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***The American Journal of Drug and Alcohol Abuse* : Introduction to the Special Issue on Use of Mobile Technology for Real-Time Assessment and Treatment of Substance Use Disorders**

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Until recently, most studies that have examined and intervened upon substance use disorders have relied upon data collection methods that require multiple in person visits. In the typical research scenario, participants arrive at a clinic, complete informed consent, and then complete questionnaires. Many of these questionnaires ask participants to estimate their average mood, stress, and cravings. During follow-up visits, participants are asked to report thoughts, feelings, and activities that occurred days or even weeks earlier (e.g., “How stressed were you when you smoked your first cigarette after your quit date?”). Some measures like the TimeLine Follow-Back¹ rely on long-term memory. Specifically, individuals are asked to report their use of substances over the past days, weeks, or even months.² Unfortunately, retrospective recall may result in biased and/or inaccurate estimates due to recall bias and errors in memory^{3,4} and only offers a gross understanding of how momentary variables (such as withdrawal, stress, and craving) effect substance use and relapse. A more nuanced picture of the interactions among biopsychosocial variables and substance use and misuse may offer important insights that may be used to inform new models of substance use and abuse and create or improve current treatments.

The Experience Sampling Method asks individuals to log thoughts, feelings, and behaviors as they occur in their natural environment.⁵ For example, psychologists often ask patients to journal mood (e.g., happiness, sadness) and substance use on a daily basis.⁶ This information can be used during treatment sessions to teach patients to attend to the relationships between mood, thoughts, and behaviors, and to monitor treatment progress. However, previous studies have indicated that individuals do not always complete mood/activity monitoring as intended.⁷ For instance, Stone and colleagues⁷ conducted a research study wherein they asked participants, assigned to either a paper diary equipped with a sensor to detect when it was opened or closed, or an electronic diary with time stamped entries to record pain three times per day for 21 days. Although self-reported compliance in the paper diary group was high, actual compliance was only 11%, and there was evidence that participants had backfilled missing data.⁷ However, actual compliance in the electronic diary group was 94%, suggesting that the use of electronic diaries may be associated with better compliance and more accurate data.

Stone and Shiffman⁸ pioneered the development of ecological momentary assessment (EMA) techniques that utilize mobile devices to prompt participants to complete brief assessments; thus, capturing life as it is lived in the individual's natural environment.^{3,9} Mobile experience sampling is less susceptible to biases and errors in memory and may facilitate a better understanding of ecologically valid mechanisms involved in successful cessation attempts, those affecting lapses, and those implicated in the transition from lapse to relapse. Researchers have noted that EMA is especially useful for data collection on substance use due to the episodic nature of drug use behaviors,¹⁰ and the importance of situational cues and environmental context to substance use.¹¹ EMA techniques that utilize time/date stamped assessments on smartphones may also improve tracking of adherence to psychotherapy assignments. EMA enables a more granular view of a behavior and behavior change. In addition, EMA data may be combined with objective sensor data such as GPS, temperature, and activity level to gain a more comprehensive understanding on an individual's natural environment outside of the clinic or lab, thus, providing a more ecologically valid assessment of variables that impact and drive substance use behavior. For example, Watkins et al.¹² combined EMA data with GPS tracking data, and found that post-quit smoking urges were higher when individuals were near a tobacco retail outlet close to their home. Participant proximity to tobacco outlets was not related to smoking urge during the pre-cessation period.

Use of the EMA approach to data collection has become increasingly common, even in populations that have been difficult to study and largely excluded from participating in research studies, such as those who live in rural areas,¹³ individuals who are homeless,¹⁴ and those with mental illnesses.^{13,15} In 2015, 77% of all US adults and 67% of adults with household incomes < \$30,000 per year owned smartphones, and smartphone owners report that their phones are within arm's reach for 90% of waking hours.¹⁶ Thus, EMA appears to be a feasible and cost effective way to collect ecologically valid data within many diverse populations.^{10,11}

This American Journal of Drug and Alcohol Abuse (AJDAA) Special Issue on the Use of Mobile Technology for Real-Time Assessment and Treatment of Substance Use Disorders includes manuscripts that utilize experience sampling to explore relationships between socioenvironmental factors and substance use. Moran et al. and Kowalczyk et al. explore relationships between craving and opiate use, Paulus et al. explore the association between pain and negative affect during a quit attempt, Black et al. and Jeffries et al. explore the relationship between PTSD and substance use, McClure et al. examines the acceptability of a remote monitoring system to examine smoking abstinence, and Santa Maria et al. examines drug use in marginalized and understudied homeless youths. The research in this issue highlights advantages of real-time assessment methods and provides insights into how craving, pain, and affect influence substance use patterns.

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