Smartphone System for Self-Management
of Schizophrenia & Implications for
Treatment of Substance Use Disorders

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The World Goes Mobile…

But, do people with schizophrenia use mobile phones?
Staged Development Process for FOCUS

**Stage 1: Needs Assessment**
- Literature review
  - Client survey
  - Practitioner interviews

**Stage 2: Intervention Development**
- Multidisciplinary team
  - Technology selection
  - Platform construction

**Stage 3: Usability testing**
- Usability cycle 1
  - Intervention adaptation
  - Usability cycle 2
  - Intervention adaptation
Stage One: Needs Assessment

Individuals with schizophrenia

N=904
63% owned a mobile device
58% daily use (call, text, internet)

Interest in mobile health services

44% Reminders
38% Check-ins
31% Psychoeducation

Ben-Zeev, Davis, Kaiser, Krzos, & Drake. APMH, 2013
Stage One: **Needs Assessment**

**Practitioners (N = 8)**

6 “Will be able to use the device”

6 “Will experience difficulties learning”

5 “Will sell the device”

2 “Will break the device”

1 “Iatrogenic effect”

“Reach the hard to reach”

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**5 Treatment targets**

- Medication use
- Social functioning
- Mood
- Sleep
- Psychotic symptoms

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**Dartmouth PRC**

Center for Technology and Behavioral Health
Innovate - Evaluate - Disseminate
Stage Two: Intervention Development
Conceptual Framework and Device

**Conceptual Framework**
- Stress Vulnerability Model
- Cognitive Model of Psychosis

*Cognitive Model of Psychosis*, Garety et al., 2001
Design Principles: Considerations for those with cognitive impairment

- Minimal steps to access content
- Memory aids
- Avoid distractions
- Simple screen arrangement
- Concrete wording
- Interface uses simple geometry
- Low reading level
- Minimal total text

Stage Three: **Usability Testing**

- 2 Research Facilitators, 1 Participant
- Device Training
- “Think Aloud”
- After-use interview

**Cycle 1 (n=7)**
System Adaptation

**Cycle 2 (n=5)**
System Adaptation
Stage Three: **Usability Testing**

"Too many words. Go right to the point."

"I like the picture of the cloud... these pictures are cool... positive."

[It will] "help me relax... like sleeping and medicines. I like the idea that you can chose what to work on."

[This is] "more helpful than a manual."

"What does THIS mean...?"

"This button is too small...."

"Good suggestion. I never tried that before..."

**Results:**

- No Abbreviations
- Shorter words
- Larger font
- Revised some content
- Adjusted touchscreen sensitivity
- More images / visuals
- Expanded space between buttons
FOCUS Prompt

System Prompt

Participant Launched

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Clinical Status Assessment

- 6th grade reading level
- Simple geometry
- Low working memory load
- Intuitive
- Encouragement and sign off
Feedback

- Engagement and prompt to continue
- Participant launched: 24 / 7
Problem Assessment

- Multiple wording variations
- Common dysfunctional beliefs
Cognitive Intervention

- Image rotation
- Multiple wording variations
- Illness self-management strategies
User 305

45% response rate over last week

Clinician Assigned Interventions: Sleep, Medication Adherence

User responses over the past 7 days:

<table>
<thead>
<tr>
<th>Issue</th>
<th>Response 1</th>
<th>Response 2</th>
<th>Response 3</th>
<th>Response 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sleep Problems</td>
<td>None - 20%</td>
<td>Some - 30%</td>
<td>Many - 35%</td>
<td>Severe - 15%</td>
</tr>
<tr>
<td>Medication Adherence Problems</td>
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FOCUS: 30 Day Trial

- N=33
- Average age 45.9
- 61% male
- 76% African-American, 21% White
- HS education, but 8th grade reading level
- 39% Living with supports

FOCUS: 30 Day Trial Average Use

- Participants used FOCUS on **86.5% of days**
  - **First week:** 6.7 days, 6.4 times a day
  - **Last week:** 5.9 days, 4.9 times a day
- 62.5% of use was **on-demand** (i.e., participant initiated)

### FOCUS: 30 Day Trial

**Agree** | **Disagree**
---|---
“I would recommend FOCUS to a friend” | 88% | 12%
“I found FOCUS to be very complicated” | 12% | 81%
“I thought FOCUS was easy to use” | 87% | 9%
“If I have access to FOCUS, I will use it” | 81% | 6%
“FOCUS was interactive enough” | 84% | 3%
“I felt very confident using FOCUS” | 90% | 6%
“I needed to learn a lot of things before I could get going with FOCUS” | 18% | 75%
“It was easy to find the information I needed” | 87.5% | 3%

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FOCUS: 30 Day Trial Outcomes

<table>
<thead>
<tr>
<th>Measure</th>
<th>Pre-Trial</th>
<th>Post-Trial</th>
<th>Sig (2-Tail)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive and Negative Syndrome Scale (Total Score)</td>
<td>77.59 (SD=10.42)</td>
<td>71.47 (SD=10.21)</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Positive scale</td>
<td>19.34 (SD=4.26)</td>
<td>16.41 (SD=4.06)</td>
<td>p&lt;.001</td>
</tr>
<tr>
<td>Negative scale</td>
<td>17.69 (3.64)</td>
<td>18.22 (SD=3.29)</td>
<td>NS</td>
</tr>
<tr>
<td>Psychopathology</td>
<td>41.15 (SD=6.22)</td>
<td>37.19 (SD=5.47)</td>
<td>p&lt;.01</td>
</tr>
<tr>
<td>Beliefs About Medicines Questionnaire Necessity-Concern Differential</td>
<td>5.16 (5.78)</td>
<td>3.53 (5.75)</td>
<td>NS</td>
</tr>
<tr>
<td>Insomnia Severity Index</td>
<td>12.25 (SD=6.34)</td>
<td>11.56 (SD=8.13)</td>
<td>NS</td>
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<tr>
<td>Beck Depression Inventory-2</td>
<td>19.69 (SD=8.94)</td>
<td>13.96 (SD=10.28)</td>
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EMA: Substance Use among People with Schizophrenia

N = 145

*Schizophrenia*: 98

*Schizo-Affective Disorder* = 47

Moderate overall clinical severity (PANSS)

26.9% Report lifetime substance use disorder

PDA, 7 days EMA- 4 per day

- Psychotic symptoms
- Negative mood states and perceived stress
- Substance Use

2,737 Valid observations

N=189 substance use reports

13.8% involving > 1 substance

## Significant Predictors of Subsequent Substance Use

**Alcohol**
- Anxious Mood
- Psychotic Symptoms

**Cannabis**
- Sad Mood
- Event Negativity

**Other illicit Substances**
(cocaine, methamphetamine, other non-prescribed drugs)
- Sad Mood
- Psychotic Symptoms

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FOCUS Prompt

System Prompt??

Participant Launched
Clinical Status Assessment

Craving Intensity

How intense is your craving right now?

- Not at all.
- A little.
- Moderately.
- Extremely.
Feedback

Engagement and prompt to continue

Patient launched: 24 / 7
Problem Assessment

- Reasons to Use

- Reduce my cravings
- Deal with symptoms from my illness
- It’s fun
- I’m sad
- I’m stressed / anxious
- I’m lonely
- I’m angry
- I’m bored
Cognitive Intervention

- Select preferred type of strategy
Cognitive Intervention

You may not be feeling hopeful right now. But you know what?

That’s OK.

You can feel one way today and another way tomorrow. Keep in mind, this feeling will pass and you will have better days!

Keep your chin up!
You got this, champ.
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Cravings....
FOCUS: Summary

- People with schizophrenia use mobile phones
- Many want mobile interventions/mobile support
- Mobile Health (mHealth) approaches need to be tailored to the needs of the target population
- The FOCUS smartphone system is acceptable, usable, and engaging
- FOCUS has promising clinical utility that could be translated to substance abuse treatment.
THANKS!
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