Real-Time Electronic Diary Reports of Cue Exposure, Mood, and Drug Use

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Ecological Momentary Assessment
- EMA -

Prospectively assess the   nd
pr   ents
cr   y
b

Assess exposure to
p

Distinguish subtypes of relapse - stress-induced, cue-induced.

Real-Time Self Report

PDAs have EMA software with normal features locked out.
Security Features:
  Password protected.
  No link between stored data and
    questions.
Other Features:
  Demo option to show friends.
  Can briefly suspend random prompts.

Palm Z22
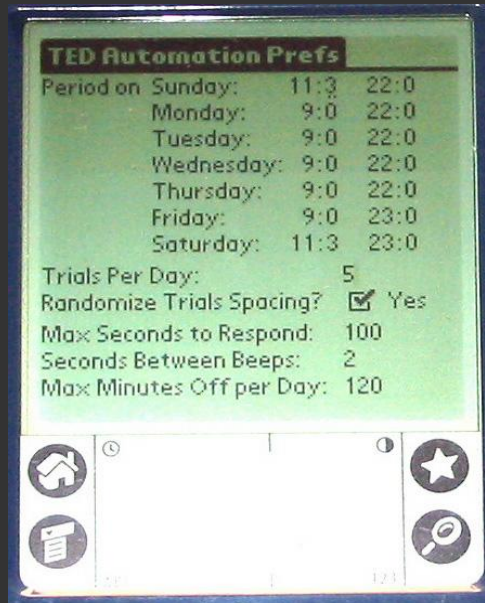Cost approx. $100
Size: 10.3 x 6.9 x 1.3 cm
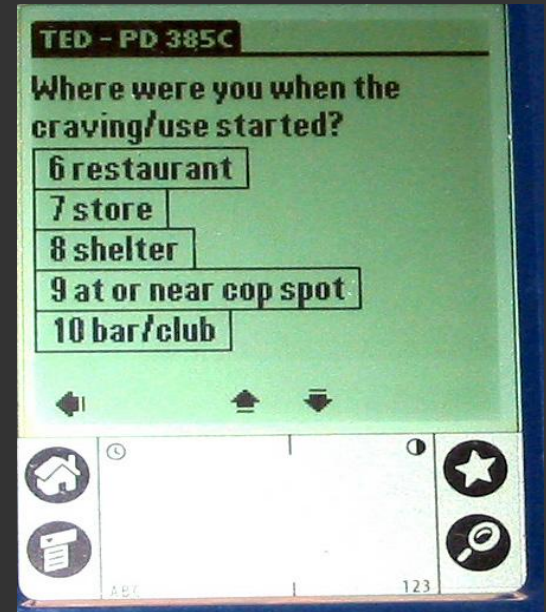Flash memory
Beep only (no vibrate mode)
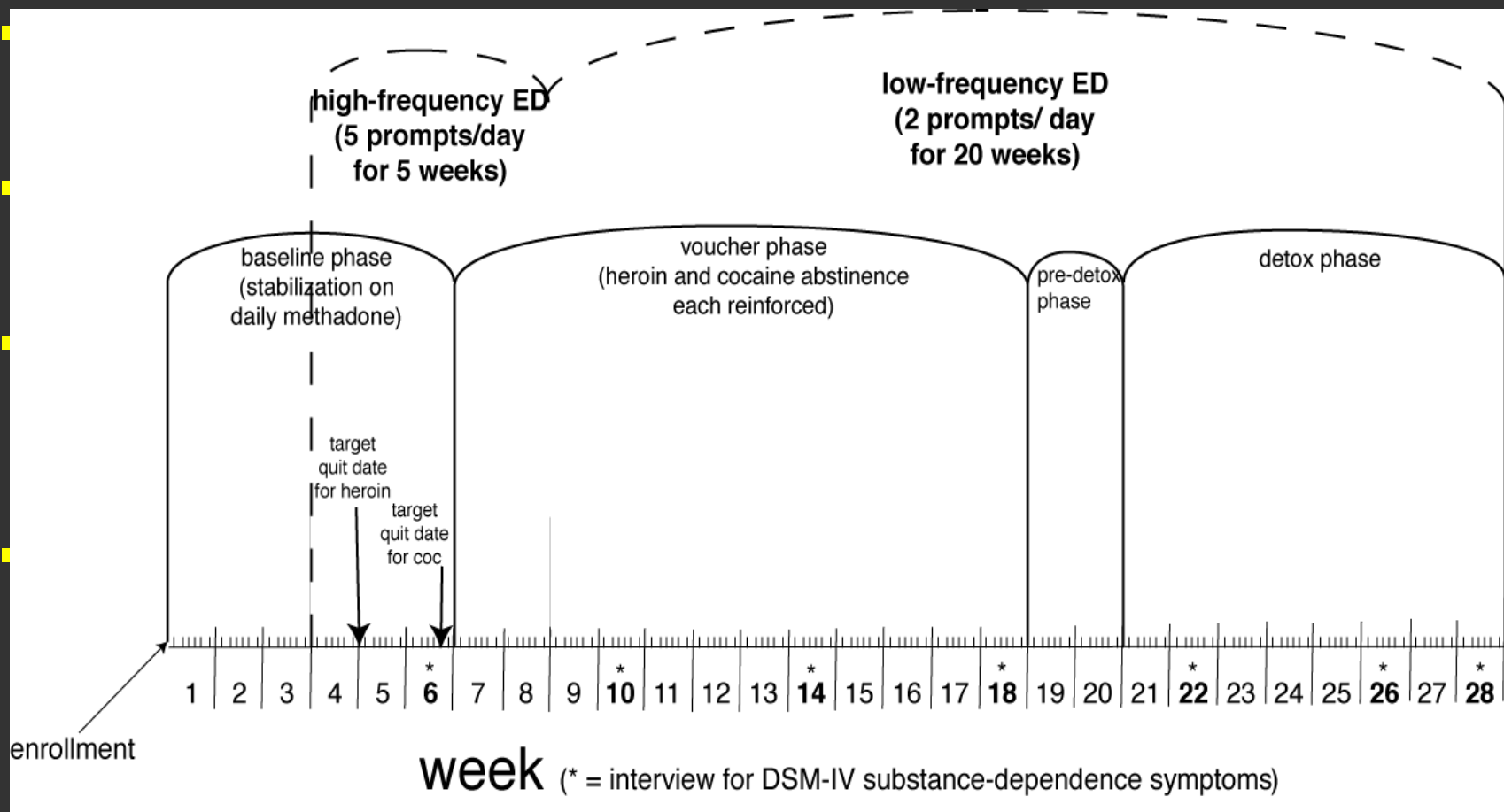Battery life acceptable

Main screen	Set random prompts	Sample question

TED – Electronic Diary

Random Prompting is ON.
To stop it for less than 120mn/day,
Enter the duration and Click 'STOP'

Duration(mn) .... [STOP]

Enter your password to begin a trial
Password .... [OK]

[Demo]

TED Automation Prefs

Period on	Sunday:	11:3	22:0
	Monday:	9:0	22:0
	Tuesday:	9:0	22:0
	Wednesday:	9:0	22:0
	Thursday:	9:0	22:0
	Friday:	9:0	23:0
	Saturday:	11:3	23:0

Trials Per Day: 5
Randomize Trials Spacing?   ☑ Yes
Max Seconds to Respond: 100
Seconds Between Beeps: 2
Max Minutes Off per Day: 120

TED – PD 385C

Where were you when the craving/use started?

6 restaurant
7 store
8 shelter
9 at or near cop spot
10 bar/club

Trial Design

EMA Questions

- **Random Prompt Entries**
  - Where are you?
  - Whom are you with?
  - What are you doing?
  - Rate mood
  - Rate craving
  - Exposure to 23 different cues in the past hour.

- **Event Contingent**
  - What happened? (Craved or Used)
  - Which drugs were involved? (heroin, cocaine or both)
  - I think it happened because

Population and Study Site Characteristics

Participants

Treatment seeking heroin users who also use other drugs (cocaine)

60% African American; 70% male

Average age about 40 years

Average education through grade 11

Employment: 1/3 full time, 1/3 part time, 1/3 unemployed

Archway Clinic

Standard treatment: opiate agonist maintenance
          & weekly individual counseling

Observed urine collection and self-reported drug use 3 times weekly

Study duration: 6-10 months

Retention in study >80%

Feasibility

- 226 PDAs were issued - 71 reused for multiple participants

- 114 participants carried PDAs for a total of 14,918 person-days (mean 130.9 days/pt, median 162.5, range 6-189)

- PDA nonrecovery - one for every 226 person-days of use.

- Random prompts:
    Issued - 34,400, Answered - 26,969 (78%)

- 2,500 event-contingent entries were initiated
    per participant - mean 22 (median 14.5, range 0-131 per day - mean 0.2 (median 0.1, range 0-2.2).

Acceptability in our Population

1. Questionnaire administered in clinic at end of study
2. Participants generally reported liking the EDs, sometimes finding them therapeutic, "like a journal," despite the multiple-choice nature of most of the items
3. The most common complaint was inaudibility of the random prompts.

How Easy to Use?

Easy 45%
Very Easy 55%
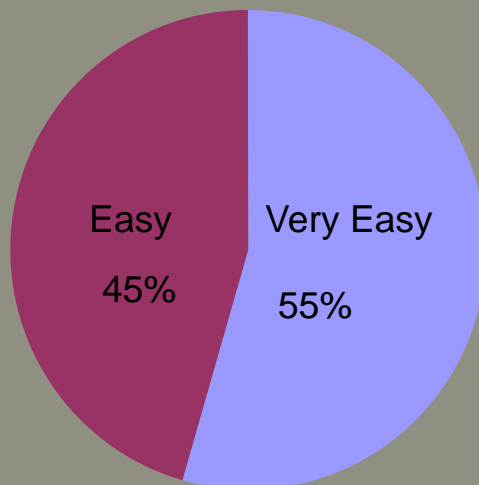
1 Very easy
2 Easy
3 Difficult
4 Very difficult

Number of Beeps per day?

A little too much 5%
Too much 5%
Just right 90%
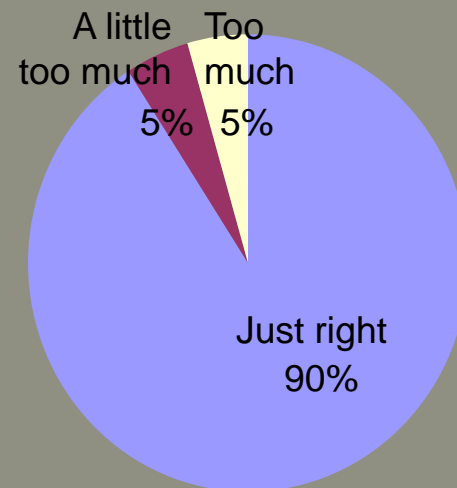
1 Not enough
2 Just right
3 A little too much
4 Too much

Compliance with EMA in our population
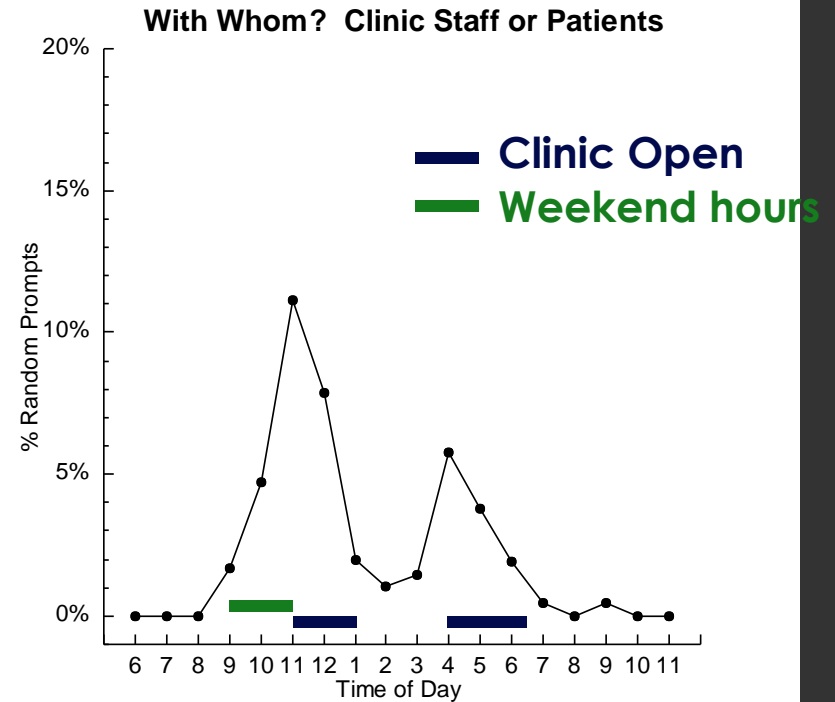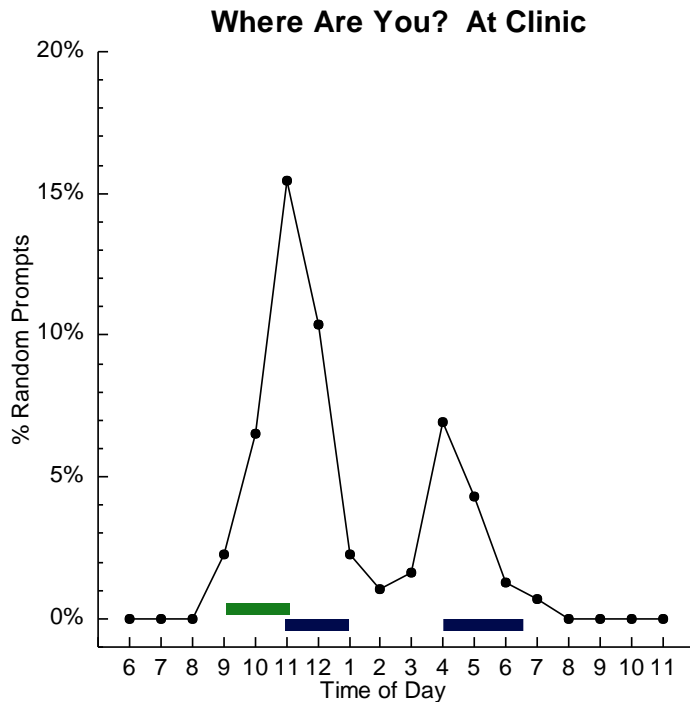
Real-Time Electronic Diary Reports of Cue Exposure and Mood in the Hours Before Cocaine and Heroin Craving and Use

David H. Epstein, PhD; Jessica Willner-Reid, BSc; Massoud Vahabzadeh, PhD; Mustapha Mezghanni, MS; Jia-Ling Lin, PhD; Kenzie L. Preston, PhD
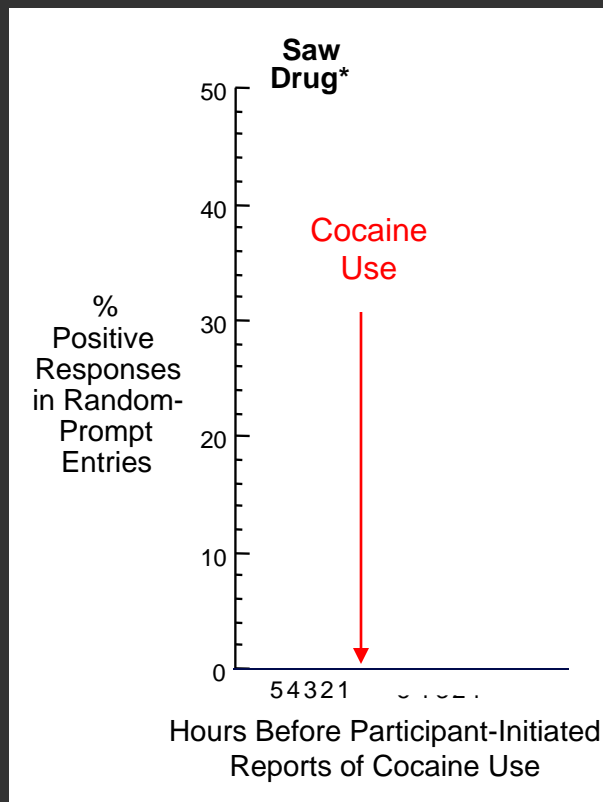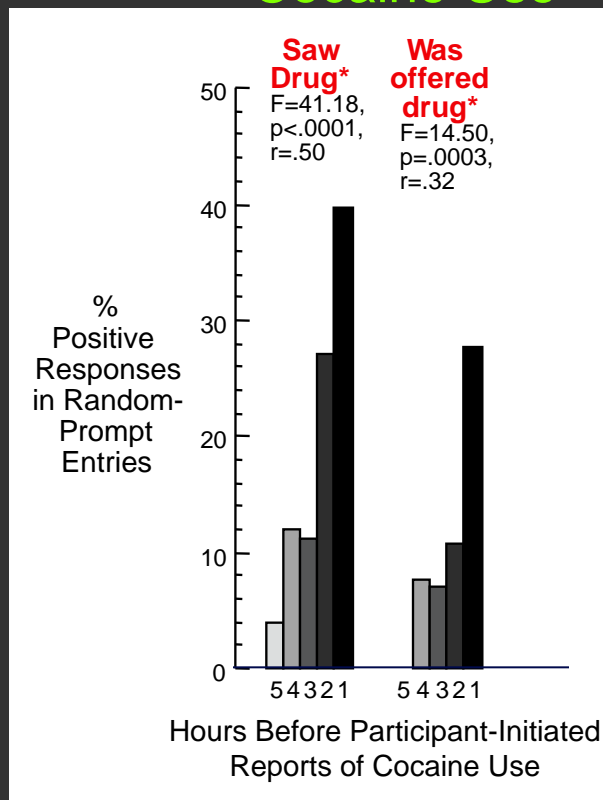
(83 to 101 datapoints per bar)

Cocaine Use

Seeing or being offered cocaine was associated with increasing likelihood of cocaine use.

Do behavior patterns differ during periods of cocaine abstinence versus use?

Random prompt data; N = 112
Abstinence Periods - at least 1 week of consecutive cocaine-negative urines
Using Cocaine Periods - at least 1 week of consecutive positive urines
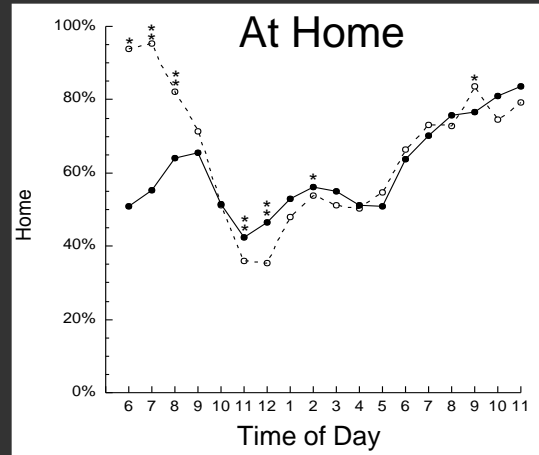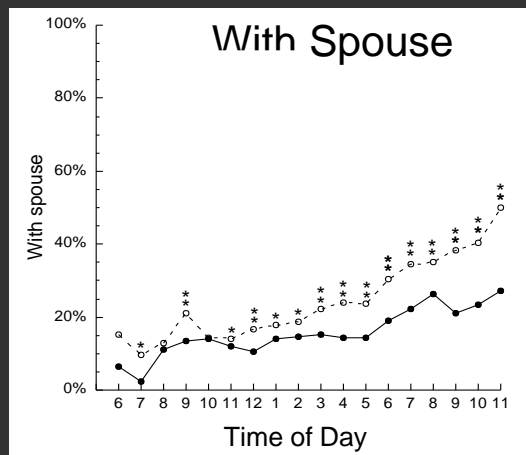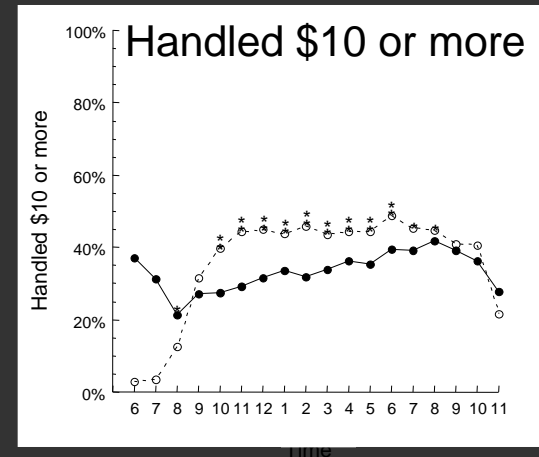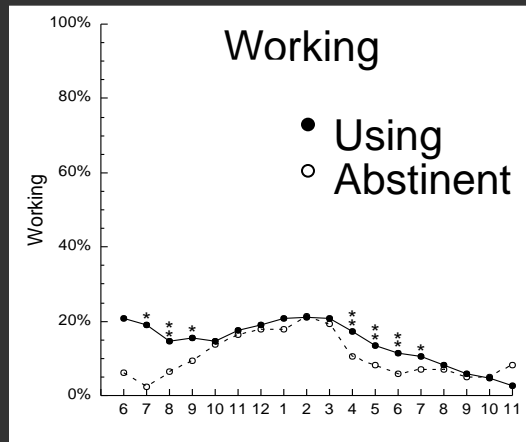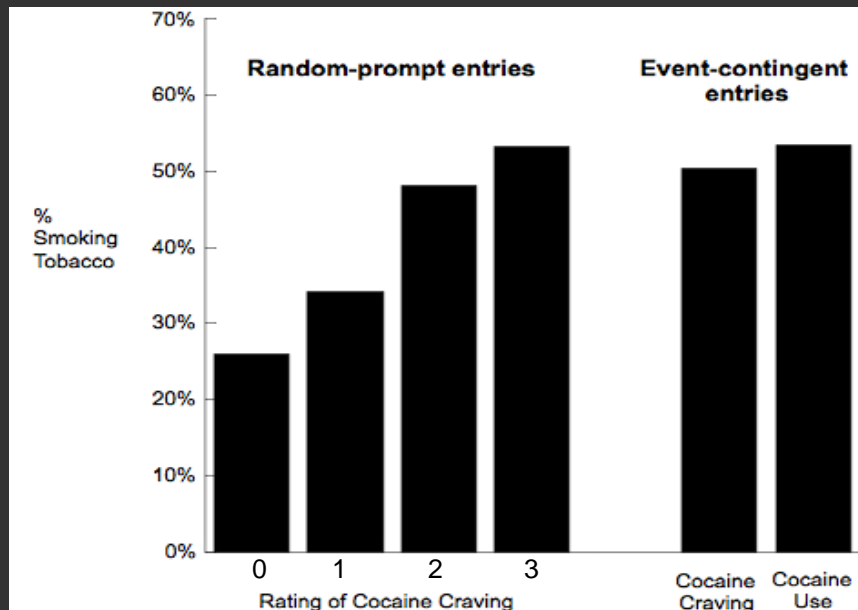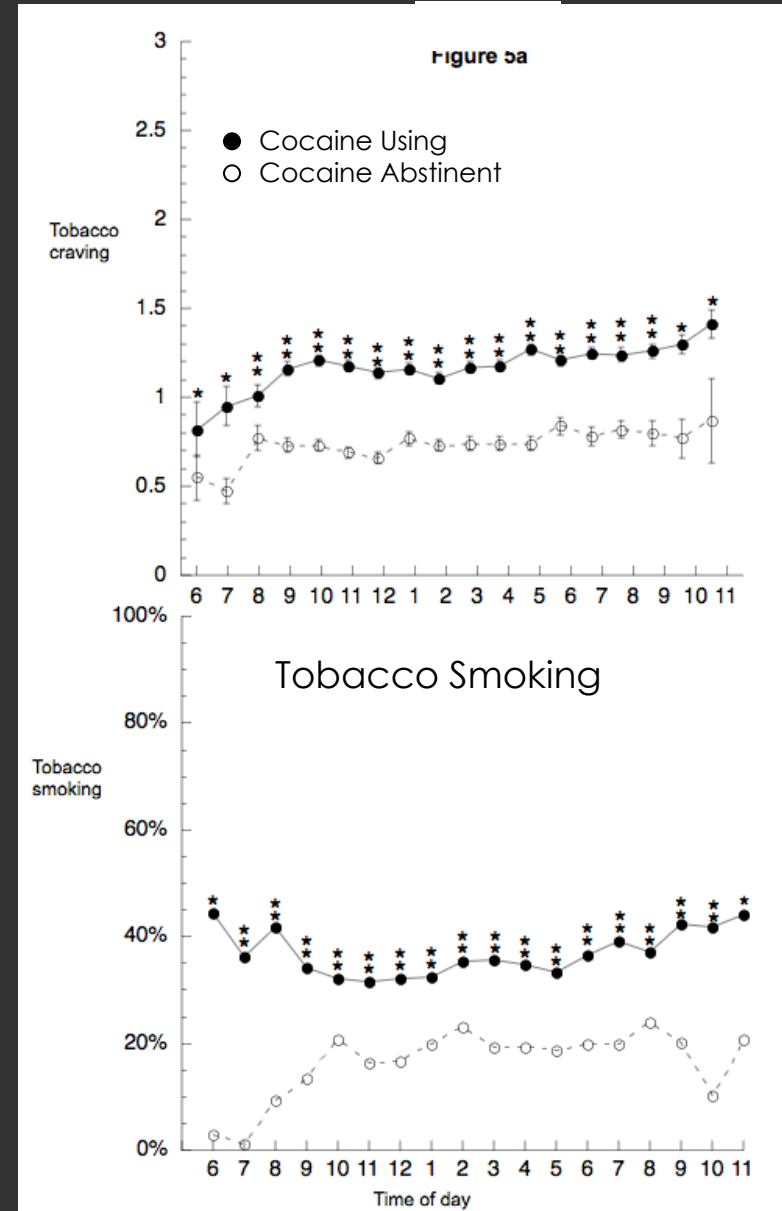
Tobacco and Cocaine: Craving and Use

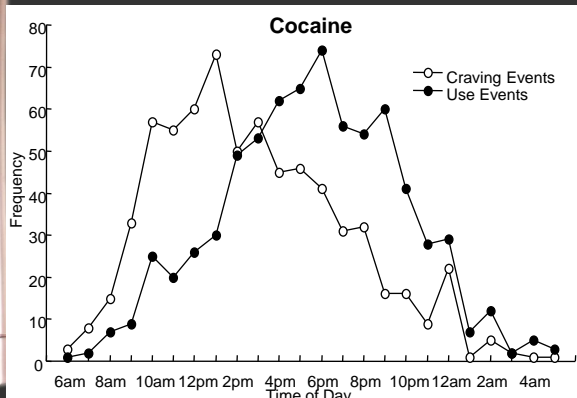## Tobacco Craving and Use
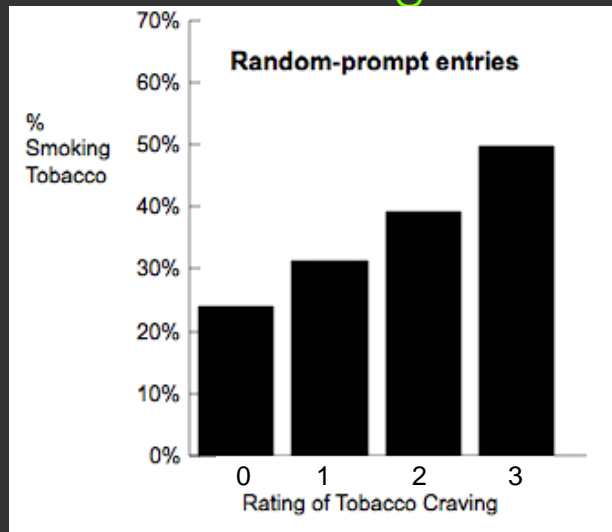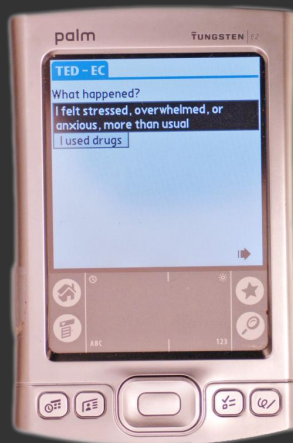

Tobacco and Cocaine

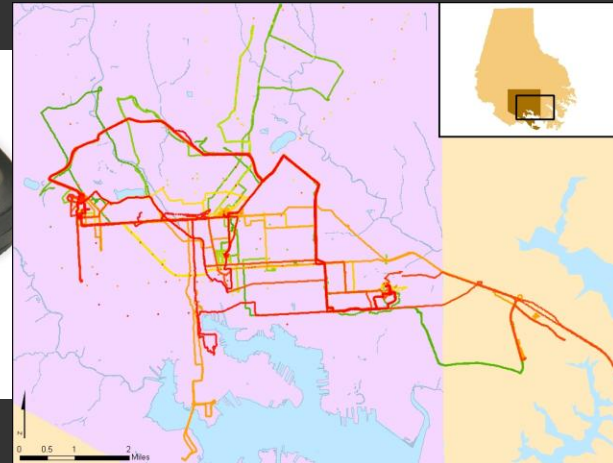
Cocaine Abstinence vs. Use

Exposure to Psychosocial Stress and Illicit Substances
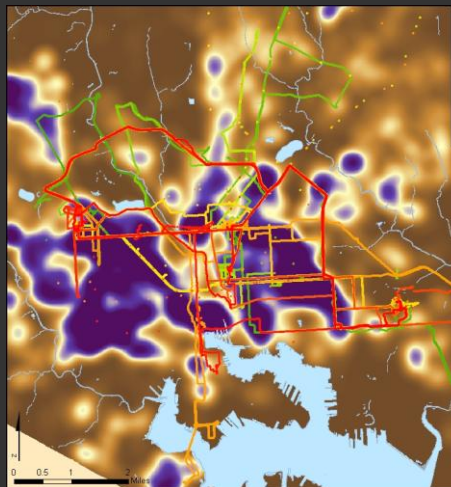
Real-time self-report *electronic diaries*

Real-time location *GPS*

Environmental Risk Measures

Crime
Drugs
Violence
Socioeconomic
    Statistics
from public and
research databases

Exposure Algorithm

Self report &
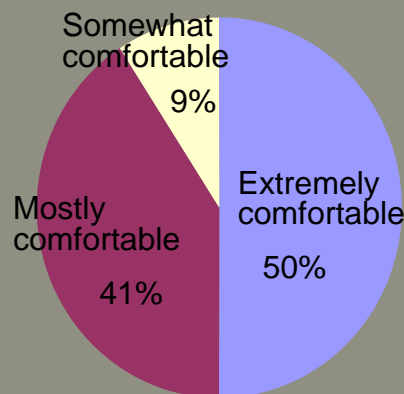Location

Drug use
Stress Event

Time spent
in high vs.
low risk
environments

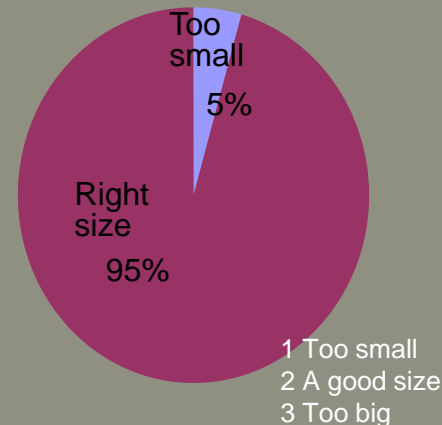# Feasibility - Real Time Location

- 29 participants enrolled, 27 received devices

- PDAs and GPS units carried for 2,775 person-days (mean 103 days/pt);

- 64 PDAs issued; 7 broken; nonrecovery: one for every 394 person-days. Random prompts: compliance (80%)

- 62 GPS units issued; 13 broken (largely due to recharging at home), 3 lost ; GPS nonrecovery: one for every 173 person-days of use.

GPS - Usability/Acceptability

How comfortable carrying GPS?

Somewhat comfortable 9%

Mostly comfortable 41%

Extremely comfortable 50%

How is the sized of the GPS?

Too small 5%

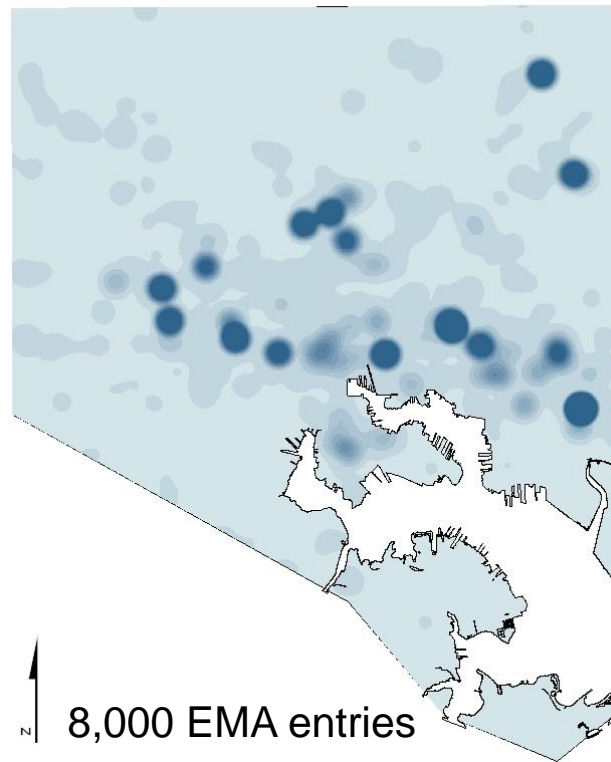Right size 95%

1 Too small
2 A good size
3 Too big

Density of GPS and EMA Entries

Participant Tracks **All EMA Entries** **Event Contingent Entries**

Approx 2700 tracks

0   0.5   1   2
                      Miles
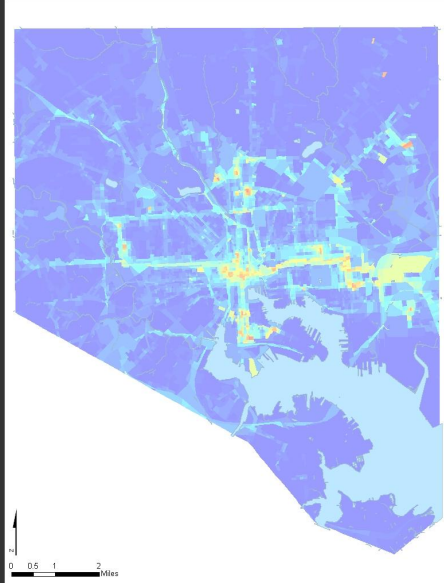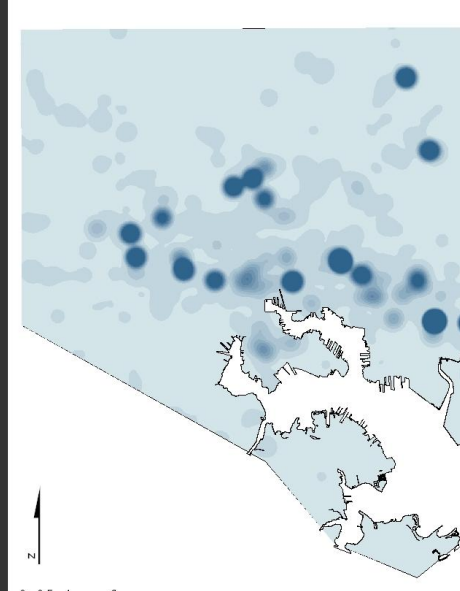
8,000 EMA entries
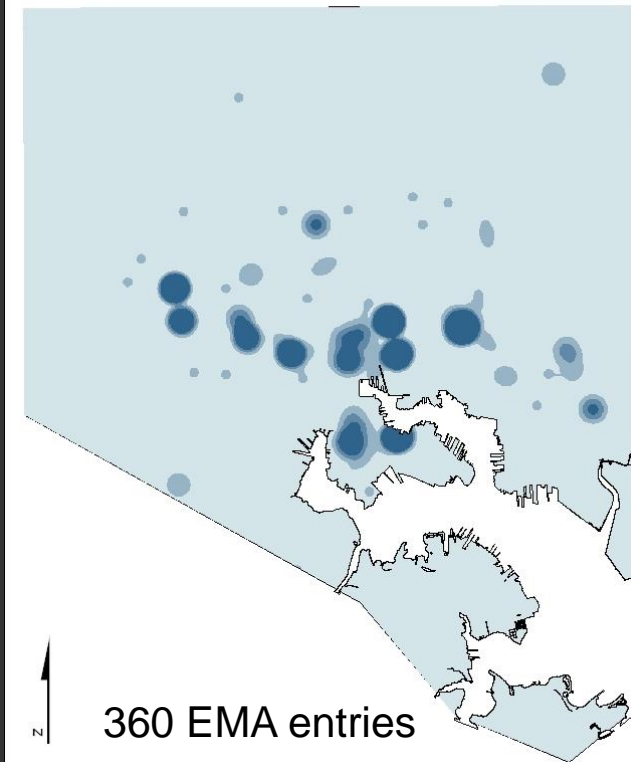
360 EMA entries

27 participants; approx. 100 days each

Location, Neighborhood Risk, Stress and Drug Use

Participant Tracks

EMA Entries
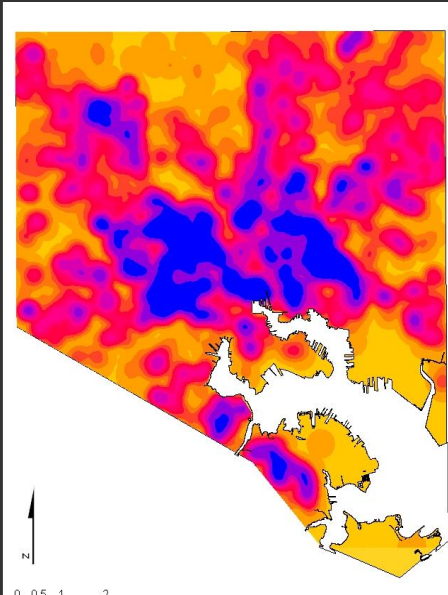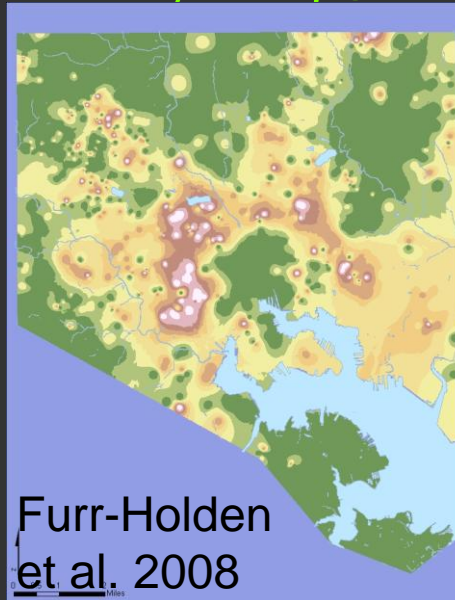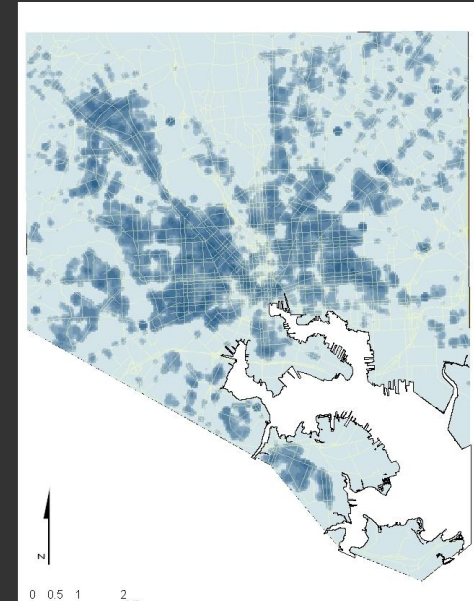

EMA Drug Use/Craving

Violence
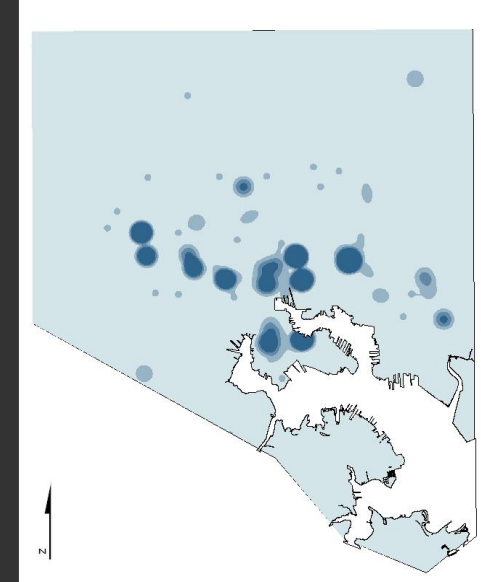
NIfETy Drug Scale

Furr-Holden et al. 2008

Calls for Service-Drugs

Ecological Momentary Assessment
- EMA -

Prospectively assess the ... nd pr... cr... b...

Assess exposure to ... nts

Distinguish subtypes of ...

re... c...

Monitor and enhance adherence to treatment.

PDAs to remind patients to complete homework assignments for Cognitive Behavioral Therapy (CBT).

Contingency Management
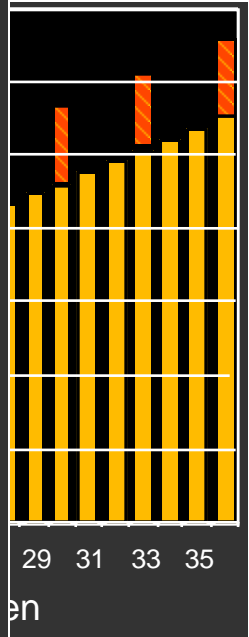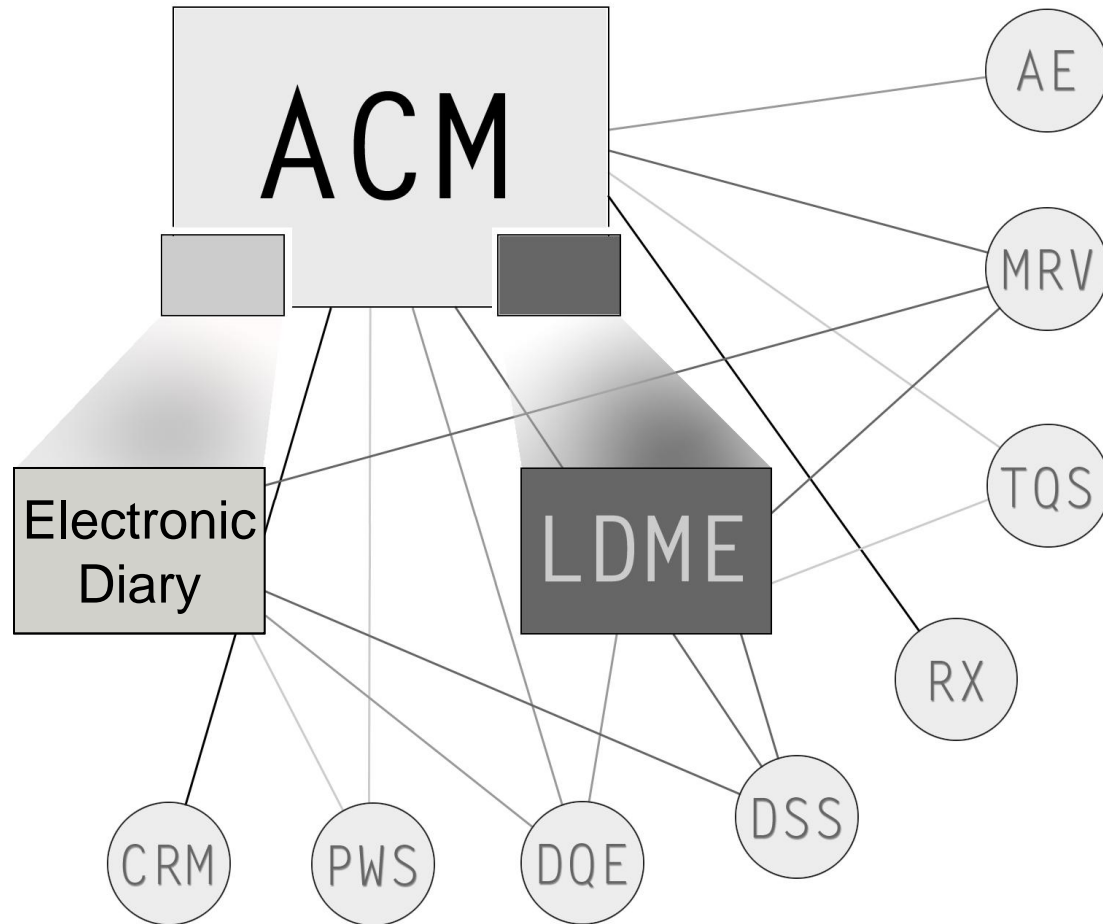
Contingency Management On the Internet

An Internet-based abstinence reinforcement smoking cessation intervention in rural smokers

William W. Stoops [a,b,*], Jesse Dallery [c,d], Nell M. Fields [a], Paul A. Nuzzo [a], Nancy E. Schoenberg [a], Catherine A. Martin [a,e], Baretta Casey [f], Conrad J. Wong [a,b,e]

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[b] University of Kentucky, Center on Drug and Alcohol Research, 643 Maxwelton Court, Lexington, KY 40506, United States
[c] University of Florida, Department of Psychology, Room 114, Psychology Building, Gainesville, FL 32611, United States
[d] National Development Research Institutes, Center for Technology and Health, 71 West 23rd Street, 8th Floor, New York, NY 10010, United States
[e] University of Kentucky College of Medicine, Department of Psychiatry, 3470 Blazer Parkway, Lexington, KY 40509, United States
[f] University of Kentucky College of Medicine, Center for Excellence in Rural Health, 750 Morton Boulevard, Hazard, KY 41701, United States

Conclusions

- Illicit drug users in treatment are willing and able to carry PDAs.

- Illicit drug users in treatment can self-report on mood and behaviors in real time.

- Loss and breakage of electronic devices occur at a relatively low rate.

- Speculation:
  - Electronic devices may be a useful addition to contingency management for remotely monitoring and reinforcing medication adherence.
  - Location data may give additional information on:
    - environmental factors affecting adherence
    - placement of mobile health care services.

Individual Participant

GPS

EMA

GPS plus EMA Entries
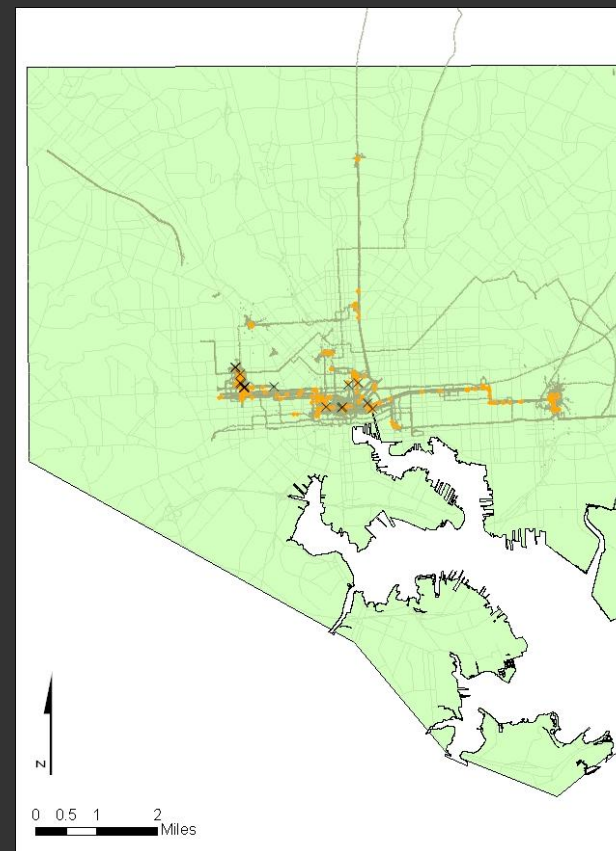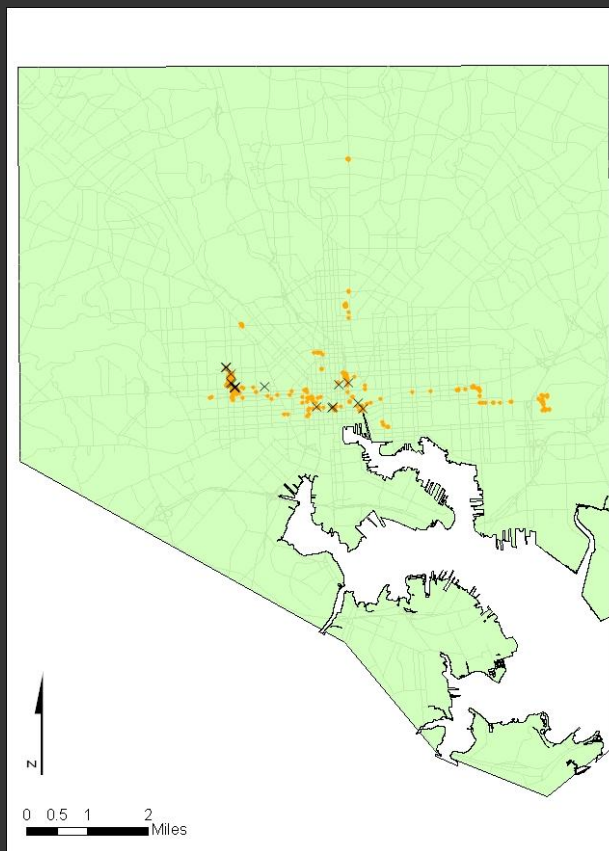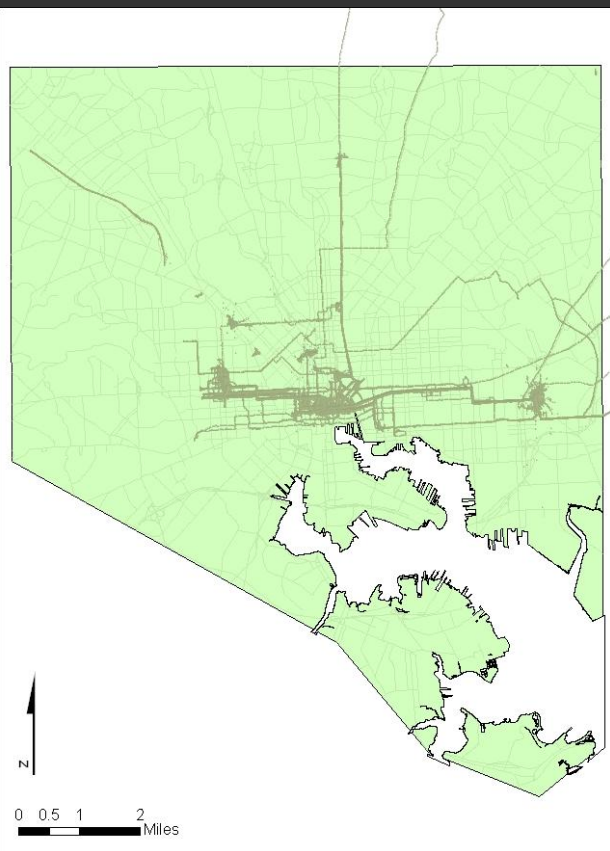
Stress Questions - Event Contingent

166 entries from 11 (out of 16) participants

107 stressed, 19 overwhelmed, 19 anxious
8 stressed & other, 2 overwhelmed & anxious

23 conflict, 38 just thinking, 5 legal, 4 money, 10 health, 5 surroundings unsafe, 50 other (all but 2 filled blank; most family-related)

68 passing annoyance/ hassle,
48 day spoiler;
41 more than day spoiler