

Designing PI Applications for Critical Behavioral Self-Tracking Contexts

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Overview: Our work seeks to apply the social and technical expertise of the HCI community in technology-supported behavior change towards supporting people’s recovery from substance abuse. Personal informatics tools have been shown to be effective and engaging for people starting new behaviors and maintaining long-term habits in similar contexts, such as smoking cessation (Paaye et al 2015). Specialized behavioral self-tracking tools could potentially be incredibly impactful in the process of recovery from substance abuse. Insights from prior qualitative work in our research group and in the addiction research community has established that specialized self-tracking tools would be useful and desirable for this population (e.g. Yarosh, 2013). Therefore, we are currently investigating how people employ digital self-tracking tools, in concert with traditional treatment and supplemental maintenance programs, to support their own recovery efforts.

For this study, we are building a wearable PI system, Powertoken, to help promote accountability and awareness on progress towards self-defined recovery behavior goals. Powertoken provides aspirational and maintenance goal-setting (via a mobile app), automatic location-based activity tracking (app), meaningful data aggregation (via backend server), and ambient awareness of progress and goal attainment (via a wearable tracker). Rather than creating a custom wearable, we repurpose the Fitbit¹ technical infrastructure for our wearable tracker, leveraging the robust hardware and API to create a high-fidelity prototype suitable for field deployment. We also partner with an existing goal-tracking app, WeConnect², for people to document their behaviors and progress. Below, we briefly describe the substance abuse context and challenges for PI-based behavioral interventions. To conclude, we outline several social and technical issues that we hope to discuss further at the Social PI workshop.

Substance Abuse Recovery:

According to the 2014 National Survey on Drug Use and Health (SAMHSA, 2014), over 20.2 million adults had a substance abuse disorder in the past year. Substance abuse disorders occur when recurrent alcohol or drug use cause a person to experience significant clinical or functional impairments in their everyday life. Of those who had experienced a disorder, the same survey finds that 2.5 million had received treatment for their drug or alcohol use in a specialty treatment facility. A national survey conducted in 2012 on substance abuse and addiction reported that ten percent of U.S. adults (23.2 million) people were in recovery from substance abuse (OASAS, 2012). Recovery has been defined as the “process of change through which individuals improve their health and wellness, live self-directed lives, and strive to reach their full potential.”³

Studies have found that people in recovery who are successful in achieving long-term abstinence supplement their traditional (clinical) treatments with a regular maintenance program that promotes behaviors that contribute to a positive and healthy lifestyle (e.g. DiClemente et al., 2003; Hendershot et al., 2011; Laudet, 2011; Marlatt & Gordon, 1980.) These behaviors may be as diverse as attending peer support groups, meditating, volunteering, or participating in formal post-treatment programs. Yet, starting and maintaining desired behaviors is difficult, even when highly motivated. Recovery from substance use disorders (SUDs) is hindered by relapse rates of 50% or more (e.g. McLellan et al, 2000; Miller et al, 2001; Witkiewitz, 2008.) Although this rate is similar to other chronic illnesses, substance abuse relapse can lead to much greater psychological and physiological harm (SAMHSA, 2014).

Interventional PI Applications:

Personal informatics (PI) applications span self-motivated, recreational uses to more formal or “imposed” contexts, such as in prescribed self-monitoring for home healthcare (Lupton 2016). Self-tracking for substance

¹ a) <https://www.fitbit.com>, b) <https://dev.fitbit.com>

² <https://weconnectrecovery.com>

³ <https://www.samhsa.gov/recovery>

abuse recovery spans these usage scenarios: a person might self-track out of curiosity and to learn more about their triggers or habits, or a person might participate in self-tracking activities required by a treatment program. Although manual self-tracking is a common practice in substance abuse recovery, digital self-tracking has not been well-studied in this context. Approaching relapse and recovery from a behavior change paradigm, our work will investigate the individual, personal effects of using digital PI applications for self-tracking, as well as the social effects of care and recovery, such as managing identity, relationships with care providers, and connections with emotional supporters.

This work presents important sociotechnical design challenges for PI researchers working in “critical” behavioral contexts, in which self-tracking has become essential for maintaining physical, mental, and emotional health. Below, we present two issues particularly relevant to the workshop:

1. Building reliable prototypes for vulnerable populations. Personal informatics is arguably the “killer app” of wearable devices, which provide convenient, user-friendly platforms to collect, manage, and present biological and personal data. Yet, for the social impact of wearable PI technologies to be adequately studied, researchers and practitioners must evaluate these systems in the real world, deploying them “in-the-wild.” In deployment, bugs and system failures happen. But critical use contexts, such as medical use, have a low-tolerance for failure. To mitigate unnecessary harm to the vulnerable populations we work with, our strategy is to repurpose off-the-shelf apps and devices which have already worked out most technical issues in non-critical tracking contexts (such as fitness).

Yet every methodological choice has its benefits and tradeoffs. We hope to learn from other participants about their experiences and strategies conducting exploratory and evaluative field work with novel apps. *“What are the benefits and tradeoffs to leveraging OTS devices to investigate novel PI applications for health and wellness?”* We look forward to discussion about strategies to increase prototype reliability during deployment of novel applications in critical contexts.

2. PI and Perception. Recovery is a long-term effort. Substance abuse and addiction is considered a chronic condition, and people in recovery are not “cured,” but rather progress on a “journey” through stages of abstinence. Our work focuses primarily on people who are past the medical treatment stages of recovery and transitioning into independent maintenance programs. In this stage, they need to establish behaviors and strategies to maintain their substance-free lifestyle for the rest of their lives. However, recovery is part of life, and life does not always go according to plan.

As mentioned above, around half of recovery efforts are set back by relapse, where individuals return to using drugs or alcohol. These behavioral lapses are not necessarily tracking lapses (as studied by Epstein et al., 2016). Individuals might continue to track lifestyle habits and behaviors during a relapse period, when, for example, they are managing other health conditions or trying to regain their prior control. This is especially true for imposed tracking. Moreover, wearable and mobile devices that automatically track some information on the user’s behalf (such as location or sleeping habits) may continue to log data if not explicitly turned off. A key question to discuss in the workshop is *“How could tracking during a relapse period, both the act and the collected data, impact the person and their supporters?”* We hope to discuss how people perceive and potentially use data collected during periods of behavioral lapse, in this and other contexts.

Conclusion: PI applications and wearable PI platforms can be valuable interventions in critical behavioral self-tracking contexts like substance abuse recovery. To realize this potential in a socially responsible way, issues such as the long-term use, social acceptability, and impact of negative information must be considered. We look forward to presenting and discussing these topics with fellow workshop participants.

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