Designing for the Self: Enabling People to Design Behavioral Interventions

Elena Agapie
University of Washington
Seattle, WA, USA
eagapie@uw.edu

ABSTRACT

I investigate how individuals can employ human centered design techniques to adopt positive behaviors in their everyday life. I have designed and built a tool that supports individuals in planning physical activity using design processes such as understanding other people's behavioral needs, ideating behavioral interventions and prototyping behavioral solutions using evidence-based techniques. In my dissertation I will demonstrate how tools can support iterative behavioral design by evaluating behavioral solutions, drawing insights from testing, and making iterations to a behavioral solution. This work will result in new tools and design methods that enable people to adapt evidence-based techniques in a way that fits with their everyday needs.

CCS CONCEPTS

• **Human-centered computing** → **Collaborative and social computing**; *Collaborative and social computing systems and tools*.

CHI'19 Extended Abstracts, May 4–9, 2019, Glasgow, Scotland Uk

ACM ISBN 978-1-4503-5971-9/19/05.
https://doi.org/10.1145/3290607.3299080

KEYWORDS

Behavior Change; Social Computing; Crowdsourcing; Exercise

ACM Reference Format:

Elena Agapie. 2019. Designing for the Self: Enabling People to Design Behavioral Interventions. In *CHI Conference on Human Factors in Computing Systems Extended Abstracts (CHI'19 Extended Abstracts), May 4–9, 2019, Glasgow, Scotland Uk*. ACM, New York, NY, USA, 6 pages. https://doi.org/10.1145/3290607.3299080

Problem Statement

How can human centered design practices help people adopt and adapt positive behavior change interventions, that are inspired from evidence-based techniques, into their everyday life?

Research Questions

1. How can technology support individuals in prototyping positive behavioral change solutions through (a) understanding user needs, (b) ideating, (c) prototyping solutions informed by evidence-based techniques?

2. How can technology support individuals in adapting and iterating on behavioral interventions into their everyday life through (a) drawing insights from testing behavioral solutions and (b) iterating on existing behavioral solutions?

INTRODUCTION AND MOTIVATION

Many people aspire and seek to change their behaviors to better themselves, such as eating healthier or exercising. However, doing so successfully is difficult. A critical barrier to changing behavior is getting started and fitting the behavior into their life - what can a person do now? how can they adjust their lifestyle to accommodate for new activities in their life? People often turn to experts, such as personal trainers or dietitians. Experts are educated to provide high quality advice that is tailored to the goals of the person [3]. However, experts can be prohibitively costly.

In the absence of experts, some people turn to cheap or free mobile apps which provide exercise or diet plans. Although many apps might be designed with a human centered design approach in mind, these apps still fall short in terms of personalizing interventions to people's everyday needs. To address this, recent work in HCI has started exploring how to support people in running self-experiments that allow people to identify behavioral strategies that work for themselves [7, 8]. Current research also demonstrates how technology can empower people to use strategies traditionally practiced by experts to accomplish behavior tasks, such as mental health support [9].

My doctoral research investigates how technology can support individuals to identify, and adopt behavior change interventions that are informed by theory and are adapted to fit with a person's everyday needs. My approach to address this problem is to understand how technology can support people in conducting their own iterative design process to identify the behavioral solutions that best fit their lives. Through my research I demonstrate how to scaffold the human centered design process into technology, such that people with no design background can implement this process in the context of behavior change. Human centered design prescribes that designers should not design for themselves, and offers a variety of methods to understand the needs of users who are different then themselves. In my work I demonstrate benefits and drawbacks of enabling people to design for themselves or in collaboration with others in the context of behavior change.

Methods

I use mixed methods in my work. I conduct interviews to do formative work that results in insights about people's needs and practices. I design and build tools based on qualitative insights and theory informed techniques.

To evaluate tools, I conduct experimental studies and field deployments. My deployments have involved several weeks of system use. I evaluate tools through interviews, surveys, and self-reported behavior data.

To evaluate the behavior interventions generated in the studies I use a mix of perspectives. The quality of the intervention is evaluated by the recipient of the intervention, and by domain experts.

I collaborate with domain experts (exercise scientists or nutritionists) to inform the design of tools, the evaluation metrics, or to perform the evaluation itself.

DISSERTATION RESEARCH

In my dissertation I draw understanding into how human centered design techniques can be adapted and applied to design behavioral interventions, specifically behavior planning. I build tools that empower anyone to use human centered design techniques for creating behavioral interventions.

Behavioral intervention: behavior change plans

The behavior change interventions I focus on are: behavior change plans. Research shows that creating behavior plans makes people more likely to accomplish their goals [6]. Behavioral plans consist of a set of actions that the individual intends to perform to accomplish a goal. I worked with exercise scientists to identify best practices for physical activity prescription based on evidence based techniques [5], and expert practices [3].

Study 1: Designing tools that support prototyping behavior change plans (completed)

This study aims to understand how we can design tools that incorporate techniques such as: understanding people's needs, ideating, and prototyping behavior change plans. In this study I seek to understand the feasibility of using the design process for behavior planning. To do so, I use crowdsourcing to understand if anyone, even a crowd member can follow a design process to make behavioral recommendations. I conducted several studies to understand how to provide technological support for implementing design principles. I will refer to a prototype of a behavior plan as a preliminary behavior change solution, often imperfect. An individual attempts to implement such behavioral prototypes to help them reach their goal. To prototype a behavior plan, I designed and built CrowdFit (Figure 1) [1] a tool that incorporates understanding people's needs, ideating, and incorporates exercise science research to inform prototyping of a behavioral solution.

Understanding needs: To understand the needs of an individual seeking to change behavior, CrowdFit creates a rich user profile with behavior change relevant information. These rich user profiles enabled the plan designer to ideate recommendations that fit with the needs of the behavior plan recipient. User profiles included relevant information [3], such as goals, preferences, constraints and prior experiences with the desired behavior. The use of such a profile has the potential of building empathy with a person who is seeking to change behavior.

Ideating behavioral plans: To support ideation, CrowdFit leverages on crowdsourcing to provide the person wanting to change behavior with diverse ideas about possible solutions. This was informed by several studies I conducted in the past that touched on ideation in behavior change. In a study of Instagram users interested in eating healthy, I found that people were seeking creative ideas to support them in their goals [4]. In a study on behavior planning, I found that different people, friends of the user versus complete strangers, have different strengths in generating behavioral ideas. They

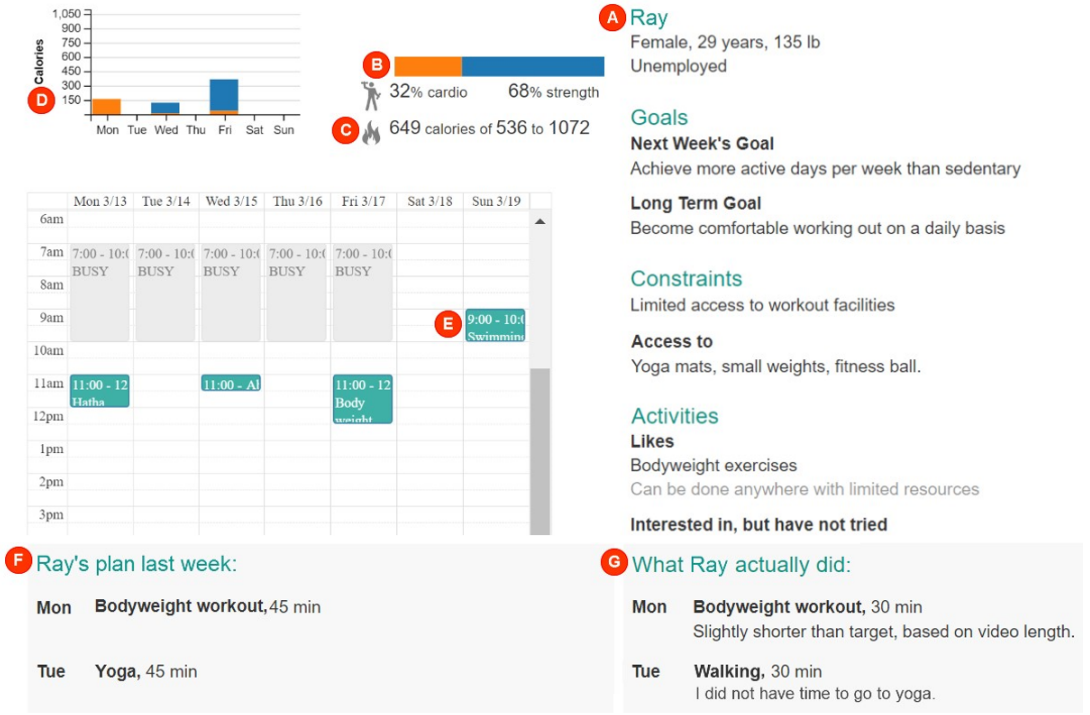

Figure 1: CrowdFit enables people to design 1-week behavior plans by understanding the needs of the plan recipient, ideating, drawing on exercise science techniques and following an effective structure for organizing information in behavior plans.

vary with respect to how diverse the ideas are, how good of a fit, and how comfortable people are to disclose information about themselves with different others [2].

Creating behavior prototypes: To support prototyping a solution, CrowdFit incorporates several elements of creating effective behavior change plans: it scaffolds domain research from exercise science [3] and from action planning [6]. This makes it easier for the person creating the behavior plan, the designer, to create well-structured plans and to incorporate domain knowledge they would not know otherwise.

CrowdFit was effective at supporting crowd members in creating exercise plans that competed in quality to expert created plans. It also provided insights into how to scaffold expert techniques in HCI planning tools [1].

Study 2: Designing tools that support iterative prototyping of behavior change plans (proposed)

I aim to understand how to support people in iterating on solutions for behavioral change planning. I will further design the CrowdFit tool to support behavioral iteration based on my preliminary findings.

Iteration: To support an iterative process, I propose to use reflection to support the individual in *drawing insights* about their own needs and about the feasibility of the behavior solution they are testing. Based on insights, I will support iterating on the behavioral solution based on dimensions relevant to physical activity. Through an evaluation study I will understand people's needs as they iteratively design behavioral solutions over time.

Self-design vs design by others: My research showed there are strengths in seeking help from others for behavioral planning. To understand strengths of people iteratively designing for themselves versus getting help at different stages, I will do a comparative study, and use a between subjects design. I will compare self-generated behavioral plans with collaborative behavior plans. I will evaluate the quality of the plans created through a mix of qualitative and quantitative measures, from plan recipients and from experts.

CONTRIBUTIONS

My research will advance HCI knowledge through (1) empirical knowledge about the effectiveness, strengths and weaknesses of using a human centered design approach to designing behavioral interventions, (2) design of novel tools that scaffold expert practices from the design process and from exercise science for novices in these domains, (3) a design method for self-designed behavioral interventions.

My work will provide tools that are helpful for informing the practices of designers who create technology for behavior change. I expect that the techniques I use will be adopted to other behavior change domains outside of physical activity. The human centric approach I take will help bridge theoretical findings in behavior change literature, to how technology can support the actual implementation of such findings in people's everyday life.

ACKNOWLEDGMENTS

I would like to thank all my collaborators on this research, in particular to Gary Hsieh and Sean Munson, for their advising. This research was in part funded by NSF grant IIS-1553167.

REFERENCES

[1] Elena Agapie, Bonnie Chinh, Laura R. Pina, Diana Oviedo, Molly C. Welsh, Gary Hsieh, and Sean Munson. 2018. Crowdsourcing Exercise Plans Aligned with Expert Guidelines and Everyday Constraints. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18)*. ACM, New York, NY, USA, Article 324, 13 pages. https://doi.org/10.1145/3173574.3173898

[2] Elena Agapie, Lucas Colusso, Sean A. Munson, and Gary Hsieh. 2016. PlanSourcing: Generating Behavior Change Plans with Friends and Crowds. In *Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing (CSCW '16)*. ACM, New York, NY, USA, 119–133. https://doi.org/10.1145/2818048.2819943

[3] Barbara A. Bushman, Rebecca Battista, Panela Swan, Lynda Ransdell, and Walter R. Thompson. 2013. *ACSMâĂŹs Resources for the Personal Trainer: Fourth Edition*.

[4] Chia-Fang Chung, Elena Agapie, Jessica Schroeder, Sonali Mishra, James Fogarty, and Sean A. Munson. 2017. When Personal Tracking Becomes Social: Examining the Use of Instagram for Healthy Eating. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17)*. ACM, New York, NY, USA, 1674–1687. https://doi.org/10.1145/3025453.3025747

[5] Carol Ewing Garber, Bryan Blissmer, Michael R. Deschenes, Barry A. Franklin, Michael J. Lamonte, Min Min Lee, David C. Nieman, David P. Swain Swain, and American College of Sports Medicine. 2011. Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: Guidance for prescribing exercise. *Medicine and Science in Sports and Exercise* 43, 7 (2011), 1334–1359. https://doi.org/10.1249/MSS.0b013e318213fefb

[6] Peter M. Gollwitzer. 1999. Implementation intentions: Strong effects of simple plans. *American Psychologist* 54, 7 (1999), 493–503. https://doi.org/10.1037/0003-066X.54.7.493

[7] Jisoo Lee, Erin Walker, Winslow Burleson, Matthew Kay, Matthew Buman, and Eric B. Hekler. 2017. Self-Experimentation for Behavior Change: Design and Formative Evaluation of Two Approaches. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (CHI '17)*. ACM, New York, NY, USA, 6837–6849. https://doi.org/10.1145/3025453.3026038

[8] Kwangyoung Lee and Hwajung Hong. 2018. MindNavigator: Exploring the Stress and Self-Interventions for Mental Wellness. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18)*. ACM, New York, NY, USA, Article 572, 14 pages. https://doi.org/10.1145/3173574.3174146

[9] Kathleen O'Leary, Stephen M. Schueller, Jacob O. Wobbrock, and Wanda Pratt. 2018. "Suddenly, We Got to Become Therapists for Each Other": Designing Peer Support Chats for Mental Health. In *Proceedings of the 2018 CHI Conference on Human Factors in Computing Systems (CHI '18)*. ACM, New York, NY, USA, Article 331, 14 pages. https://doi.org/10.1145/3173574.3173905