

Thesis Portfolio

**Increasing Engagement in eHealth Interventions
Using Personalization and Implementation Intentions**
(Technical Report)

Addiction Treatment: Healthcare May Be Part of the Problem
(STS Research Paper)

An Undergraduate Thesis
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Bachelor of Science in Systems Engineering

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TABLE OF CONTENTS

SOCIOTECHNICAL SYNTHESIS

INCREASING ENGAGEMENT IN EHEALTH INTERVENTIONS

USING PERSONALIZATION AND IMPLEMENTATION INTENTIONS

with Darby Anderson, Amanda Brownlee, Camryn Burley, Georgie Lafer, Taylor Luong,
Meaghan McGowan, Judy Nguyen, and Halle Wine

Technical Advisor: Laura Barnes, Department of Systems Engineering

ADDICTION TREATMENT: HEALTHCARE MAY BE PART OF THE PROBLEM

STS Advisor: Kent Wayland, Department of Engineering and Society

PROSPECTUS

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Anxiety and mental health problems are a common experience shared by many, and a large number of these individuals never receive treatment due to multiple factors, including financial burden and perceived stigma. Another major reason for this treatment disparity is the prevalence of drug addiction. Substance use disorder (SUD) is a mental illness that has the potential to produce intense anxiety within those whom it directly affects. There are eHealth applications aimed at reducing anxiety that have implemented intervention therapy programs already, but these programs fail to retain users throughout the course. In-person interventions aimed at reducing anxiety, specifically addiction treatment methods like holistic therapy and prescription drug substitution, have accessibility issues rendering them ineffectual for a large amount of the addicted population. Overall, treatment for those with anxiety-inducing disorders must be more accessible and effective, which is the problem focused on in both the Technical and STS Research Projects.

The Technical project deals mainly with helping those who suffer from general anxiety disorder through an eHealth intervention called MindTrails. The MindTrails Project is an interdisciplinary team at the University of Virginia that aims to reduce this gap in mental health coverage through its freely accessible online research platform. The MindTrails Calm Thinking study aims to reframe the thinking patterns of highly anxious individuals when they respond to ambiguous situations that they might interpret as stressful. The study is experiencing a high attrition (dropout) rate, which is common to eHealth interventions. In response to this, our project utilized two novel approaches to online anxiety interventions to improve engagement and retention: (1) personalization of training content and (2) implementation intentions and goal setting. We designed a prototype for a new mobile interface using these approaches. We then conducted a pilot study, which involved user testing of our prototype and follow-up interviews,

with five former MindTrails participants. Overall, the users liked the app, averaging 4.6 on a 5-point Likert scale rating. They also felt engaged by the design, averaging 4.4 out of 5.

Suggestions for future work focus on more extensive user testing with a larger sample size. We hypothesize that the Calm Thinking mobile application will further connect users with an evidence-based mental health intervention and increase the efficacy of the program.

As discussed, the disparity in mental health treatment is significant in the sphere of SUD. The STS research topic shifts the focus to a specific anxiety-inducing disorder, SUD, and the accessibility of treatment surrounding it. The United Kingdom and the United States have both been deeply affected by addiction, and large numbers of addicts are left untreated in each country. Accessible addiction treatment is paramount in attempting to bridge the gap. By taking a closer look at how these nations' health insurance entities handle the treatment of those suffering from SUD, I hope to show how the differences in these countries provide both good and bad outcomes for addicts. With the goal of providing better care for addicted patients in mind, I examine all of the addiction services that the UK's NHS has to offer and a sample of US insurance policy on addiction treatment. I find that, though the US's system possesses the funding, staff expertise, and adequate amount of staff members to treat addicts, high costs tend to discriminate against many. On the other hand, the UK possesses all the affordable services without adequate resources to match demand, resulting in overly long wait times and, thus, more addicted individuals giving up. A health insurance system that can balance the best of what both have to offer may be ideal for reform.

In regards to value of work, I am proud of the results of both projects, and I believe that both projects completed what they were set out to do. Our Technical team was able to design a prototypical mobile application that not only implements both personalization and goal-setting,

but can also be made fully functional. The user study we ran also provided results pointing out the improved engagement and usability of the application, due to our new design. Overall, we advanced the fight against attrition in MindTrails, and thus opened more doors for those with anxiety. Next steps here should include doing more extensive user testing, finalizing the prototype, and then creating the mobile application. As for my STS Research Paper, I believe that my findings illuminated issues with the accessibility of addiction treatment in countries where drugs are criminalized, with a focus on the private vs. universal insurance dynamic. Much more can be looked at here, such as possible insurance reform or even the correlation between drug criminalization and treatment accessibility.