Issues impacting optimal use of the app emerged during discussions around challenges using the app. Some participants noted that they felt ignored when there was inactivity in the group. Others noted variability in the time that people commented as a barrier to feeling connected as many participants reported checking the app during the beginning of the day. Some participants noted that they experienced long time delay without a response if they were not on the app when someone was commenting. Some participants noted a need for structure to the discussions; for example, more than one participant mentioned the value of encouragement from a moderator to share recovery story. Others recommended having designated time-frame to go online (e.g., 2-4 pm for group discussion).

Theme 3: Feature recommendations

Additional features for future versions of the app were recommended by most interviewees, including direct messaging, notification messages, app update notifications and regular check-in messages each day. Participants were interested in participating in multiple groups simultaneously (i.e., parenting, females/males in recovery). In addition, participants found that it was important to have mixed treatment status within each group (i.e., early in recovery, late in recovery). While participants noted feeling relatively safe with the anonymity of the space, they did note that it would be important to monitor talk about reoccurrence of drug use, medical advice and language that indicates racism, homophobia, and cyber victimization/bullying (participant 38).

Theme 4: Support

Participants voiced several ways the app served as support during the treatment process. They often commented on aspects of community affiliation and providing supportive behaviors. One participant noted: "You reached out. You built connections. I mean, with mysterious people that you didn't know, but you all related in some way. You bonded. So, it was a very helpful app." Some aspects of support mentioned by interviewees included: having an alternative to talking to family and friends who may not understand and discussing treatment issues (i.e., getting "dirty" to get treatment, a phrase used by participants to describe the process of testing positive for opioids in a urine toxicology screen prior to medication induction). Participants often spoke of the ability to provide support as an unexpected benefit of the app. Types of supportive behaviors consisted of expressions of empathy, advice and information, and encouragement in difficult situations. For example, several members of a group independently mentioned an event where members helped someone through a potential reoccurrence of drug use.

Theme 5: Alternative to 12-step self-help groups

Many participants spontaneously mentioned the use of the app as an alternative to 12-step self-help groups. "It was more than a regular meeting that I go to outside or a regular group meeting". For example, many people discussed the difference between the app and attending a meeting including limited talk about drugs. "I don't like hearing the stories because then that just goes to making me want to use, so I can't do the AA meetings and the NA meetings, because when they get up there to talk and I can see the little smile on their face, because they're happy talking about it, and it's giving them fond memories and to me that's just not the way I can recover, I just can't do it that way. You know." (Participant 50). As the app provided a place where their information remained confidential, some felt it was safer than a traditional peer support group.

Discussion

To our knowledge, this is one of the first formative evaluations of a novel mobile peer support application. Based on objective metrics on app usage, as well as qualitative feedback, this method of delivering peer support is feasible, acceptable, and well-received by patients already in treatment for recovery. Overall, study participants liked the format and structure (e.g., stigma-free environment), but highlighted key considerations for future mobile-peer support applications (e.g., wanting to participate in more than one group or specialized groups).

Peer support in addiction recovery has been shown to be an effective strategy to increase motivation in treatment and prevent reoccurrences of drug use. When members feel a sense of community and low judgement, they are likely to remain engaged even during difficult/high-risk situations (i.e., experiences of cravings/urges to use drugs). However, many people in recovery are unable to engage in in-person peer support due to issues with transportation, childcare, or due to current limitations on gatherings in the context of the COVID-19 pandemic. While evidence indicates that shared experiences create a strong alliance between individuals and encourage readiness for change [11], research evaluating the acceptability of online resources for peer support is lacking. The fact that 89% of eli-

gible patients were interested in participating in the study, 44% consented to participate, 80% were retained, and 64% used the app on a daily basis is a strong endorsement of the acceptability of delivery peer support through remote methods.

This study also qualitatively supports the value of a smartphone-based mobile peer support application for individuals in different stages of recovery. Many participants felt a mobile peer support application could provide a sense of community affiliation and provide a safer form of support compared to a traditional peer support group (e.g., 12 step meetings). Interview participants articulated a strong desire for accessible immediate feedback from other participants, reflecting the overall preference for peer support in this population [12]. Participants expressed appreciation for resourceful information they received (e.g., housing, insurance, medical treatment) and confidence in being able to help and encourage other peers. Overall, participants shared that a smartphone-based application could serve as support during the treatment process.

No participants raised any ethical concerns on the app, and some highlighted the safeguard feature of anonymity. Participants felt comfortable opening up about a potential reoccurrence of drug use highlighting the function of the application. However, many noted a need to monitor posts relating to reoccurrence of drug use and medical advice, and language that indicates racism, homophobia, and cyber victimization or bullying. This underscores the importance of either active (i.e., moderator) or passive (i.e., AI) monitoring of peer group chat.

There are several limitations to the current study. Although participation reflected the demographics of the outpatient treatment center, and interviews continued until saturation was reached, it is possible that different themes would arise with participants in other recovery settings. In particular, the study was restricted to English-speaking patients. If future work deems this intervention is effective with English speakers, expansion to non-English languages is warranted. In addition, our study was conducted only with participants who were already engaged in treatment. Future studies should include participants who are not currently engaged in treatment and receiving treatment in other settings. Lastly, our group moderator was a member of the study team. While this was done for safety and monitoring purposes, having a peer-led group (i.e., by a certified peer-recovery support specialist) could have a different impact on the group dynamic and outcomes. This should also be incorporated into future studies.

Conclusion

This formative analysis provides valuable information that may improve acceptability of a smartphone-based mobile peer support application for adults engaged in treatment for OUD. Participants noted preferences for a mobile peer support application and immediate feedback from both peers in recovery and a moderator. Features should be tailored to incorporate feedback from the study participants, including: direct messaging, notification messages, app update notifications, multiple group chats, and structure to the discussions via encouragement from a moderator. This preliminary study supports the need for larger scale trials to examine whether mobile peer support platforms can increase and sustain treatment in recovery.

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Contributors

FLB, MLR, KJL were responsible for the study concept and design. CS contributed to the acquisition of data. EJ and CS performed the data analysis and interpreted the findings. CS and EJ drafted the manuscript. FLB, MLR, KJL, JP provided critical revision of the manuscript for important intellectual content. All authors critically reviewed content and approved the final version of the manuscript for publication.

Conflict of Interest

This research was funded by a Small Business Technology Transfer (STTR) grant from the National Institutes of Health (R41 DA047837). The small business recipient of this award, Beacon Tech Inc., developed the mobile application evaluated in this report. However, no personnel from Beacon Tech Inc. were involved in the generation or approval of this report. None of the co-authors have any financial interest in Beacon Tech Inc.

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