SARA: An app to increase engagement of substance use data collection among 14-24 year olds

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Motivation
- Substance use is a public health issue
- Adolescents and emerging adults (14-24 year) are at high risk
  - Adolescents (age 14-17): 11.6% used, 6.1% binge
  - Emerging adults (age 18-25): 59.6% used, 37.7% binge
- The science of how substance use happens in this age group is still at its infancy
- Mobile technologies can help, but many substance use related data need to be self-reported (e.g., stress, mood, hopefulness) and adherence to self-reports are low

Engaging with rewards
- Just-in-time rewards can increase adherence of data collection
- Our approach

The SARA mobile app
- SARA contains a variety of engagement strategies

Micro-randomized trial
- 4PM push notification
  - Probability 0.5: Inspiration message
  - Probability 0.5: No Inspiration message
- Post survey completion reward
  - Probability 0.5: Meme
  - Probability 0.5: No meme
- Post active tasks completion reward
  - Probability 0.5: Life-insight
  - Probability 0.5: No Life-insight
- One fish per day
  - 1 dollar for each 3 day streak
  - SMS for 3 day non-disengagement
- Proximal outcome: whether participants fully complete survey and/or active tasks

Iterative design and evaluation
Research and development
- Development started Dec 2016 and continued for 6 months
Focus group (May-Jun 2017)
  - Three focus group, N=21, Undergraduate students
  - Goal: Investigate acceptance and usability improvement
  - App was generally well accepted
Pilot study (Jun-Aug 2017)
  - 15 participants, each used the app for 30 days
  - Rating: at least 4 out 5 stars
  - 84% said they would use SARA to self-report
  - Approximately one-third of participants (n=5) were at least 70% adherent during the field testing period.
Clinical trial (Aug 2017-Mar 2018)
  - A clinical trial is now on the field
  - We are recruiting from emergency department at University of Michigan Health System
  - The trial started at August 21. Recruitment will end Feb 1.
  - Our projection is we will recruit 50 people or more
Ongoing and future work
- We submitted a protocol at Open Science Foundation where we pre-specified our hypotheses and analysis
- We are working on a simulator for evaluating the hypothesis
- Just-in-time adaptive engagement intervention

Contributions
Mashfiqui Rabbi: mobile systems, intervention design, algorithms, HCI
Meredith Kotov: intervention design, psychiatry, study coordinator
Erin Bonar: psychiatrist, substance use expert
Predrag Klasnja: behavioral Science, intervention design
Inbal Nahum-Shani: behavioral Science, intervention design
Maureen Walton: psychiatrist, substance use expert, experiment design
Susan Murphy: experiment design, causal inference, intervention design

Clinical trial
(1) A growing virtual aquarium

(2) Meme

(3) Life-insight

(4) Inspirational message

More frequent rewards
Less frequent rewards

Different types of rewards
Pre self-report or post self-report

Survey
(4PM)
(Mood, hopefulness etc)
2 active tasks
between: 6PM and midnight

Self-report event
An example day

Survey
(4PM)
(Mood, hopefulness etc)
2 active tasks
between: 6PM and midnight

Self-report event
An example day

4PM
6PM
6PM
12AM
12AM

Rating: at least 4 out 5 stars
- SMS for 3 day non-disengagement
- 1 dollar for each 3 day streak
- Probability 0.5: No life-insight
- Probability 0.5: Life-insight
- Probability 0.5: No meme
- Probability 0.5: Meme
- 1 fish per day
- SMS for 3 day non-disengagement
- Probability 0.5: No Inspiration message
- Probability 0.5: Inspiration message
- Proximal outcome: whether participants fully complete survey and/or active tasks