

## **Emotion and Thought Responses to Data Engagement and Design Features in Diet and Fitness Apps Report**

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### 1. Introduction

The purpose of the independent study is to learn about research methods and procedures in Human Computer Interaction (HCI) as well as writing academic articles for HCI-related venues. In order to get this experience, I helped develop a research project which aims to investigate scenarios that invoke negative emotions and ruminative thought in the context of diet and fitness tracking apps. This domain was chosen because health apps have become increasingly popular. By understanding instances where rumination and negative emotions are likely to occur, we can develop better diet and fitness apps.

I began this project in October 2018 alongside 3 undergraduates at the University of California, Irvine. During December 2018, I became project manager and assumed more responsibilities for this Independent Study. As part of this project, I have engaged in the following activities:

- Attending/schedule weekly meetings with my team, running the meetings if advisor not present
- Conceptualizing and developing the research project
- Reviewing and reading HCI/Psychology literature
- Assisting with a small grant application for funds to conduct this research, which we were awarded in January 2019
- Filling out the Institutional Review Board (IRB) application for human participant research (final revisions are currently under review)
- Developing data collection instruments, including surveys, think-aloud exercise protocols, and interview scripts
- Creating recruitment flyers
- Participating in 10 data collection practice sessions with volunteers
- Working with my team to practice all research procedures, including contacting research participants, prepping materials, setting up data collection sessions, uploading audio files and notes, and deleting sensitive data
- Revising data collection materials after every data collection session
- Learning how to build rapport with participants, engage in active and empathetic listening, and probe for more information in order to get quality data
- Submitting abstract and poster presentation for University of California, Irvine Research Symposium to be held in May 2019
- Acted as Project Manager for 5 months
- Took a Coursera module on qualitative analysis through University of Pittsburgh (audited the courses)

- First-authored a CSCW submission (currently under review)

### ***Learning Objectives Achieved***

- Obtain hands-on experience conducting think aloud exercises, surveys, and interviews and gain an understanding of their utility in usability research
- Learn qualitative coding and thematic analysis to generate user needs

### ***Future Learning Objectives***

- Understand how to utilize computational linguistic analysis approaches to connect qualitative data to outcomes
- Learn basic quantitative analysis to answer hypotheses

In the remainder of this report, I will discuss the background of the research project and what procedures we created. I will also discuss my involvement in more detail during the phases.

## 2. Background

Personal informatics (PI) – defined as the practice of collecting data about oneself to acquire self-knowledge or achieve a goal – is becoming increasingly popular as more technologies support self-monitoring, self-tracking, and the quantified self [16]. Self-tracking technologies, often in the form of mobile applications (apps) and wearables, have been touted as tools that will positively impact individuals' health, finances, sustainability efforts, productivity, and more [3,17]. A key component of the process of using self-tracking for personal improvement is self-reflection, which acts as a catalyst for positive changes and self-knowledge [7,14,21]. In fact, PI tools are intended to help users collect personal data for self-reflection [15].

While users may experience thought cycles that lead to new insights and progress (i.e., self-reflection), they may also experience negative thought cycles that inhibit personal development, known in Psychology as rumination [12,19,22]. Although researchers have drawn attention to the potential for negative thoughts and emotions associated with engaging with self-tracking tools [2,5,6,9,10,21] as well as the downsides to self-reflection [18], most research has not focused on understanding what design features incite rumination.

**Specific Aim 1:** Identify problematic design features and connect them to outcomes

**Specific Aim 2:** Investigate characteristics that make rumination more likely

**Specific Aim 3:** Provide evidence regarding how these experiences relate to users' ability to achieve their goals, gain insight, etc.

### 2.2. Participants:

Our research group consisted of me and 3 undergraduate students at the University of California-Irvine under the advisor Dr. Elizabeth Eikey. We wanted to conduct research on people we can relate to and on a topic we have experienced ourselves. We chose to

choose college students in undergraduate programs in the United States. Our target audience needed to be ages 18-22, currently use diet and fitness applications that tracks both food and exercise and must be English speaking.

### 3. Methods

**Specific Aim 1:** Identify problematic design features and connect them to outcomes

**Specific Aim 2:** Investigate characteristics that make rumination more likely

**Specific Aim 3:** Provide evidence regarding how these experiences relate to users' ability to achieve their goals, gain insight, etc

### **Research Opportunity Program Grant through University of California, Irvine**

In order to conduct our research study on participants, we needed to retrieve funds from grants. We applied for the Research opportunity program grant through the University of California, Irvine. UROP sponsors the UCI Undergraduate Research Symposium, an annual event held in May that allows hundreds of undergraduates the opportunity to present the results of their research or creative activities in a professional setting. We were awarded a small grant for \$500 for participant compensation.

### 4. IRB Process

Although we submitted the IRB in November 2018, it is still currently under review. I helped with multiple parts of the original IRB application as well as its revisions. For instance, I was in charge of creating the recruitment flyer and the study information sheet, and I helped fill out the protocol narrative sheet. In February, we needed to make revisions, which are I helped make.

### Recruitment Flyer:



**Do you use a diet and fitness app?**

**have you ever had a negative experience using it?**

The study will take approximately 35-40 minutes over 1 day.

Participants will be asked to complete two short interviews, an exercise where you share your thoughts and feelings out loud as you use your app (known as a think-aloud), and a survey (part 1 and part 2).

**You will receive a \$15 e-gift card for your participation.**

**Eligibility for study:**

- Attend college in an undergraduate program in the United states
- Between age 18-22
- Currently uses a diet and fitness app (application that allows users to track both food and exercise -related information)
- English speaking

**TO PARTICIPATE IN THIS STUDY, PLEASE CONTACT THE PRIMARY RESEARCHER**

**Elizabeth Eikey, Ph.D.      [eikeye@uci.edu](mailto:eikeye@uci.edu)**

### Information Sheet:

The information sheet purpose's is to inform the participant about the procedure, why we are conducting the research, and to inform the participant on the potential risk and benefits. The potential benefits for someone to participate in a think aloud on a fitness app includes having a safe area to vent about frustration, potentially improve the design of apps, and to recognize healthier habits when using self-tracking apps. This deliverable for the participant is important due to the potential risks they might endure.

Participants could have gone through traumatic events in the past before using these apps and we are specifically asking to recount a distressing event when using the app. We needed to ensure that the participant can opt out of the cognitive walkthrough at any time and not be penalized for it. This is also the space to inform the participant that their data will be coded to ensure confidentiality but warned to potential privacy violations if the information is lost.

### **IRB Application and Revisions:**

For the IRB, I was in charge of filling out the major sections of the IRB, including the research protocol, recruitment, risks, and methodology section. Our undergraduate research teammates helped fill in the rest of the document, consulting me on correctness and whenever they needed help. Completing the IRB for this research project was a difficult task. We could not have seen the IRB taking so long to be approved and we did not know we had to revise the IRB to new standards this year. After completing the revisions, I wish we completed this earlier in September rather than November. The extra months would allow us to collect data faster. It was a very rewarding experience to complete the IRB with our group members. Clearly laying out our research methods, clarifying risks and sensitive data, and thinking whole circle on this process will cause me to approach more tasks similar to this.

## **5, Proposed Methods & Creating Data Collection Materials**

### ***5.1 Pre-Interview***

We proposed doing a pre interview in order to learn more about the participant before the think aloud. We need to figure out exactly what diet or fitness app the person use and why they use it. We are talking about distressing events that the participants have endured, which could make the situation uncomfortable for participants to speak out loud. A pre-walkthrough interview is the perfect way to build rapport with the participant and make them feel more comfortable with the researcher conducting the data collection session. We ask simple questions about the participants, on how they are doing, what school they go to, etc. Once we acquire this information, we can assume the participant will feel at ease and be more willing to say their thoughts during the data collection session

### **Pre-Interview Script:**

#### **Beginning** *[Purpose: Build trust and rapport]*

To begin with, I'd like to just start with some background questions...

- Tell me a little bit about yourself
- What year are you in school?
- What is your major?

### **Pre-Think-Aloud Interview**

1. What diet and fitness app or apps do you use?  
    . [If multiple]: Which one do you use most?
2. Why did you decide to use [app]?
3. What are your perceptions of [app]? [Then probe with]:  
    What do you like about the app?
  1. What do you dislike about the app?
  2. Do you find the app useful? How?
4. Have you ever stopped using [app]?  
    [If yes]: Why did you stop?

### ***5.2 Think-Aloud Exercise***

We are specifically using a think aloud exercise in order to get qualitative data on how participants experienced a distressing event when using the app. Performing a think aloud will allow for unfiltered thoughts to emerge while the participant is guiding us through the event. We instruct the participant to say anything in their mind out loud and to show us the screen at all times. We are also audio recording this segment to transcribe each session afterwards.

### **Think-Aloud Script:**

Now, we're going to move into the think-aloud exercise. A think-aloud exercise is just a fancy way of asking you to speak aloud any words in your mind as you complete a task on your app. During this time, we will look at your [app] on your [smartphone/tablet] together. As we go through this together, say what you're doing, thinking, and feeling, no matter how small.

1. Can you please describe the last time you felt especially distressed or upset when using the app? *[pause - let them describe it and then move to 2]*
2. Now, I'm going to ask you to show me this on the app. Can you please show me this experience or something that represents this experience on the app? As you pull up the app, talk out loud everything you're thinking and feeling.
  - a. Can you explain how what you're showing me on the app represents the negative experience you just described?
3. Would you like to add anything else about this experience?

*[As you go through this part, you may have to remind the participant to think aloud everything they're thinking and feeling. If they start just naming the bad parts of the app, say: "I appreciate all the bad points you have stated. Can you bring it back to a specific experience that made you feel about these bad design features in the app?"]*

### **5.3 Survey**

Our survey was designed for two purposes, gain demographic information from our participants and to ask questions after conducting the think aloud. The first portion of the survey is about how participants react and feel after they recount their distressing event and go through the walkthrough. We want their unfiltered thoughts on the survey in order to draw comparisons using thematic analysis. We use the Likert scale in the survey in order to record responses, asking participant how they feel or agree with a certain question. For the demographic section of the survey, we wanted to conduct it after the post walkthrough survey because there are sensitive questions that might make the participant uncomfortable to answer, such as gender or sexual orientation. Originally, we had this survey right after the pre walkthrough interview, but we did not want the participants to become more nervous after building rapport.

We went through a revision with this survey. Our first version did not allow participants to skip an answer or did not tell them when they missed an answer. This was causing frustration and was going against our data information sheet. We needed to allow the participants take the survey and have the option to not answer any questions.

### **5.4 Post-Interview**

After the participant has finished the survey questions revolving around the distressing event they just discussed, we wanted to ask more questions in a semi structured interview way. This allows the participant to voice any reasons or concern during the distressing event and how the event changed them. We also allowed the participant to comment on anything about the process or any information they thought would be necessary for us to know.

**Post-Interview Script:**

Thank you! I would like to ask you a few more questions about the negative experience you described during the think-aloud.

1. Why do you think the experience you described was particularly distressing?
2. Did seeing this information on the app change what you did the day after?
  - a. If so, how?
3. How did this experience affect how you **use the app**?
4. How did this experience affect how you **feel about yourself**?
5. How did this experience impact **your ability to achieve your goals**?
6. Would you change this [*design*] based on this experience?

If yes: what / how?

Follow up: Would there be other things you would change based on this experience? (If so, why or how?)

**6. Data Collection Practice Sessions**

In order to learn about the structure of semi structured interviews and the methods of collecting data through survey, we wanted to get experience and the feel of the procedure before going into a real one. Having this experience beforehand will allow us to be more confident with our participants, making them feel more assured about telling their experience. Without this practice, we will seem unprofessional and make the participant question our practice. They will not feel comfortable, and without feeling safe to speak their thoughts, our data collection would be over.

We conducted numerous practice data collection sessions. One was conducted with Dr. Eikey's guidance. Then we conducted 2 with our team members. Then we asked for volunteers to improve our skills. I recorded 10 practice participants at the University of Pittsburgh, and these participants were my classmates and coworkers. I chose a quiet place to record the data collection session and conducted the walkthrough. Once we finish the data collection, we entered in the information into an Excel sheet to ensure tracking and put in audio logs into google drive. We practiced this method with each individual to ensure we have the technique perfect when we actually conduct on participants. With the data collection session, we revised our script several times. We needed a more organic feel to our script, and noticed we had awkward phrases. With each participant, we revised our script and asked our pretend participants for any advice on how our rapport was during the data collection.

The biggest challenge was asking the participants questions during the think aloud. We could not ask the participants to do anything specific in the think aloud to avoid leading

them on. If we lead them on, we are tampering with our data and it would not make our data valid. This process took 4 weeks to get comfortable conducting this part of the data collection session. I noticed I started feeling more comfortable with follow up questions, my body language during sessions felt more professional, and I was becoming more involved with notetaking during the procedure. With this experience, my future job as a user experience researcher will be easier for me to acclimate to qualitative sessions.

## **7. Project Manager Role**

Being project manager has grown me into the graduate student I am this semester. This position taught me to juggle school and research in ways I could not imagine. For the past 5 months, I have been scheduling meetings with my teammates, prepping the meetings to ensure smoothness, and being able to answer any questions my teammates have. I lead the meetings when Dr. Eikey was unavailable and taught the undergraduates how to complete IRB materials, effective research methods, and effective methods of finding literature. I sent weekly emails to our advisor Dr. Eikey, updating her on our progress for tasks she gives weekly. I worked very close with her in completing the IRB materials and creating the materials for data collection sessions. We created and revised the scripts while teaching the undergraduates the importance of this type of research. Through teaching, I learned great organizational skills to keep track of all the duties I had for school and research. I learned to balance my time between each task, ensuring each task has enough work in and nothing is falling behind. This experience will definitely help me when I go for my PhD.

## **8. Data Analysis: Coursera Course**

Since we did not have our IRB approved, we started learning more about the qualitative research method and how to conduct it. We are learning from Coursera, Quantitative Analysis, so we know exactly how to analyze our data. The course discusses deductive approaches, coding, framework analysis, inductive analysis, and grounded theory. The module took 4 hours to learn everything and there were about one hour of testing once you completed the course. We will apply this to our work by using thematic analysis when completing think aloud with our participants.

## **9. Practice Writing Academic Papers**

During this semester, I first authored a CSCW paper under the guidance of our advisor. Dr. Eikey and I have worked on a research project in the past revolving around immigrant college students and their perceptions on social media while experience depression. This paper focused on our findings for the past two years. I spent weeks writing this paper, revising and analyzing our data. Dr. Eikey would proofread and give me hints on what direction the paper should go. This experience is extremely valuable to me if I am to become a user experience researcher and if I want to go for my PhD after working for a few years. I know how to balance my work/research around writing this paper and how to talk like a researcher on paper. I used everything I learned in grad school to create this

paper and the content I learned in my classes helped shape the direction I wanted to share. We submitted my paper and now waiting for the results.

## **10. Next Steps**

Once the IRB application is approved, we will begin recruitment. We will be recruiting with flyers on University of California, Irvine's campus and on our own personal social media accounts. Our next steps after the semester has ended will be conducting the data collection from the participants at the University of California Irvine or on our social media platforms. For full data collection sessions, we plan on having about 20-30 participants until we hit data saturation. For the survey only portion, we intend to get approximately 100-200 responses through social media ads and paper flyers at the University of California, Irvine. Once the data collection sessions are finished, we will analyze the survey and the survey we post online with descriptive analysis. We will compare statistics against each participants for results. We will then look at the qualitative data with thematic analysis, looking for common themes between each participant to find trends. Once we collect the data we need, we intend on publishing to conferences or journals

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