

# Lydia A. Shrier: mobile technology—a way out for adolescent mental health problems and risk behaviors

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## Editor's note

Marijuana is the most commonly used illicit drug in the United States, according to the National Survey on Drug Use and Health (1). Marijuana use is widespread among adolescents and young adults, and potentially poses risks to escalating medical emergencies. Over the past decade, there has been a decline in teens' perceptions of the risks of marijuana use, possibly due to increasing public debate about legalizing or loosening restrictions on its medicinal and recreational use. Worse still, social support that addresses the problematic marijuana use in young patients is limited.

In light of this dire situation, the team of Prof. Lydia A. Shrier (*Figure 1*) at Boston Children's Hospital, Massachusetts has developed an interventional program called MOMENT (Momentary Self-Monitoring and Feedback + Motivational Enhancement Therapy), which combines brief motivational enhancement therapy provided in clinic followed by ecological momentary interventions delivered via mobile technology aiming to reduce marijuana use among this vulnerable group of people (2). *mHealth* is pleased this time to interview Prof. Shrier who will share with us more about this interventional program.

## Expert introduction

Lydia A. Shrier, MD, MPH, currently serves as the Director of Clinic-Based Research and Attending Physician of Division of Adolescent Medicine at Boston Children's Hospital, Massachusetts. She is also the Associate Professor of Pediatrics at Harvard Medical School, Boston, Massachusetts.

Prof. Shrier's research focuses on the link between mental health and risk behavior in adolescents and young adults. Her research uses momentary assessment methods with mobile devices to study emotional states, social contexts, and health behaviors *in vivo*. She has developed the MOMENT intervention, which uses smartphones to reduce marijuana use in heavily-using youth, and is



**Figure 1** Prof. Lydia A. Shrier.

currently conducting a randomized controlled trial to test the feasibility and preliminary efficacy of the intervention. Previously, her team also created the Safer Sex Intervention that aims to reduce sexual risk behaviors in high-risk adolescent girls. Currently, multiple sites across the US are conducting replications of the Safer Sex Intervention.

## Interview

***mHealth:*** *Having been studying in the field of adolescent mental health and risk behavior for years, what do you think are the critical issues facing the field?*

**Prof. Shrier:** One critical issue in adolescent health is reaching at-risk youth who are not being reached by current prevention and intervention strategies. Many of the social and educational factors that place youth at risk for adverse health outcomes, such as substance use, unplanned pregnancy, and sexually transmitted infections, also challenge efforts to reduce that risk. *mHealth* offers a means of bringing established and effective behavioral science to bear on these pressing public health problems. Another critical issue is providing youth

facing multiple difficulties with comprehensive interventions without strapping limited resources. To this end, I have been developing approaches to helping youth with mental health problems and risk behaviors that address the intersection of these emotional and behavioral issues with a combination of clinic-based in-person counseling and mobile technology-delivered intervention.

**mHealth:** *You recently conducted an NIH-funded pilot randomized trial called MOMENT that aimed to reduce marijuana use in youth. What were the rationale and methodology of this trial?*

**Prof. Shrier:** By the end of high school, most adolescents have tried marijuana and 1 in 17 is using marijuana daily. Frequent marijuana use may have particularly profound neurocognitive effects for adolescents, disrupt school and social functioning, and lead to use of other substances and psychiatric symptoms. Even when problems associated with use are detected, treatment options are limited and many affected youth cannot get the care that they need to avoid long-term and serious health and social consequences. As an approach to providing treatment in primary care, my colleagues and I developed MOMENT, an intervention to reduce marijuana use that combines brief motivational therapy provided in clinic with self-monitoring and messaging responsive to context and behaviors delivered using mobile technology. In MOMENT, youth meet with a trained counselor for two motivational counseling sessions separated by one week, to discuss their marijuana use, personal goals and values, and motivation for reducing or discontinuing marijuana use, and develop a behavior change plan. As part of the counseling, youth identify their affect and social context triggers for marijuana use and choose their top three. These three triggers are used to program the mHealth component. Then, for two weeks, youth respond to momentary surveys 4 to 6 times a day on a mobile device. If they report a personal top-3 trigger for use, marijuana desire, use, or effort to avoid use, they receive a motivational message.

In the pilot randomized trial, we evaluated the feasibility of a fully-powered randomized trial of the MOMENT intervention in primary care settings serving adolescents and young adults. We recruited primary care patients age 15–24 years who reported using marijuana at least 3 times/week and randomized them to MOMENT (MET counseling + momentary assessment + responsive messages) vs. No-Messages (counseling + momentary assessment)

vs. MET-Only (counseling). At baseline and 3-month follow-up, youth completed a survey and a timeline follow-back calendar of their substance use, then momentary assessments 4 to 6 times a day for one week. We evaluated trial feasibility (e.g., recruitment, retention, and response rates; feedback survey responses) and explored MOMENT's effects on marijuana desire and use after three months.

**mHealth:** *What were the results of the trial? What insights did it bring to guide similar trials in the future?*

**Prof. Shrier:** We enrolled 70 youth (mean age 20.7 years, 60% female). With regard to trial feasibility, most youth who dropped out, did so during the baseline, prior to any intervention. Of those completing the first counseling session, 82% completed treatment and 79% provided data at three months. Youth gave high ratings for acceptability of MOMENT and wrote free-text comments about feeling more motivated and making positive behavior change. Across the three study arms, youth reported significantly lower marijuana use, desire, and problems at 3-month follow-up, compared to baseline. Exploratory analyses of the momentary assessment data found that momentary marijuana desire decreased to a greater degree in youth receiving the full MOMENT intervention, compared to those receiving counseling alone (MET-Only). Youth in the MOMENT and No-Messages arms were less likely to use marijuana use following a targeted context or behavior, compared to those in the MET-Only arm.

Similar trials may wish to consider ways to reduce assessment burden, which we believe contributed to the attrition prior to intervention delivery. Alternatively, an assessment or run-in period can be used to identify individuals who may be willing and able to participate in an mHealth intervention. In our trial, technological issues may have reduced recruitment and retention rates. Other trials should consider the optimal frequency of prompting and reporting, so that sufficient self-report data may be gathered to tailor the intervention without creating undue burden. Passive data collection (e.g., for location) can reduce some but not all of the data collection responsibilities for the individual participating in an mHealth behavioral intervention. The mHealth software and delivery device are also important parts of intervention acceptability. Another issue for similar trials may be attention to increasing variety of messages, which is particularly important for trials delivering mHealth interventions frequently over extended periods of time.

**mHealth:** *Your team has also created the Safer Sex Intervention to reduce sexual risk behaviors in adolescent girls. Would you briefly introduce us to this intervention?*

**Prof. Shrier:** The Safer Sex Intervention is a clinic-based intervention to reduce sexual risk behaviors in adolescent and young adult women. We designed Safer Sex to be delivered at the time of diagnosis or treatment of a sexually transmitted infection. A female health educator administers Safer Sex in a 30- to 50-minute counseling session following one of two intervention guides, which is chosen based on the young woman's stage of behavior change.

**mHealth:** *What are the major challenges in your area of research? And what have been driving you to move forward and make progress in it?*

**Prof. Shrier:** Sexual health and substance use research with adolescents and young adults has many challenges related to developmental stage (e.g., capacity for abstract thought, self-regulation) and human subject concerns (e.g., privacy, confidentiality, safety plans). My training in pediatrics, adolescent medicine and behavioral health, and public health; clinical expertise in adolescent primary and specialty care; and research experience in mental health, risk behaviors, momentary assessment, and behavior intervention has helped me to address these challenges. Another pressing concern is funding for sexual risk behavior and substance use research. Many funding streams are disease-based and less concerned with prevention of consequences related to risk behaviors. I have found it helpful to be optimistic, creative, and nimble in my efforts to secure funding for my research.

**mHealth:** *How do you see the future development of mobile technology in the field of adolescent mental health and risk behavior?*

**Prof. Shrier:** Adolescents have high rates of mobile phone

usage and express preference for mHealth interventions. Adolescents with mental health problems and risk behaviors may not be accessing care delivered in person, in clinics owing to difficulties with interpersonal communication, organization, availability of appropriate care, transportation, ability to pay, and other issues. These barriers to care can be overcome using mobile technology, with thoughtful and careful consideration of risks as well as benefits of monitoring and treatment delivered outside of clinical settings. Exciting avenues for future research on mobile technology in the areas of adolescent mental health and risk behavior include optimizing use of passive as well as active (user-initiated/provided) data collection and developing just-in-time adaptive interventions.

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### Footnote

*Conflicts of Interest:* The author has no conflicts of interest to declare.

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