Researching the Ecology of Addictive Behavior Change for Nicotine

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Normally, when folks hear the word "ecology," they think of biology and studying animals in the wild. The truth is, however, that ecology is a perspective that applies even to humans. It is about understanding the behavior of any organism in context, which includes both other humans and the place they are located. Perhaps this reminds you of the "people, places, and things" refrain. Indeed, basic processes of learning in addiction are sensitive to place (O'Brien, Childress, McLellan, & Ehrman, 1992). And certainly, we have seen the utility of understanding the effects of "place" in treatment, such as through classic and effective approaches of helping clients manage risky situations via relapse prevention (Marlatt & Gordon, 1985).

In fact, the behavioral ecology of addiction is a booming field of research. It is helping us understand how things interact in real time in real situations, providing the possibility of an integrated perspective on how to better help our patients. To date, we have seen benefits of using these methods across diverse problems such as understanding how symptoms develop, how emotions may vary in real time, identifying internal and situational determinants of psychopathology, understanding stress in person-environment interactions, examining social interactions, and in evaluating treatment in real world circumstances (Myin-Germeys, Kasanova, Vaessen, Vachon, Kirtley, Viechtbauer, & Reininghaus, 2018). In this article, I would like to share about ecological momentary assessment (EMA), or what we call experience sampling. The collection of cell phone data, telehealth, and the use of apps is skyrocketing. Estimates as of 2014 suggest that 93% of people in the world owned cell phones, with 100% of residents of developed countries having at least one phone (Birenboim & Shoval, 2016). The benefits of this method of data collection are that it allows for relatively unobtrusive automatic observations, highly specific programming, minimal expenses, and the ability to yield data to remote researchers with ease (Raento, Oulasverta, & Eagle, 2009; Harari, Lang, Wang, Crosier, Campbell, & Gosling, 2016).

When many people think about phones and addiction, they first think of addiction problems. But the reality is that these devices offer many possibilities for both research and intervention, extending a rich tradition of human ecology studies in addiction.

In the area of smoking studies, EMA is teaching us about variations in smoking behavior by population group and the different situations they encounter. For example, Nguyen, Nguyen, and Thrul (2020) reviewed co-use of marijuana and cigarettes and report that EMA data show that there are diverse patterns of co-use. For instance, some users smoke the drugs separately, while some are combining them into a single blunt or cigarette. These patterns may demand different treatment approaches. Another EMA study by Shiffman and colleagues, who have been using experience sampling methods in addiction studies for decades, also looked at smoking (Shiffman, Scholl, Mao, Ferguson, Hedeker, & Tindle, 2020). They examined EMA of temptations and lapses in non-daily smokers; these are individuals who are generally not dependent on nicotine, but still have a hard time quitting. The researchers used EMA to study 130 initially abstinent individuals, capturing over 11,000 randomly timed assessments, and learned that cues to smoke (e.g., others smoking, alcohol consumption, lax smoking restrictions) may indicate more conditioned psychological dependence than was realized.

In another EMA study, Livingston, Flentje, Heck, Szalda-Petree, and Cochran (2017) studied sexual and gender minority individuals (N=50) for 14 days, taking measurements six times a day between 10 a.m. and 10 p.m. They found that discrimination experiences had both immediate and delayed association with subsequent use of nicotine and other substance use. Further, relative to other mistreatment, discrimination effects became stronger throughout the day and evening and were consistently larger in magnitude. Again, these fine-grained details would be hard to capture with a static questionnaire or even an interview, as recall for such nuances are not necessarily evident in the moment for the person experiencing these things, thus highlighting one of the benefits of EMA.

When many people think about phones and addiction, they first think of addiction problems. But the reality is that these devices offer many possibilities for both research and intervention, extending a rich tradition of

human ecology studies in addiction. Smart phones are but one area where we are growing our ability to improve our ecological understanding (and treatment) of addiction. E-health programs and web-based interventions, machine learning, computerized adaptive testing, wearable devices and digital phenotyping, biofeedback, and virtual reality (Ferreri, Bourla, Mouchabac, & Karila, 2018) all join with EMA to improve what we do. And for smoking in particular, this is very important as smoking is still one of the costliest addictions out there in terms of public health impact. So, as you think about your clients, reflect on how evolving technology such as smart phones can help you in your work. What else do we need to know about the ecology of nicotine use and related smoking? EMA is one way we can get those answers.

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