

Dan Adler

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EDUCATION

Doctor of Philosophy

2019-Present

Cornell University

Information Science. Thesis Committee: Tanzeem Choudhury, PhD (Advisor and Chair), Deborah Estrin, PhD, Fei Wang, PhD.

2021 National Science Foundation Graduate Research Fellow

2022-23 Digital Life Initiative Doctoral Fellow

Master of Science

2022

Cornell University

Information Science. Awarded at admission to PhD Candidacy.

Bachelor of Science, GPA 3.91/4.00

2016

The Johns Hopkins University

Double Major in Biomedical Engineering (BME) and Applied Mathematics and Statistics (AMS), minor in Computer Science (CS), specializations in computational biology and optimization.

SUMMARY

I envision a world where data is used to improve the delivery of health services for both patients and care systems. Clinical data can be combined with information from connected devices (eg, smartphones, wearables) to help clinicians and their patients collaborate and personalize treatment decisions. Health system administrators, payers, and policymakers can learn from real world data to understand how practice and policy decisions affect patient care. AI can assist to summarize multimodal healthcare data and extract insights.

My PhD work has specifically focused on how connected devices can be used to improve clinical decision making in behavioral healthcare. I have built AI tools to detect symptom changes in patients living with schizophrenia and individuals at high risk of depression . I have also spoken with clinicians to understand the use of these tools in both clinical and more general populations. My current work focuses on how we can learn from data collected from patients during and outside of clinical encounters to improve accountability and clinical practice in behavioral healthcare.

Quantitative skills: programming (Python, R, Java, C++, Matlab), excel, data visualization, machine learning (model training, feature engineering, validation, auditing), statistical methods

Qualitative skills: user-centered design, prototyping, speculative design, semi-structured interviewing, qualitative coding, thematic analysis

ONGOING RESEARCH

Connecting Quality Monitoring to Measurement-based Mental Healthcare

In collaboration with Deborah Estrin, PhD, Tanzeem Choudhury, PhD (Cornell Tech), Anna Van Meter, PhD (NYU), and Julia Tartaglia, MD (Northwell Health)

Measurement-based care is an evidence-based practice in which clinicians routinely record outcome measures during clinical encounters and use these measures to inform treatment. In addition, measurement-based care enables administrators and accreditation boards to monitor the quality of care patients receive, which is necessary for future payment arrangements where reimbursement is tied to the value of care. In this study, we are conducting interviews and co-design sessions with mental health clinicians to understand how they would design programs that tie measurement-based care to quality monitoring. The outcomes of this research will reveal novel insights into how mental health clinicians would design and participate in future value-based care arrangements to increase effectiveness and uptake.

Designing AI-Mediated Mental Health Digital Markers for Clinical Settings

In collaboration with Tanzeem Choudhury, PhD, Deborah Estrin, PhD (Cornell Tech), Fei Wang, PhD (Weill Cornell Medicine), and David Mohr, PhD (Northwestern University)

Over the past decade, researchers have identified novel associations between digital markers, derived using behavioral and physiological data from connected devices (eg, smartphones, wearables), and mental health symptoms. AI can mediate this process to identify these novel associations. In this work, we aim to understand the readiness of using AI-mediated digital markers for clinical mental healthcare using both quantitative and qualitative methods. From a quantitative perspective, we are developing and auditing existing AI tools used for digital marker derivation to measure their reliability and validity. Qualitatively, we are speaking with mental health clinicians to understand how digital markers can be used to improve patient care.

SELECTED PUBLICATIONS

1. **Daniel A. Adler**, Caitlin A. Stamatis, Jonah Meyerhoff, David C. Mohr, Fei Wang, Gabriel J. Aranovich, Srijan Sen, and Tanzeem Choudhury. Measuring algorithmic bias to analyze the reliability of AI tools that predict depression risk using smartphone sensed-behavioral data. Accepted for publication in npj Mental Health Research. Accepted version: <https://dadler.co/wp-content/uploads/2024/02/Reliability-Paper-Accepted-Version.pdf>
2. Angel Hwang, **Daniel A. Adler**, Meir Friedenber, and Qian Yang. Societal-Scale Human-AI Interaction Design? Investigating How Hospitals and Companies Integrate Pervasive Sensing into Mental Healthcare Ecosystems. Accepted to the 2024 ACM Conference on Computer-Human Interaction (CHI).
3. Neha Manjunath*, Ze Yuan Li*, Eunsol Soul Choi*, Srijan Sen, Fei Wang, and **Daniel A. Adler**. Can Data Augmentation Improve Daily Mood Prediction from Wearable Data? An Empirical Study. Adjunct Proceedings of the 2023 ACM International Joint Conference on Pervasive and Ubiquitous Computing & the 2023 ACM International Symposium on Wearable Computing. <https://doi.org/10.1145/3594739.3612876>

* Indicates equal contribution.

4. Jodie Nghiem*, **Daniel A. Adler***, Deborah Estrin, Cecilia Livesey, and Tanzeem Choudhury. 2023. Understanding Mental Health Clinicians' Perceptions and Concerns Regarding Using Passive Patient-generated Health Data for Clinical Decision Making: a Qualitative, Semi-structured Interview Study. JMIR Formative Research 7, 1: e47380. <https://formative.jmir.org/2023/1/e47380>
* Indicates equal contribution.
5. **Daniel A. Adler***, Emily Tseng*, Khatiya C. Moon, John Q. Young, John M. Kane, Emanuel Moss, David C. Mohr, and Tanzeem Choudhury. 2022. Burnout and the Quantified Workplace: Tensions around Personal Sensing Interventions for Stress in Resident Physicians. Proc ACM Hum-Comput Interact. 6, CSCW2: 430:1-430:48. <https://dl.acm.org/doi/10.1145/3555531>
* Indicates equal contribution.
6. **Daniel A. Adler**, Fei Wang, David C. Mohr, and Tanzeem Choudhury. 2022. Machine learning for passive mental health symptom prediction: Generalization across different longitudinal mobile sensing studies. PLOS ONE 17, 4: e0266516. <https://doi.org/10.1371/journal.pone.0266516>
7. Lisa Militello, Michael Sobolev, Fabian Okeke, **Daniel A. Adler**, and Inbal Nahum-Shani. 2022. Digital Prompts to Increase Engagement With the Headspace App and for Stress Regulation Among Parents: Feasibility Study. JMIR Formative Research 6, 3: e30606. <https://doi.org/10.2196/30606>
8. **Daniel A. Adler**, Fei Wang, David C. Mohr, Deborah Estrin, Cecilia Livesey, and Tanzeem Choudhury. 2022. A call for open data to develop mental health digital biomarkers. BJPsych Open 8, 2. <https://doi.org/10.1192/bjo.2022.28>
9. **Daniel A. Adler**, Vincent W.-S. Tseng, Gengmo Qi, Joseph Scarpa, Srijan Sen, and Tanzeem Choudhury. 2021. Identifying Mobile Sensing Indicators of Stress-Resilience. Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies 5, 2: 51:1-51:32. <https://doi.org/10.1145/3463528>
10. **Daniel A Adler**, Dror Ben-Zeev, Vincent W-S Tseng, et al. 2020. Predicting Early Warning Signs of Psychotic Relapse From Passive Sensing Data: An Approach Using Encoder-Decoder Neural Networks. JMIR mHealth and uHealth 8, 8: e19962. <https://doi.org/10.2196/19962>

INVITED TALKS AND PRESENTATIONS

Beyond Symptom Prediction: New Opportunities for AI in Mental Healthcare. To be presented at the Mila Health AI Reading Group. 12 February 2024. Virtual.

Personal sensing in mental healthcare: towards responsible development and implementation. Presented at the Center for Behavioral Intervention Technologies (CBITs) Digital Mental Health Seminar. 2 May 2023. Virtual.

Machine learning and mental health digital biomarkers: Towards reliable development and ethical implementation. Presented at Cornell Tech's Machine Learning in Health Class. 18 April 2023. Oral.

Mental Health Digital Biomarkers: Moving from Research to Implementation. Presented at the AI and Defence: Readiness, Resilience and Mental Health Workshop, a part of the UK's Defence Science and Technology Laboratory's (Dstl) AI Fest 5. Virtual. 31 March 2023. Oral.

Mental Health Digital Biomarkers: Moving from Research to Practice. Presented at the Cornell Tech Digital Life Initiative (DLI) Seminar. New York, NY. 9 March 2023. Oral.

Exploring tensions towards implementing digital measurements of mental health and well-being. Presented at the Behavioral Health Next Summit. New York, NY. 6-7 March 2023. Oral.

Burnout and the Quantified Workplace: Tensions around Personal Sensing Interventions for Stress in Resident Physicians. Presented at the ACM Computer Supported Cooperative Work (CSCW) Conference. Virtual. 8-22 November 2022. Pre-recorded video.

Are mental health digital biomarkers reliable? Poster presented at the Nature Medicine in a Virtual Age Conference. Virtual. 5-6 October 2022. Poster.

Identifying Mobile Sensing Indicators of Stress-Resilience. Presented at the ACM Ubicomp Conference. Atlanta, GA. 14 September 2022. Oral.

Are mental health digital biomarkers reliable? Invited talk with the Data Science for Mental health special interest group (DS4MH) at The Alan Turing Institute. Virtual. 21 July 2022. Oral.

Machine learning for passive mental health symptom prediction: Generalization across different longitudinal mobile sensing studies. Poster presented at Cornell's Machine Learning in Medicine Symposium. New York, NY. 6 June 2022. Poster. **Third place "Best Poster" Award.**

Mobile Sensing Data, Machine Learning, and Mental Health. Invited guest lecture at Cornell Tech's Machine Learning and Health Class. New York, NY. 2 February 2022. Oral.

Identifying Mobile Sensing Indicators of Stress-Resilience. Invited guest lecture at Cornell Tech's AI in Health Class. New York, NY. 21 November 2021. Oral.

Developing Generative Adversarial Networks to Predict Individual-Level Mental Health Symptoms. Presented at the Cornell Artificial Intelligence Seminar. New York, NY. 25 September 2020. Oral.

Predicting Indicators of Resilience Using Wearables and Smartphones. Presented at the Cornell Information Science Seminar. New York, NY. 15 September 2020. Oral.

A System for Predicting Relapse in Schizophrenia Spectrum Disorders. Presented at the Precision Behavioral Health Virtual Launch at Cornell Tech. Virtual. 14 September 2020. Oral.

HONORS & AWARDS

Cornell InfoSci Department Service Award, AY 2021-2022
Johns Hopkins University Honors, Spring 2016

Biomedical Engineering Departmental Honors, Spring 2016
Applied Mathematics and Statistics Departmental Honors, Spring 2016
Dean's List, Fall 2012 - Spring 2016
Biomedical Engineering Richard J. Johns Award, Spring 2016
Applied Mathematics and Statistics Mathematical Modeling Award, Spring 2015

CONFERENCE AND WORKSHOP ORGANIZING EXPERIENCE

UbiComp 2023 Co-Leader. Mental Health Workshop.
ICMI 2023 Program Committee.
UbiComp 2022 Co-Organizer. Mental Health Workshop.
KDD 2022 Program Committee. KDD Health Day.

TEACHING EXPERIENCE

Cornell Tech INFO 5610 Precision Behavioral Health Lead Instructor, Fall 2023
Cornell Tech INFO 5375 Machine Learning in Health TA, Spring 2022
Cornell Tech Masters Specialization Project Advisor, Spring 2022, Spring 2021, Fall 2021
Cornell Tech INFO 5610 Precision Behavioral Health TA, Fall 2020
Cornell Tech CS 5304 Data Science in the Wild TA, Spring 2020
Coder Academy Australia Post Tech Academy, Machine Learning Developer and Teacher, 2019
PwC R Bootcamp Developer and Teacher, Spring 2017, Python Bootcamp, Fall 2017, Spring 2018
TEALS, Microsoft Philanthropies Computer Science Teacher, Fall 2017, Spring 2018
Johns Hopkins BME 580.222 Signals, Systems and Controls TA, Spring 2016
Johns Hopkins AMS 550.111 Statistical Analysis 1 TA, Fall 2015

INDUSTRY AND RESEARCH EXPERIENCE

Graduate Student Researcher 2021-2022
Optum Labs, UnitedHealth Group

- Researched novel programs integrating near-continuous digital data streams (eg, wearable, smartphone data) into collaborative care settings for improved mental health risk stratification and treatment.

Educator & Course Developer 2018-2019
Coder Academy

- Developed and taught a two-year technology innovation boot camp for a large organization within Australia
- Created and taught data science courses and workshops to upskill adults on industry-relevant problems

Associate, Advisory Analytics
PricewaterhouseCoopers

2016-2018

- Drove large investments into community health by working with provider systems to analyze their patient populations using public/proprietary datasets, machine learning and simulation
- Worked on the creation of an application in PySpark hosted on a hadoop-environment to perform automated optimization and data mashing using a set of linear programming and k-nearest neighbor based algorithms
- Performed data cleaning and merging for a large pharmaceutical company to better track their product performance
- Investigated the use of an Agent Based Model (ABM) to assess the market potential for a new Pharmacogenomic (PGx) test

SERVICE

PhDs at Cornell Tech (PACT) Hiring Committee Officer, 2022

Big Brothers Big Sisters (BBBS) of NYC Big, 2021-2022

Cornell IS Grad. Student Association Admissions Representative, 2020-2021

Tau Beta Pi Maryland Alpha Chapter President, 2015-2016

Johns Hopkins Clinic Scheduling Team Leader, 2014-2016

THREAD Head of Family, 2015-2016

PROFESSIONAL ORGANIZATIONS

Society for Digital Mental Health, 2022-Present

Association for Computing Machinery, 2021-Present

Tau Beta Pi Engineering Honors Society, 2014-Present

Upsilon Pi Epsilon Honor Society, 2016-Present