Building Equity in Technology

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AI for Accessibility

Pushing the limits of what AI can do in accessibility
The ‘Disability Divide’ is widening

The Disability Divide
The gap in societal inclusion for people with disabilities, including in education, employment, and access to technology.

Disability numbers are growing
• Long-term COVID-19 health consequences (‘long-haulers’)
• Mental health conditions are increasing
• World population is aging

The employment divide is worsening
• Unemployment rates for people with disabilities have been disproportionately impacted by the pandemic

Education gaps are increasing
• People with disabilities consistently have lower levels of education than their peers
Making AI systems more inclusive

Lack of datasets that represent or include people with disabilities is a common problem for researchers and developers.

AI algorithms that aren’t trained on inclusive data often don’t work well for people not in that dataset.

We must improve the fairness of systems when it comes to gender, race, and disability.

AI systems built by and with the disability community will reflect a wider spectrum of users, leading to greater innovations for everyone.

AI for Accessibility

A 5-year, $25 million program to accelerate solutions that amplify human capability for people with disabilities

Empower researchers, startups, nonprofits, and assistive technology companies around the globe to push the limits of what AI can do in accessibility
Focus areas

**Education**
Ensure accessibility of learning materials, language development, and assistive technology options

**Employment**
Attract, retain, and upskill talent with disabilities, including workplace accommodations

**Community**
Improve personal connections to maintain relationships and mental health

**Home**
Advance opportunities in appliances, healthcare, transportation, and safety
Community

Challenge

• Mental health is the top cause of disability in the world and a growing concern as a result of the pandemic.
• In many countries, the number of mental health professionals cannot meet demand.

Opportunity

• AI can help people and their providers monitor, manage, and improve wellbeing, as well as facilitate connection.
• We are investing ideas that:
  – Nurture connection
  – Deepen personal relationships
  – Protect mental health
Community

Featured Project: Empathetic rewriting

Facilitating empathic conversations in online mental health support

Researchers at the University of Washington are working with TalkLife and Supportiv to train natural language models to recognize empathy in text-based messages, then offer suggestions to make responses more empathetic.

Location: USA
Community

Featured Project: Adaptive text messaging

Meeting young adults where they are: via text message

Partnering with Mental Health America (MHA), Northwestern University and University of Toronto are developing an adaptive, AI powered text-messaging platform for interventions designed to deliver engaging, personalized support for young adults who may not seek formal mental health treatment.

Location: Canada and USA
Community

Featured Event: Supporting mental health in Black communities

A discussion about biases, health care access, and the potential of technology

Workshop explored the intersection of disability and race. Experts from across disciplines addressed how to improve representation in AI, increase mental health research from and in Black communities, and how AI can both help and harm Black people seeking mental health support. Report: http://aka.ms/ai4amhreport

Location: USA
Grant selection criteria

Developed with or by people with disabilities

Relevance: Built with AI/ML and Azure

Impact: Elevates education, employment, community, home

Data: Open to sharing (privacy compliant) data for future innovation

Feasible and Sustainable: Potential beyond year of funding

Capable: Team skills and knowledge

Showcase: A strong story to shift sentiment
Join us on our journey

Learn more
AI for Accessibility – Microsoft AI

Apply for a grant
AI for Accessibility Grants – Microsoft AI

Upcoming award rounds

Employment
Requirements posted: early June 2021
Submission deadline: July 30, 2021

Low-Cost Assistive Technology*
Requirements posted: early October 2021
Submission deadline: December 17, 2021

*Focus will be on improving access to assistive technology in communities outside the US
Thank you!
GRIEVING ON THE DIGITAL STREET

Dr. Desmond Upton Patton
Senior Associate Dean, Columbia University
Associate Professor of Social Work and Sociology, Columbia University
Director, SAFE Lab
Introduction

The SAFELab is a research initiative focused on examining the ways in which youth of color navigate grief and trauma on and offline by drawing on computational and social work approaches to research.
Chicago Handgun Crimes
2001 - 2018

Crime incident descriptors
AGGRAVATED: HANDGUN
ARMED: HANDGUN
data.cityofchicago.org
TEENS ON SOCIAL MEDIA

92% ONLINE DAILY
71% USING MORE THAN ONE SOCIAL NETWORKING SITE
45% OF BLACK TEENS USE TWITTER
Theoretical Background

Young people in neighborhoods with high rates of violence use social media to communicate their lived experiences, including trauma and violence.
Lil Shawtty got hit Up who Sung that #Bdk song. That shit Sad. But thats a fine example of how Internet drilling get u kilt. Smd R.I.p Jojo

I swear if I was Jojo’s mama, Maugs would be dyin of all sorts of accidental deaths man... These kids have no concept of life n death...

That shit crazy I just seen jojo ass on 73nd and may that saturday of my lil sis party bess smith

Thinking” this Chief Keef Jojo Lil Reese situation is gonna blow up into this national news
GRIEVING IN DIGITAL SPACE
CASE STUDY: GAKIRAH BARNES
Gakirah’s History of Loss

Rip carlton tutu archer he one of da brothers #STLAWRENCE

Tyquan Died I Lost My Mind 🙏

Lil B 🙏

12:12 AM - 9 Sep 2013

9:20 AM - 10 Feb 2014

12:31 PM - 10 Apr 2014

4 Retweets 3 Likes

2 Retweets 1 Like

11 Retweets 12 Likes
DEEP QUALITATIVE ANALYSIS

NLP SUPERVISED MACHINE LEARNING
CONTEXTUAL ANALYSIS OF SOCIAL MEDIA (CASM)

Jay Smokin' thinking bout Dmoney

Rival gang member this user has allegedly killed

Grieving with Emojis

Substance Use

Fellow gang member recently killed by police

2:12AM - 3 Apr 2014

Late at night
@TyquanAssassin Why TF You Leave Us 😡
Why Man I Swear This Ain't Really
Happening .. I'm Finna T'UP 😈😤 Shit O V
A

9:36 PM - 11 Apr 2014
Results

Anger and Retaliation

DA Police I'd kill u Faster Dan niggaz on Da Corner Rip King Lil B 🙏🏼🙏🏼🚨👨‍🚀👩‍🚀entanyl CPDK

1:10 AM - 3 Apr 2014

15 Retweets 9 Likes
Thinkin bout Da first time Lil tyquan got sum
my lil bro was happy asl 😞🙏

11:35 PM - 10 Apr 2014

67 Retweets  70 Likes
Accepting the Reality of Death

In da end we DIE 🙏 100

10:53 PM - 10 Apr 2014

671 Retweets  245 Likes
Natural Language Processing Analysis
Important Features

<table>
<thead>
<tr>
<th>Feature</th>
<th>Weight</th>
<th>Occurrences</th>
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<tbody>
<tr>
<td>RIP</td>
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<td>129</td>
</tr>
<tr>
<td>Free</td>
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<td>16</td>
</tr>
<tr>
<td>Damn</td>
<td>1.02</td>
<td>35</td>
</tr>
<tr>
<td>🙏</td>
<td>0.93</td>
<td>84</td>
</tr>
<tr>
<td>R.I.P.</td>
<td>0.93</td>
<td>18</td>
</tr>
</tbody>
</table>

Rip Boss Trell
11:34 AM - 10 Apr 2014
16 Retweets 8 Likes

Da Copz tried to take our whole organization Dwn 💯 Free My Gang STLEBT
11:20 AM - 28 Feb 2014
3 Retweets
Future Potential

TWITTER COULD IMPEDE GRIEF PROCESS

SOCIAL MEDIA AS POTENTIAL CHANNEL OF SUPPORT

PAIRING QUALITATIVE AND COMPUTATIONAL APPROACHES FOR INTERVENTION AND PREVENTION WORK
QUESTIONS?

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AI and Mental Health: Building Equity through Co-Design

Theresa Nguyen, LCSW
Mental Health America
MHA Screening ([www.mhascreening.org](http://www.mhascreening.org)): Over 9.8 Million Completed Screens

- Depression (PHQ-9)
- Anxiety (GAD-7)
- Bipolar (MDQ)
- PTSD (PC-PTSD)
- Youth Screen (PSC-YR)
- Parent Screen (PSC)
- Alcohol and Substance Use Screen (CAGE-AID)
- Psychosis Screen (Ultra-High Risk) (PQ-B)
- Eating Disorders
- Postpartum Depression (EPDS)

MHA Screening reflects the experiences of a help-seeking population that accesses mental health screening through [www.mhascreening.org](http://www.mhascreening.org). We do not reach the entire population; therefore our numbers are likely to underreport the actual experiences of the population.
Overview of MHA Screening Demographics

- 9 million screeners since 2014;
  - Represent a help-seeking population for mental health conditions;
  - Help seeking increased dramatically in 2020
  - Expected reach in 2021: 4.5 Million
- 73% are female;
- Screeners screen more often for depression than any other condition;
- 47% identify as a racial/ethnic minority;
- 8% are international.
- In 2020, MHA results are consistent with the 2020 US Census Bureau Pulse Survey and CDC findings.
High Severity, No Previous Support

Percent Scoring Moderate Severe for all Conditions
- 77%
- 23%
  - Moderate to Severe
  - None to Mild

Have you ever received treatment or support for a mental health problem?
- 36%
- 64%
  - Yes
  - No
What do People Want

• Information about mental health
• Use at home - worksheets or coping skills to
• Online or mobile program that can help you track or manage your symptoms
• Referrals to those that can help
• Phone number for immediate support

Need for Co-Designed Technology

Specific to Early Intervention

<table>
<thead>
<tr>
<th>Service</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Information and Education</td>
<td>48.55%</td>
</tr>
<tr>
<td>DIY: Self-Help Tools</td>
<td>46.16%</td>
</tr>
<tr>
<td>Referrals to Care and Services</td>
<td>45.25%</td>
</tr>
<tr>
<td>Engagement with People Like Me (Peers)</td>
<td>18.80%</td>
</tr>
<tr>
<td>Phone number for immediate support</td>
<td>13.74%</td>
</tr>
</tbody>
</table>
What Youth are Saying

“I feel so disconnected and confused and alone”

“Feeling so lost and alone”

“Never had enough help to know”

“Feeling like no one else is feeling what I’m feeling, or feeling like no one is there for me”

“…wondering what is wrong with me because no one else seems to feel this way”

“I know people who I fear risk suicide but I don’t know how to help”

“Not knowing how to get help”

“I don’t know what’s happening to me but I need help. I’m not okay.”
Problem: Our Mental Healthcare System is Broken

Mental Health Problems are common: 20% of Americans each year have a diagnosable mental health condition

Treatment is hard to access
- 24% receive adequate care; 29% receive inadequate care;
- 55% receive no care

Burden is not equally distributed
- Racial, ethnic, gender minorities receive treatment less than half as often as Whites.
- Young people less likely to want or receive treatment
- 120M people in Federally Designated Mental Health Treatment Shortage Areas.
Building Equitable AI Solutions

1) Are we inclusive and representative?
2) Are we responsive to needs?
3) Are we making sustainable and systemic change?
4) Are we harming communities?

Responsible AI to Support Mental Health in Black Communities:
https://aka.ms/MHReport2021

Video from the meeting:
https://aka.ms/MHWSVideos2021

AI for Accessibility Projects:
https://aka.ms/ai4a
Co-Designing Research

- Patient Participatory Research
- Community Participatory Research
- People are involved from the beginning
  - The idea development, the design of the research, the design of the product, findings, iterations, and final product
- Initial data from users, interviews, focus groups, crowdsourced materials.
Our Team

David C. Mohr, PhD, (PI - digital mental health)
Madhu Reddy, PhD (Co-I - HCI)
Rachel Kornfield, PhD (Co-I - design & content development)
Jonah Meyerhoff, PhD (postdoc)

Joseph Jay Williams, PhD (co-PI - CS)
Sam Maldonado (Software Engineer)
Theresa Nguyen, LCSW (Stakeholder)

Our Mission

To create an accessible digital mental health service that is effective, fits easily into the fabric of people’s lives, and is freely available.
Aims

Design and pilot an automated text messaging service to support common mental health problems (depression and anxiety).

Why text messaging:

- Apps have low engagement (top 30 apps have 97% abandonment in first two weeks).
- SMS app is most used app on a phone.
- Fits into fabric of user’s life

Objectives

1. **Design**
   - Understand MHA users
   - Co-design messaging strategy

2. **Develop**
   - Infrastructure for automated messaging and machine learning.

3. **Pilot** 2-week version
   - 50 MHA users
   - 200 MHA users
What We’ve Done: Co-Design Process

- Recruit young adults completing mental health screeners on MHA website
- Represent diversity of MHA user population (gender, race, ethnicity, etc)
- A range of levels of participation depending on interest and comfort
- Entirely remote
- Allow for and encourage interaction with one another

2 online, asynchronous discussion groups with ~30 young adults each, plus individual phone interviews with most participants

Design workshops with a subset of 9 participants (Zoom)

48 participants used a Wizard-of-Oz prototype of a texting intervention for 1-2 weeks, and gave feedback in individual interviews
Learnings: Who is the MHA user?

- Pandemic has been an added stressor
- Want validation that their experiences are common, but without dismissing their seriousness
- Formal help-seeking is not seen as appealing or within reach, largely due to costs and preferences for self-reliance
- Interested in learning new self-management skills, and rehearsing some they know about but that aren’t at the top of mind
- Many have used mental health apps but have not sustained engagement
Learnings: What users want in a digital tool

• Make interactions simple, but allow for engaging more deeply based on time and motivation
• Present the tool as a scaffold for self-help
  • Give users agency to make choices and provide feedback
  • Allow for low-stakes experimentation with diverse content
• Bring in peer perspectives
Design Preview: Automated Messaging Program

- Open source bots to deliver messages via SMS
- Provide diverse content
  - Psychological strategies
  - Interaction types
- Collect user responses and preferences so that the system gives users more of the kind of content they like over time
- Will be available for free through Mental Health America to users who take their mental health assessments
Learnings: High User Engagement

Daily Engagement

Prompts
86% replied at least once/day

Stories
86% replied at least once/day

Writing
79% replied at least once/day

Modular
83% replied at least once/day

1 Week Program (n=31)

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<th>Day 2</th>
<th>Day 3</th>
<th>Day 4</th>
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<td>75%</td>
<td>100%</td>
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</table>

2 Week Program (n=11)

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All users interviewed (n=21) were interested in continuing to use the system, if available for a longer timeframe.
Goal is to fully deploy this service within 12 months

- **Expand content.** Extend the content bank to 8 weeks, and diversify to meet many users’ needs.
- **Build to scale.** Create a robust technical infrastructure.
- **Personalization.** Enroll and test with a minimum of 5,000 users to develop robust reinforcement learning algorithms.
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