

Undergraduate Thesis Prospectus

## Complex Mechanisms for Student Entertainment and Stress Relief

(technical research project in Mechanical Engineering)

## Outreach or Out of Reach: How the University of Virginia Sees Its Students

(sociotechnical research project)

by

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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## **General research problem**

*How can the mental health of college students be improved?*

Among college and university students, mental health struggles are common, and access to care has been inadequate. An international survey of college students held by the World Health Organization found that roughly 35% of first-year students had at least one of six common lifetime mental disorders (Auerbach et al., 2018). These disorders cause pain and even stunt student achievement. For US college students, five of the six largest factors affecting their grades are psychological (Clark, 2017). The foremost factor is stress, but research suggests that most students experiencing stress will not seek counseling (Holland, 2016).

## **Complex mechanisms for student entertainment and stress relief**

*How can engineering be used to promote mental health for college students?*

Our project entails the design of a clock that changes in time as a series of mechanisms do tasks. Our advisor is Gavin Garner in the mechanical engineering department. The project is a capstone with team members Trenton Bilyeu, Daniel Disano, Alexander Dixon, Dylan Moore, Owen Petito, and Will Pfister.

We aim to use kinetic art as a disruption to coursework to relieve anxiety. Findings of the American College Health Association-National College Health Assessment III show that 48.2% of collegiate students have found academics to be traumatic or difficult to handle (ACHA, 2022). Among them, engineering student-bodies (14.5%) possess a higher percentage of students that identify as having “extremely severe” levels of anxiety compared to non-engineering students (13.7%) (Lee and Wan Adam, 2016).

The primary project goal is to make a display that can bring joy to students as they go to class. One constraint is that the product must be able to function untouched into the future. At the University of Virginia, the state of the art is such that we have few student exhibits that are both technologically and visually engaging. The MAE building has a number of complex mechanisms that manifest the intelligence of their engineers, but they primarily exist to bring prestige, not joy.

To construct the final product, we will use construction techniques such as 3D printing, laser cutting, CNC machining, and welding. CAD modelling and rapid prototyping will be used to design, build, test, and refine iterations of our product. The project will be complete once a design can perform its function continuously without supervision. It will then remain in a public display so that it can bring joy and inspiration to any passing student.

### **Outreach or out of reach: how the University of Virginia sees its students**

*How do UVA administrators and faculty monitor and address the mental health needs of the student population?*

How does The University of Virginia (UVA) help students manage their mental health? Mental health is affected by many external factors (Teachman, 2014). Social stigma, culture, and access to healthcare can have broad effects on a community's mental health, and the UVA administration's use of those external factors is critically important. To what extent does UVA understand and leverage its means to improve student mental health?

Research has shed light on the importance of external factors on mental health. For example, Teachman (2014) describes how most mental illnesses go untreated, and how online tools can reach those that were previously ignored. Holland (2016) investigates the effect of

stigma on student use of mental health services, and she found a correlation between increased stigma and reduced use. Hurd, Stoddard, and Zimmerman (2012) discuss how a culture can lead to internalizing symptoms of mental illness. This research supports the idea that community culture is significant for improving student mental health. To understand the ways UVA attempts to improve outcomes through culture change, it is necessary to focus on its unique circumstances. Kezar and Eckel (2002) suggests that “campuses should conduct audits of their institutional culture” before attempting culture change, because best practices for change differ with cultures. New and specific research must be conducted on UVA’s culture to answer the research problem.

Participants in this problem are both students and UVA employees. Student groups like Active Minds and representatives like the student council push for better standards from UVA and the community. UVA mental health professionals and teachers have important roles acting on UVA policy and fostering a healthy culture.

Active Minds has an interest in reducing the stigma around mental illness. Active Minds leverages social media to promote community events at UVA focused around mental health. A post on their Facebook promotes an initiative “#HugMore this week,” and provides a graphic (fig. 1) espousing the benefits of a hug (AMUVA, 2019).

**12 BENEFITS OF A HUG** \*  
\*It only works if it's consensual!

BE KIND. STRESS LESS.  
**#HUGMORE**

*a hug can...*

- reduce stress
- improve your mood
- reduce fear
- reduce pain
- calm nerves
- help you feel less alone
- help resolve conflict
- promote trust
- boost sleep
- improve self-esteem
- relax muscles
- boost empathy

**Caring for others cares for the self.**  
Research shows walking around and offering kindness, such as a hug, reduces one's own anxiety and increases empathy, caring, and feelings of connectedness.

**Connection with others can start with a hug. Just how many hugs?**  
Some say 8 hugs a day for maintenance, 12 hugs a day for growth.  
We say, **as many as possible.**

Figure 1. #HugMore Facebook Post (AMUVA, 2019).

The student council has made efforts to change protocol around mental health. A member has said “The state of mental health crisis response and interventions into aggravated situations at the University is abysmal” (Pallas, Surovell, and Pokhriyal, 2021). To combat this, the student council is funding and partnering with other student organizations to run the University Networks of Care (UNOC). This program aims to remove police from students’ nonviolent mental health crises and provide an alternative, EMTs and counselors (Pallas, Surovell, and Pokhriyal, 2021).

CAPS has stated they are “committed to providing a safe and affirming environment” for students (CAPS, 2022). They pursue this commitment by offering free services to students including a partnership with TimelyCare which provides “24/7 virtual, wraparound mental health care” (CAPS, 2022). This partnership helps the 51 team members of CAPS better address student needs.

One professor, Michael Lyons, described an increasing need for mental health care that UVA is not able to address (CBS19, 2022). Lyons intends to connect graduate student counselors-in-training to “school divisions in the area who need them most” (CBS19, 2022).

These efforts are directed primarily at reaching students who do not seek care on their own.

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