Positive Computing for Digital Wellbeing

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As the popularity of smartphones has been rapidly increasing in recent years, negative aspects of their usage have emerged, such as social conflicts, sleep deprivation, and attention deficits. According to a survey by the South Korean government, the smartphone addiction rate has been rapidly increasing, from 8.4% in 2011 to 14.2% in 2014, and further, the rate of adolescents is much higher than that of adults. This kind of smartphone overuse generally belongs to technological addictions which are defined as behavioral (nonchemical) addictions—it is known that interactive components of computer devices can have inducing and reinforcing features, which may promote addictive tendencies (e.g., tolerance, withdrawal, interference, and relapse) [1].

Our recent studies have been focused on dealing with this kind of technological addiction by applying computational techniques to better understand problematic smartphone usage and to develop computer-assisted intervention methods. This computational approach is very different from the traditional psychology studies that were largely based on subjective user reports and interpersonal counseling. Our representative research results include automatic identification of smartphone addiction, and mobile intervention software for improving self-regulating smartphone use. In the following, we summarize our recent studies on technological addictions of smart devices.

1) Automatic identification of smartphone addiction (ACM CHI 2014 [2]): We analyzed smartphone usage data and uncovered usage behaviors related to smartphone addiction. Further, we proposed a novel method that can automatically identify whether a user belongs to the risk or non-risk group at an accuracy level of 85% by using individuals' interaction data with their smartphones.

2) NUGU (ACM CSCW 2015 [3]): After this explorative study, we started working on designing novel intervention methods that can effectively mitigate smartphone overuse. We tried various strategies that are known to effective in the literature. We found that many of the self-reflection methods did not work well. That's why we examined a social intervention method, by leveraging Bandura's social cognitive theory of self-regulation. This theory illustrates that learning occurs in a social context, and much of what is learned is gained through observation. We developed a group-based intervention app called NUGU (when No Use is Good Use) where a group of friends can limit their smartphone use together and share their limiting information with one another. We performed controlled experiments and validated its effectiveness.

3) FamiLync (ACM UBICOMP 2015 [4]): It is important for children to engage with their parents in activities that encourage both parents and children to participate in co-learning of digital media use. We developed FamiLync, a mobile service that treats use-limiting as a family activity and provides the family with a virtual public space to foster social awareness and improve self-regulation. This helps family members to improve mutual understanding of usage behavior, and parents actively participated in use-limiting with their children, which significantly increased the children's desire to participate.

4) Lock n' LoL (ACM CHI 2016 [5]): To minimize smartphone distraction in group activities such as meetings, conferences, and discussions, the team developed a mobile service called Lock n' LoL (Lock Your Smartphone and Laugh Out Loud) that helps people to lock their smartphones altogether and to keep them from using their smartphones in group activities. The team conducted the Lock n' LoL campaign throughout the campus for one month this year with 1,000 students participating. As a result, students accumulated more than 10,000 free hours from using the app on their smartphones and said that they were able to focus more on their group activities.

Although our work is mainly focused on technological addiction, we believe that our computational approaches can be applicable to other mental health domains as well; e.g., early detection of problematic behaviors based on smartphone interaction data, and mitigating problematic symptoms with social support features.

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