Health: Overview

Kana Huang and Sitha Vallabhaneni

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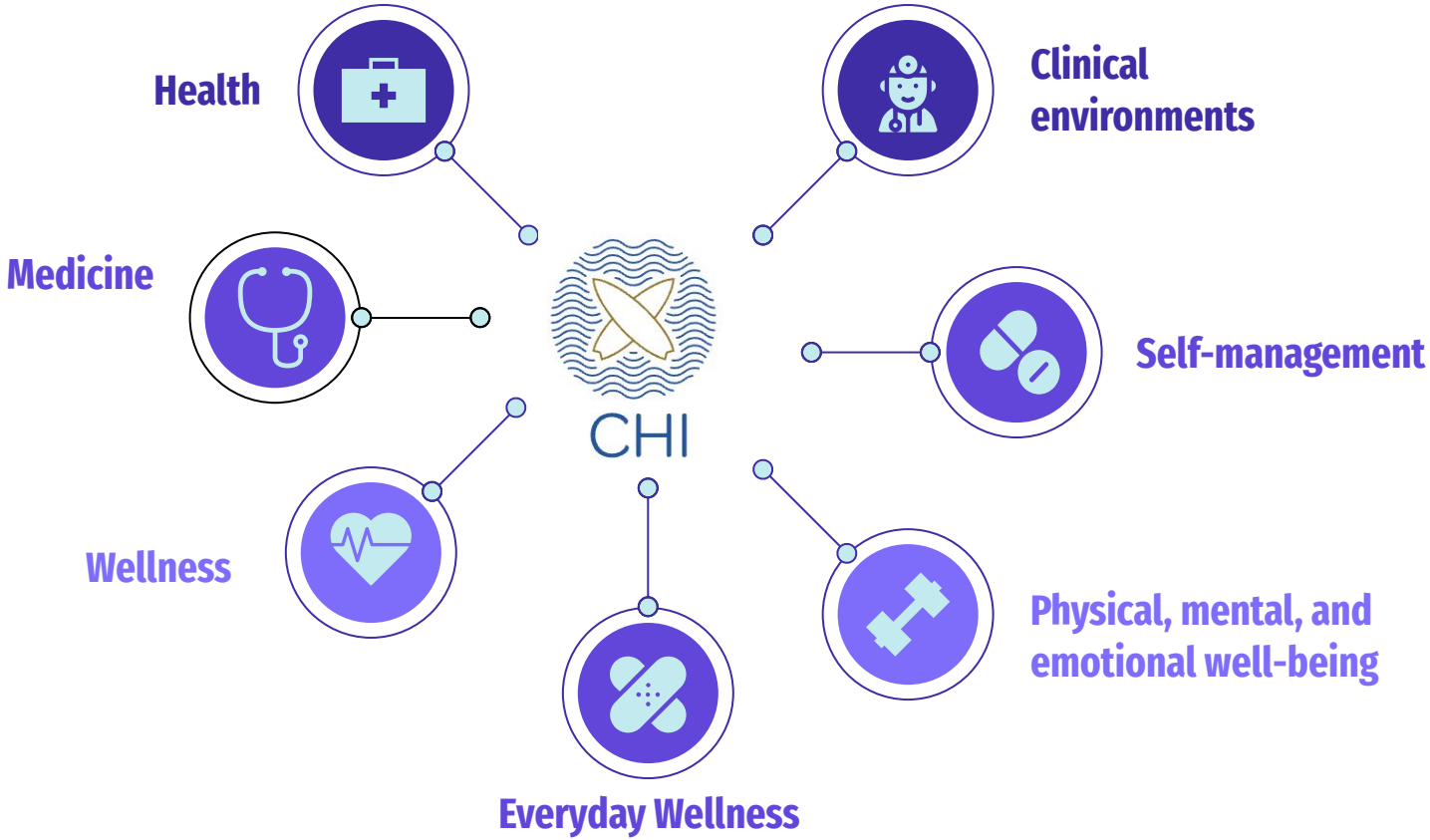
Venues for Health (+ HCI)

Academic conferences that is generally considered the most prestigious in the field of human–computer interaction.

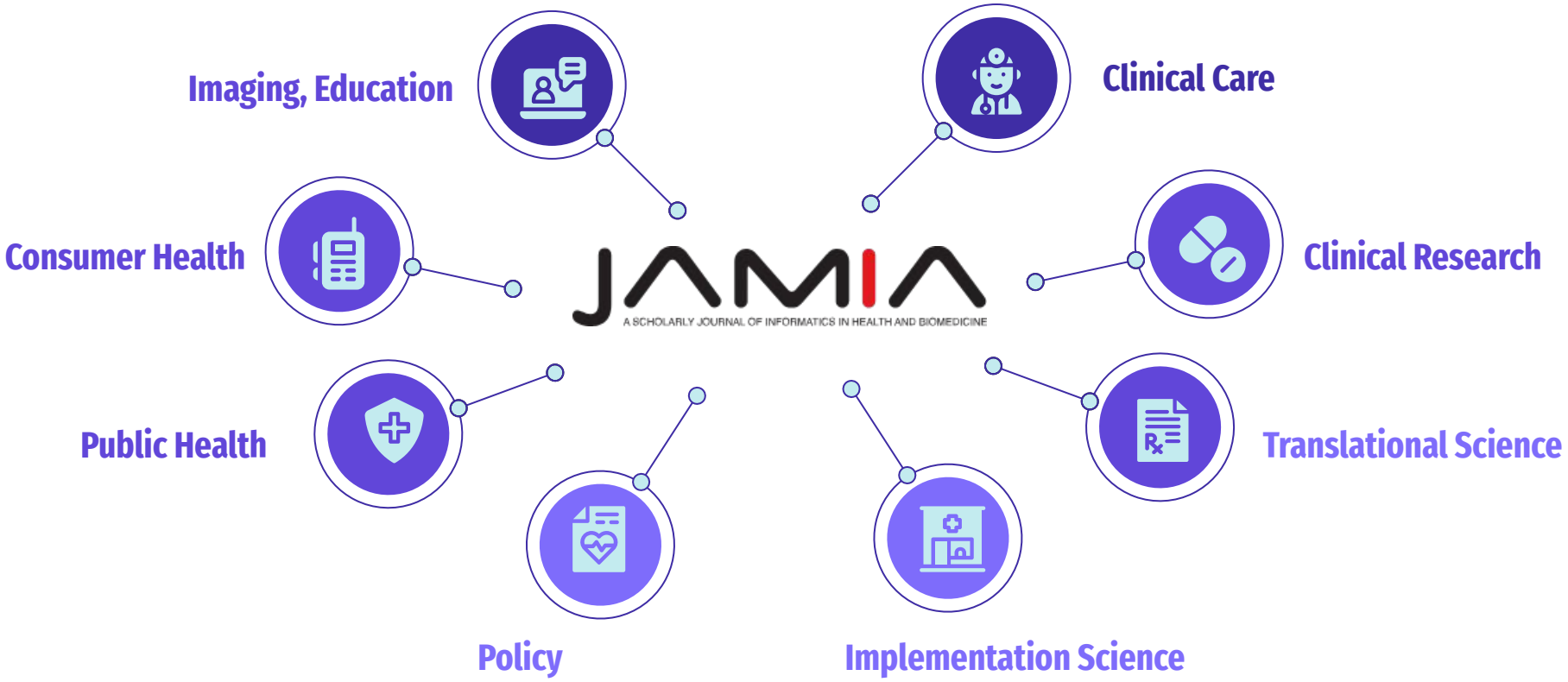
A peer-reviewed scientific journal covering research in the field of medical informatics published by the American Medical Informatics Association.

An American non-profit organization dedicated to the development and application of biomedical and health informatics in the support of patient care, teaching, research, and health care administration.

CHI Health Subcommittee: Core Research Questions/Topics



JAMIA: Core Research Questions/Topics



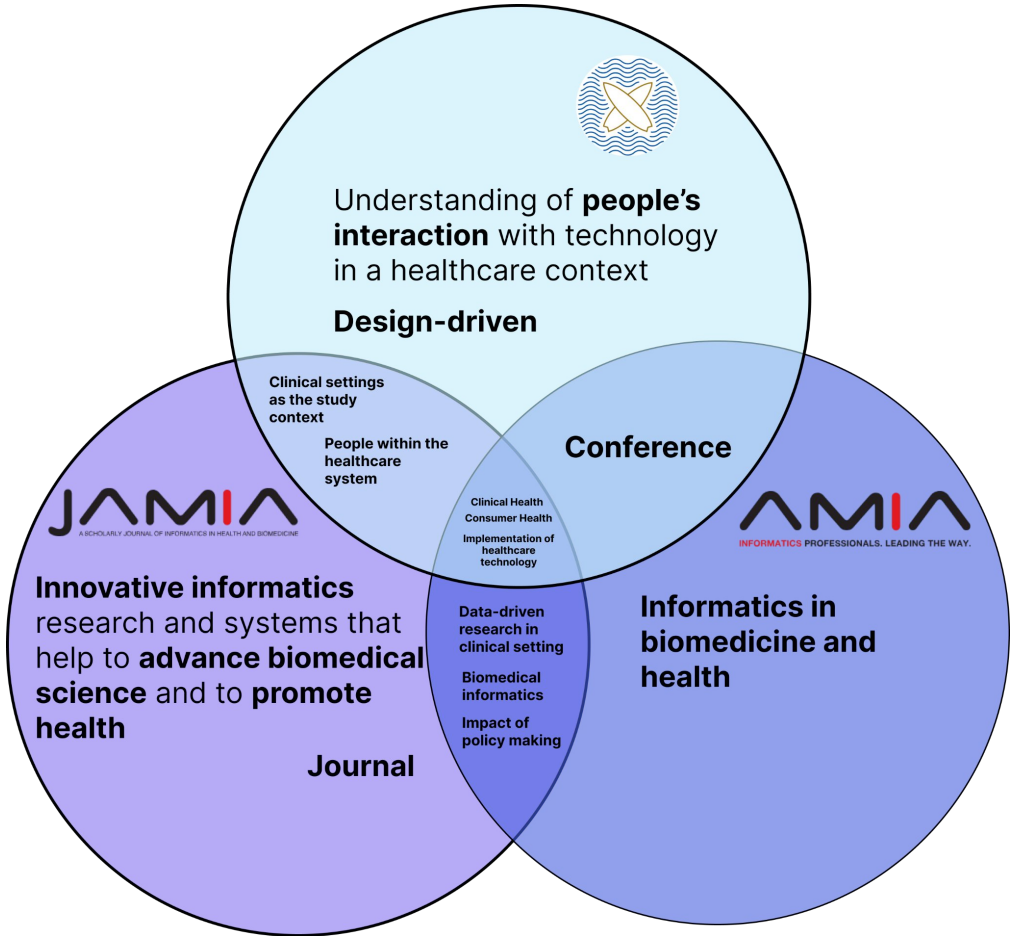
AMIA: Core Research Areas

- Translational Bioinformatics/Precision Medicine
- Clinical Research Informatics
- Data Science/Artificial Intelligence

AMIA: Highlighted Themes

1. Harnessing the Power of Large Language Models in Health Data Science
2. Real-World Evidence in Informatics: Bridging the Gap between Research and Practice
3. Integrating Multi-Modal Health Data to Enhance the Power of Informatics
4. Proactive Machine Learning in Biomedical Applications: The Power of Generative AI and Reinforcement Learning
5. Fairness and Disparity in Health and Biomedical Informatics: Addressing Inequities through Innovation
6. Implementation Science and Deployment in Informatics: From Theory to Practice
7. Telehealth, Wearable Devices, and Patient-Generated Health Data: The New Frontiers of Informatics
8. Citizen Science and Democratizing AI and Informatics for Healthcare

The Venues for Health: Similarities and Differences



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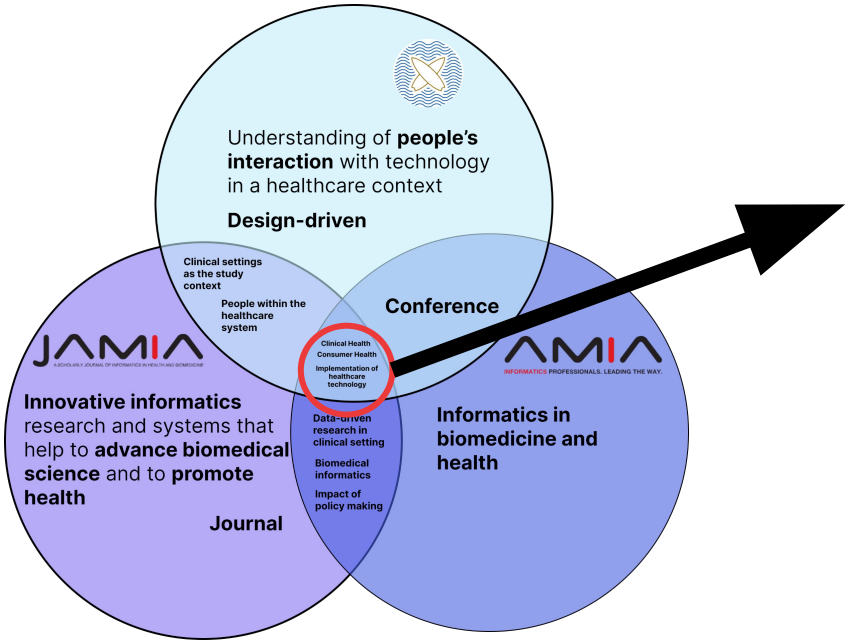
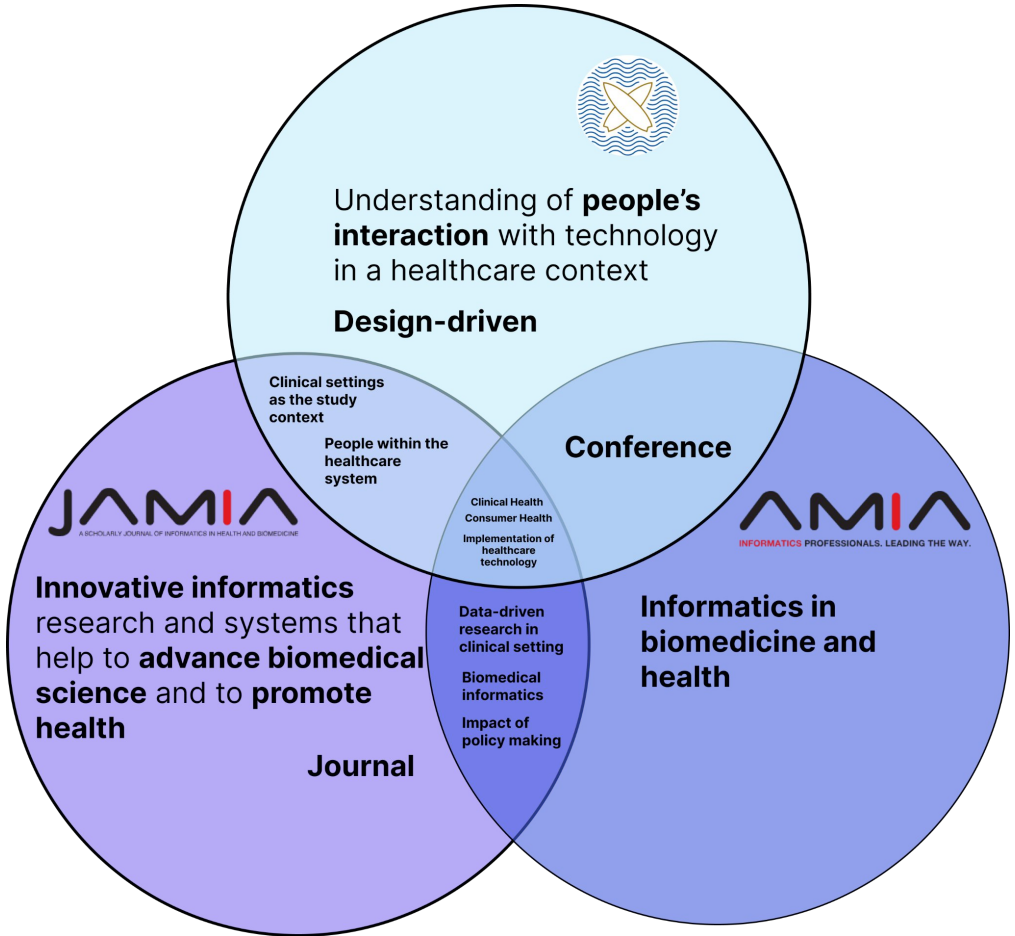


Clinical Health (Health, Medicine, Clinical care, Clinical Research Informatics)

Consumer Health (Health, Medicine, physical, mental, and emotional well-being, self-management, everyday wellness)

Implementation of healthcare technology

The Venues for Health: Similarities and Differences



Activity Time!

A

Identifying opportunities for informatics-supported suicide prevention: the case of Caring Contacts

Hannah A. Burkhardt[1], Megan Laine[1], Amanda Kerbrat[2], Trevor Cohen[1], Katherine A. Comtois[2], Andrea Hartzler[1]
[1]University of Washington, Department of Biomedical Informatics and Medical Education;
[2]University of Washington, Department of Psychiatry and Behavioral Sciences

B

Identification of Imminent Suicide Risk Among Young Adults using Text Messages

Alicia L. Nobles
Dept. of Systems and Information Engineering
University of Virginia
aln2dh@virginia.edu

Jeffrey J. Glenn
Dept. of Psychology
University of Virginia
jjg9ac@virginia.edu

Kamran Kowsari
Dept. of Systems and Information Engineering
University of Virginia
kk7nc@virginia.edu

Bethany A. Teachman
Dept. of Psychology
University of Virginia
bat5x@virginia.edu

Laura E. Barnes
Dept. of Systems and Information Engineering
University of Virginia
lb3dp@virginia.edu

C

"Can I Not Be Suicidal on a Sunday?": Understanding Technology-Mediated Pathways to Mental Health Support

Sachin R. Pendse
Georgia Institute of Technology
Atlanta, GA, USA
sachin.r.pendse@gatech.edu

Amit Sharma
Microsoft Research
Bangalore, India
amshar@microsoft.com

Aditya Vashistha
Cornell University
Ithaca, NY, USA
adityav@cornell.edu

Munmun De Choudhury
Georgia Institute of Technology
Atlanta, GA, USA
munmund@gatech.edu

Neha Kumar
Georgia Institute of Technology
Atlanta, GA, USA
neha.kumar@gatech.edu

D

What health records data are required for accurate prediction of suicidal behavior?

Gregory E Simon,[1] Susan M Shortreed,[1] Eric Johnson,[1] Rebecca C Rossom,[2] Frances L Lynch,[3] Rebecca Ziebell,[1] and Robert B Penfold[1]

[1]Kaiser Permanente Washington Health Research Institute, Seattle, Washington, USA, [2]HealthPartners Institute, Minneapolis, Minnesota, USA, and [3]Center for Health Research, Kaiser Permanente Northwest, Portland, Oregon, USA

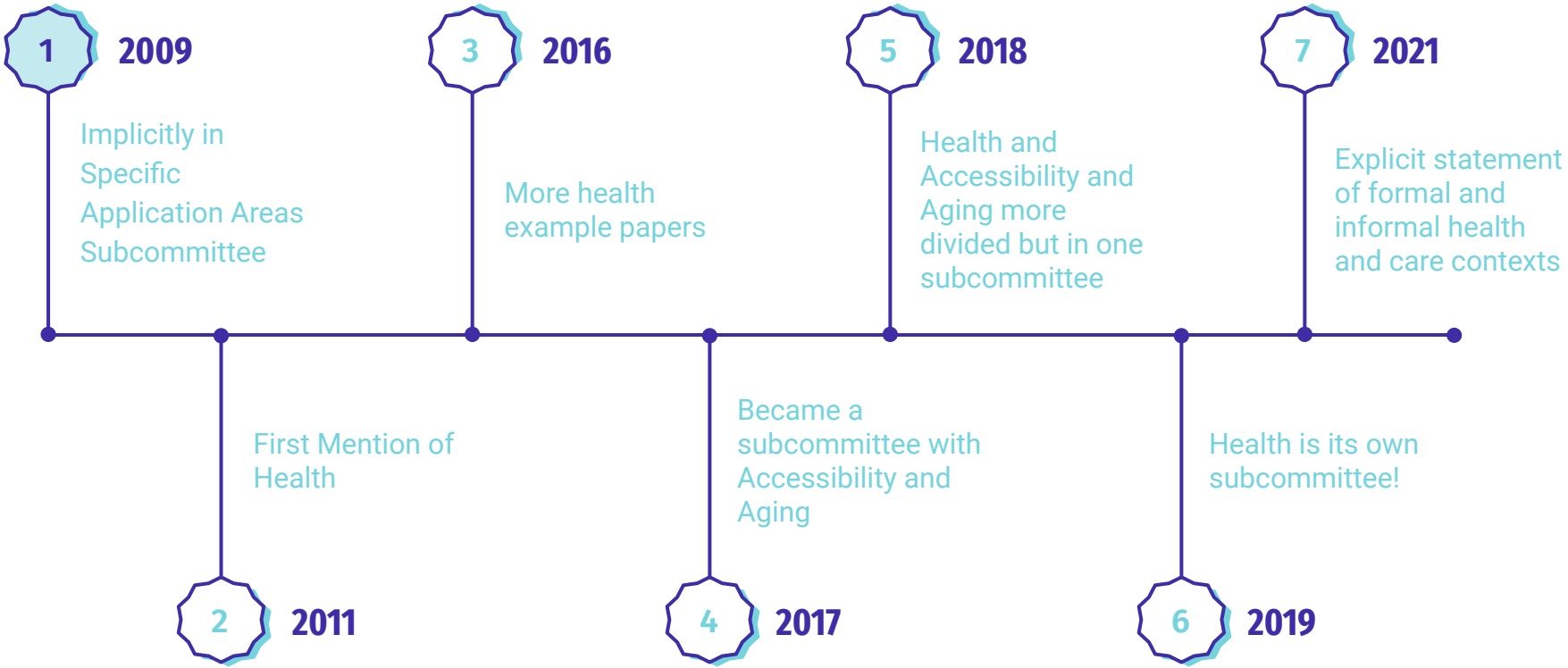
E

An NLP approach to identify SDoH-related circumstance and suicide crisis from death investigation narratives

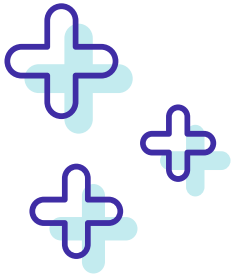
Song Wang [1], Yifang Dang [2], Zhaoyi Sun[3], Ying Ding[4], Jyotishman Pathak[3], Cui Tao[2], Yunyu Xiao[3], and Yifan Peng [3]

[1]Cockrell School of Engineering, The University of Texas at Austin, Austin, Texas, USA, [2]School of Biomedical Informatics, The University of Texas Health Science Center at Houston, Houston, Texas, USA, [3]Population Health Sciences, Weill Cornell Medicine, New York, New York, USA, and [4]School of Information, The University of Texas at Austin, Austin, Texas, USA

History of the CHI Health Subcommittee



2009: Implicitly in the Specification Application Areas Subcommittee



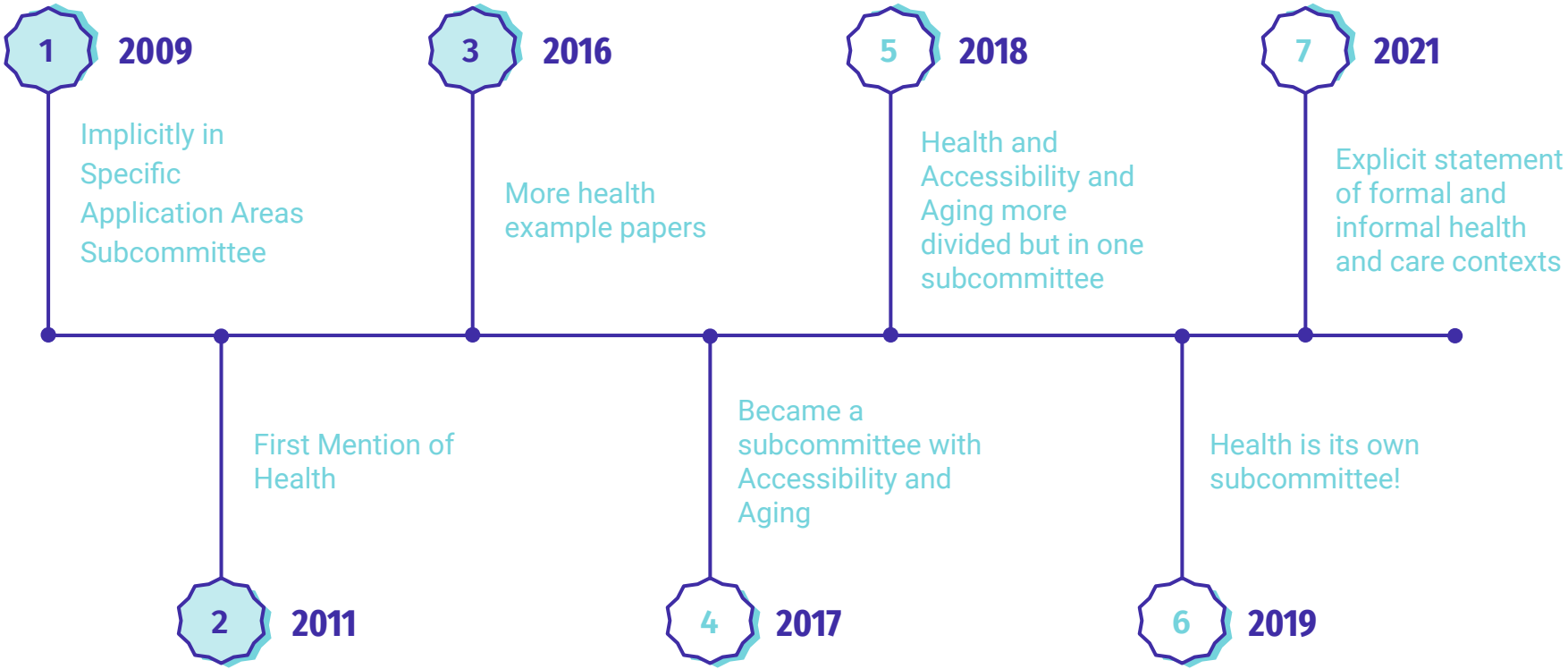
This subcommittee will focus on **papers which make a contribution by extending the design and understanding of applications for specific domains of interest to the HCI community**, or by bringing enhancements to particular user communities of interest. Examples of application areas include but are not limited to: elearning, home, office, elderly, children, ecommerce, sustainability, creativity. These contributions will be judged in part on their impact on the specific application area and/or community they address.

2011: First Mention of Health

This subcommittee will focus on papers which make a contribution by extending the design and understanding of applications for specific user communities or domains of interest to the HCI community. Examples of user communities include but are not limited to: older adults, children, families, disabled users, the underserved in developing countries. Examples of application areas include but are not limited to: education, home, entertainment, office, ecommerce, **health**, sustainability, and creativity. These contributions will be judged in part on their impact on the specific application area and/or community they address.

Example Paper: Mobile-izing health workers in rural India

History of the CHI Health Subcommittee



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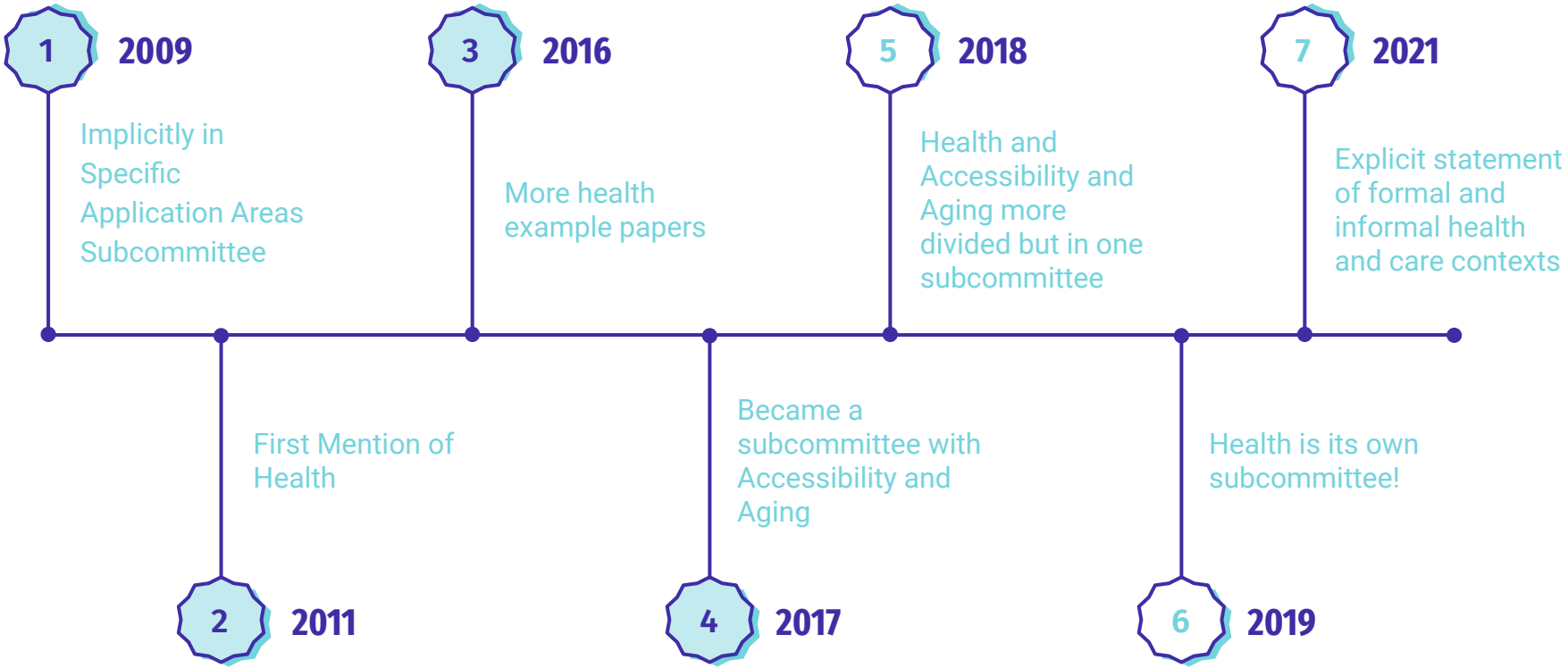
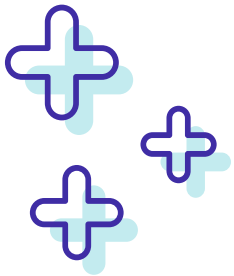


2017: Health, Accessibility and Aging Subcommittee is Formed

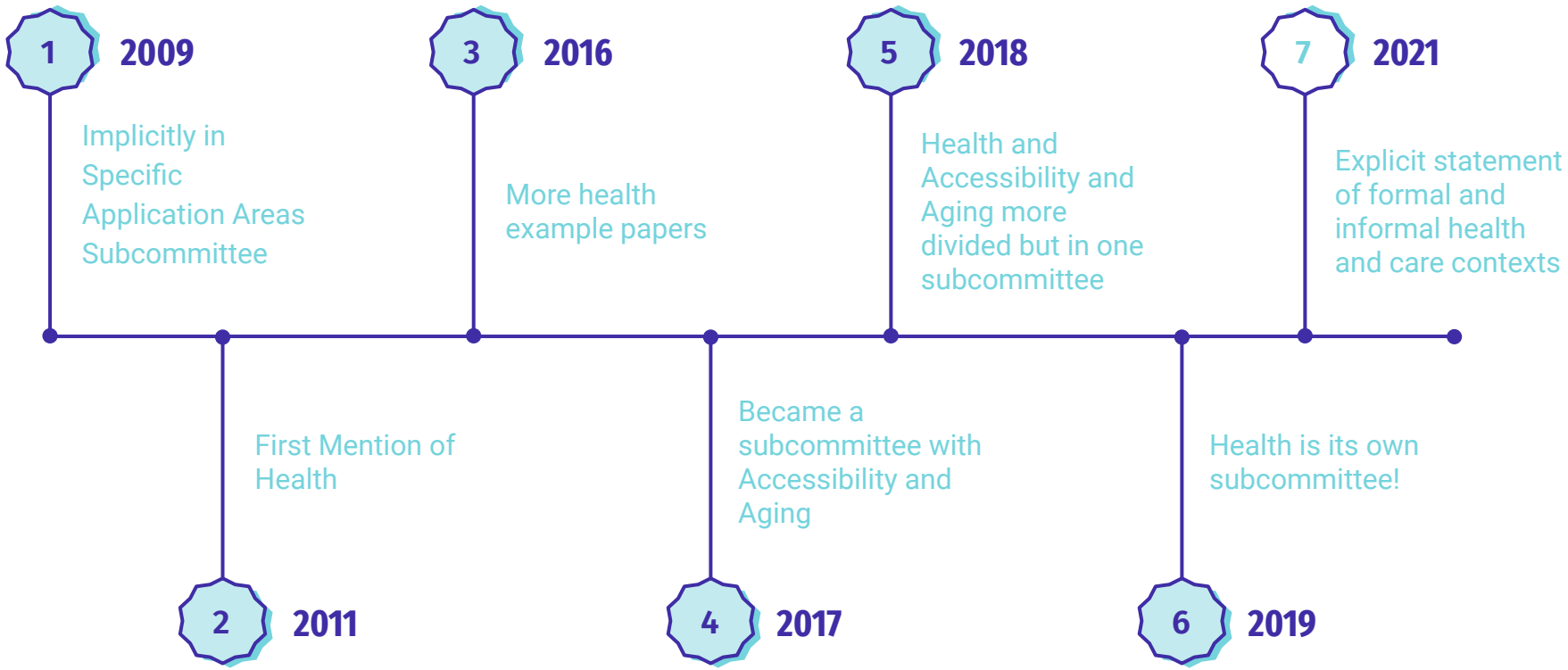


This subcommittee is suitable for **contributions to independent and healthy living over a lifetime.** It combines the areas of (i) accessibility for people with disabilities, (ii) **health, wellness,** and aging; and, (iii) technology for and studies involving older adults. Submissions to this subcommittee will be evaluated in part based on their inclusion of and potential impact on their target user groups and other stakeholders. This subcommittee balances the rigor required in all CHI submissions with awareness of the challenges of conducting research in these important areas. This subcommittee welcomes all contributions related to accessibility, **health**, and aging, including empirical, theoretical, conceptual, methodological, design, and systems contributions.

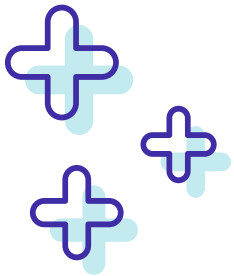
2018: Health, Accessibility and Aging Subcommittee is More Divided

The "health" component of this subcommittee is suitable for contributions related to health, wellness, and medicine, including physical, mental, and emotional well-being, clinical environments, self-management, and everyday wellness. The "accessibility and aging" subcommittee is suitable for contributions related to accessibility for people with disabilities and/or technology for and studies involving older adults (i.e., senior citizens). Accessibility papers are those that deal with technology design for or use by people with disabilities including sensory, motor, and cognitive impairments. **We have indicated below which ACs will handle the "health" papers** and which will handle "accessibility and aging"; please add the keyword "health," "accessibility," or "older adults" as appropriate to your submission in PCS so that we can be sure to direct your submission to the appropriate subset of this committee. **Note that if your paper primarily concerns interactions of older adults with their healthcare providers, then the *Health* keyword is probably a better fit,** whereas papers reflecting on how older adults use technologies and/or designing interfaces and interactions suited to the needs of older adults are better suited for the accessibility and aging component of this committee. We strongly suggest that authors review this Accessible Writing Guide in order to adopt a writing style that refers to stakeholder groups using appropriate terminology. Submissions to this subcommittee will be evaluated in part based on their inclusion of and potential impact on their target user groups and other stakeholders. This subcommittee balances the rigor required in all CHI submissions with awareness of the challenges of conducting research in these important areas. This subcommittee welcomes all contributions related to health, accessibility, and aging, including empirical, theoretical, conceptual, methodological, design, and systems contributions.

History of the CHI Health Subcommittee



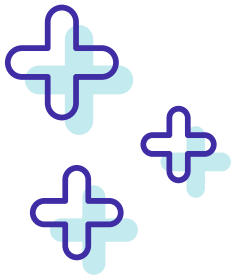
2019: Health is its Own Committee!



This subcommittee is suitable for contributions related to health, wellness, and medicine, including physical, mental, and emotional well-being, clinical environments, self-management, and everyday wellness. This subcommittee balances the rigor required in all CHI submissions with awareness of the challenges of conducting research in these challenging contexts. This subcommittee welcomes all contributions related to health, including empirical, theoretical, conceptual, methodological, design, and systems contributions. Papers are also welcome that describe studies that are impactful to their communities.

(Taken from CHI 2020)

2021: Explicit Statement of Formal and Informal Health and Care Contexts



This subcommittee is suitable for contributions related to health, wellness, and medicine, including physical, mental, and emotional well-being, clinical environments, self-management, and everyday wellness. Accepted papers will balance the rigor required in all CHI submissions with awareness of the challenges of conducting research in these challenging contexts. **The research problem can be grounded in both formal and informal health and care contexts.** Submissions to this subcommittee will be evaluated in part based on their inclusion of and potential impact on their stakeholders. We welcome papers that are empirical, theoretical, conceptual, methodological, design, and systems contributions. Papers must have a clear and novel contribution to HCI in terms of our understanding of people's interaction with technology in a healthcare context, or the design of health and wellness technologies. For example, systematic reviews or usability studies associated with clinical trials must also have contributions for the HCI community.

Framing Papers: Core Sub-Topics

- Behavior Change
- Mental Health
- Self-Tracking
- Collaborative Healthcare Work
- Artifacts & Systems
- Hospital Spaces & Operations
- Moving Care into the Home
- Telemedicine

Framing Papers: Methodological Approaches to Doing Research

"In healthcare literature over recent years, the need for a qualitative component to healthcare technology evaluations is becoming more recognised." (Sanchez et al.)

Interviews (semi-structured or unstructured)

Surveys

Ethnography/ Observations

Lab-Based Studies

Participatory Design
Design Workshops

Outcomes:

- Design Implications
- Organizational/ Conceptual Implications

THANK YOU!

Health: Discussion

Kana Huang and Sitha Vallabhaneni

Selected Papers for Today's Class

- Investigating the Role of Context in the Delivery of Text Messages for Supporting Psychological Wellbeing
- "You Can See the Connections": Facilitating Visualization of Care Priorities in People Living with Multiple Chronic Health Conditions

Investigating the Role of Context in the Delivery of Text Messages for Supporting Psychological Wellbeing

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Ananya Bhattacharjee
ananya@cs.toronto.edu
Computer Science, University of Toronto
Canada

Joseph Jay Williams
williams@cs.toronto.edu
Computer Science, University of Toronto
Canada

Jonah Meyerhoff
jonah.meyerhoff@northwestern.edu
Preventive Medicine, Northwestern University
USA

Harsh Kumar
harsh@cs.toronto.edu
Computer Science, University of Toronto
Canada

Alex Mariakakis
mariakakis@cs.toronto.edu
Computer Science, University of Toronto
Canada

Rachel Kornfield
rachel.kornfield@northwestern.edu
Preventive Medicine, Northwestern University
USA

ABSTRACT

Without a nuanced understanding of users' perspectives and contexts, text messaging tools for supporting psychological wellbeing risk delivering interventions that are mismatched to users' dynamic needs. We investigated the contextual factors that influence young adults' day-to-day experiences when interacting with such tools. Through interviews and focus group discussions with 36 participants, we identified that people's daily schedules and affective states were dominant factors that shape their messaging preferences. We developed two messaging dialogues centered around these factors, which we deployed to 42 participants to test and extend our initial understanding of users' needs. Across both studies, participants provided diverse opinions of how they could be best supported by messages, particularly around when to engage users in more passive versus active ways. They also proposed ways of adjusting message length and content during periods of low mood. Our findings provide design implications and opportunities for context-aware mental health management systems.

CCS CONCEPTS

• **Human-centered computing → Empirical studies in HCI**.

KEYWORDS

text messages, mental wellbeing, contextual factors, JITAI, daily schedule, mood, energy

ACM Reference Format:

Ananya Bhattacharjee, Joseph Jay Williams, Jonah Meyerhoff, Harsh Kumar, Alex Mariakakis, and Rachel Kornfield. 2023. Investigating the Role of Context in the Delivery of Text Messages for Supporting Psychological Wellbeing. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23), April 23–28, 2023, Hamburg, Germany.* ACM, New York, NY, USA, 19 pages. https://doi.org/10.1145/3544548.3580774

CHI '23, April 23–28, 2023, Hamburg, Germany

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https://doi.org/10.1145/3544548.3580774

1 INTRODUCTION

Digital mental health (DMH) tools enable users to access resources and strategies for managing their psychological wellbeing at their own convenience [9, 86]. However, a common concern about these tools is that they often deliver interventions that are mismatched to users' needs at a particular time [31]. This is of particular concern for push-based tools that initiate interactions with the user, such as text messages and notifications. Push-based DMH tools can potentially support users at moments when they may not have the motivation or forethought to proactively engage, yet they risk being perceived as insensitive to the user's current mental state or availability [31, 87]. These issues can cause frustration and eventually contribute to quitting or disengaging from digital interventions altogether [61, 94].

Incorporating information about a user's context has the potential to overcome this fundamental challenge of disengagement with push-based tools, helping DMH systems deliver interventions that will be perceived as timely, appropriate, and relevant [48, 80, 88]. While *context* is a broad term that can have many interpretations [20, 22], HCI researchers generally acknowledge contexts by dividing them into several contextual factors (e.g., location, time of day, activity level). HCI researchers generally integrate context into their work by gathering data about dynamic situational factors and using them to inform the delivery of an intervention. These dynamic factors may be calculated (e.g., time of day) [6, 75], gathered through sensors and digital traces (e.g., location, movement, social proximity, engagement with the phone) [48, 80], or actively reported through brief assessments (e.g., mood, energy) [27]. For just-in-time adaptive interventions (JITAIs), these contextual factors are incorporated into algorithms and machine learning models that personalize the timing and content of an intervention [35, 87].

Although JITAIs have shown promise for sustaining engagement and motivating health behavior change in more personalized ways, HCI literature has argued that they are still far from accounting for the dynamic changes in people's lives [118, 129]. This may be particularly true in a mental health context, where contextual factors like social interaction and movement can have complex and

- **CHI 2023**
  Best Paper

- **Keywords**
  Text messages, mental wellbeing, contextual factors, JITAI, daily schedule, mood, energy

- **Study Purpose**

- **Contribution Type**

Investigating the Role of Context in the Delivery of Text Messages for Supporting Psychological Wellbeing

Investigating the Role of Context in the Delivery of Text Messages for Supporting Psychological Wellbeing

Ananya Bhattacharjee
ananya@cs.toronto.edu
Computer Science, University of Toronto
Canada

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williams@cs.toronto.edu
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Canada

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jonah.meyerhoff@northwestern.edu
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  Empirical studies in HCI

“You Can See the Connections”: Facilitating Visualization of Care Priorities in People Living with Multiple Chronic Health Conditions

“You Can See the Connections”: Facilitating Visualization of Care Priorities in People Living with Multiple Chronic Health Conditions

Hyeyoung Ryu
hyryu115@uw.edu
University of Washington
Seattle, WA, USA

Andrew B. L. Berry
andrew.berry@northwestern.edu
Northwestern University
Chicago, IL, USA

Catherine Y. Lim
catherine.y.lim@gmail.com
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Andrea L. Hartzler
andreah@uw.edu
University of Washington
Seattle, WA, USA

Tad Hirsch
tad.hirsch@northeastern.edu
Northeastern University
Boston, MA, USA

Juanita I. Trejo
juanita.i.trejo@kp.org
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Zoë A. Bermet
bermetz@uw.edu
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Brandi Crawford-Gallagher
brandi.l.crawford-gallagher@kp.org
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Vi Tran
vitran18@gmail.com
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Dawn Ferguson
dawnmferguson@gmail.com
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

David J. Cronkite
david.j.cronkite@kp.org
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Brooks Tiffany
brooks.t.tiffany@gmail.com
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

John Weeks
john.m.weeks@kp.org
Kaiser Permanente Washington
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Seattle, WA, USA

James D. Ralston
james.d.ralston@kp.org
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

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CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**; **Empirical studies in visualization**; **Empirical studies in interaction design**; • **Applied computing** → **Health informatics**.

KEYWORDS

multiple chronic health conditions, reflection, sensemaking, patient-clinician communication, visualization, patient priorities care, values

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- **CHI 2023**
  Honorable Mention
- **Keywords**
  Multiple chronic health conditions, patient-clinician communication, patient care plan, patient priorities and values, sensemaking, visualization
- **Study Purpose**
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  Understanding the roles of visualization and facilitated conversations by human interventionists trained as social workers in the activities of reflection by the individuals with multiple chronic health conditions (MCC) and sharing with their healthcare providers.
- **Contribution Type**

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- **Contribution Type**

  Empirical

Let’s Start to Break Down This Paper More...

In Groups:

How do both papers argue that its topic is worthy of study?

Investigating the Role of Context in the Delivery of Text Messages for Supporting Psychological Wellbeing

Investigating the Role of Context in the Delivery of Text Messages for Supporting Psychological Wellbeing

Ananya Bhattacharjee
ananya@cs.toronto.edu
Computer Science, University of Toronto
Canada

Joseph Jay Williams
williams@cs.toronto.edu
Computer Science, University of Toronto
Canada

Jonah Meyerhoff
jonah.meyerhoff@northwestern.edu
Preventive Medicine, Northwestern University
USA

Harsh Kumar
harsh@cs.toronto.edu
Computer Science, University of Toronto
Canada

Alex Mariakakis
mariakakis@cs.toronto.edu
Computer Science, University of Toronto
Canada

Rachel Kornfield
rachel.kornfield@northwestern.edu
Preventive Medicine, Northwestern University
USA

ABSTRACT

Without a nuanced understanding of users' perspectives and contexts, text messaging tools for supporting psychological wellbeing risk delivering interventions that are mismatched to users' dynamic needs. We investigated the contextual factors that influence young adults' day-to-day experiences when interacting with such tools. Through interviews and focus group discussions with 36 participants, we identified that people's daily schedules and affective states were dominant factors that shape their messaging preferences. We developed two messaging dialogues centered around these factors, which we deployed to 42 participants to test and extend our initial understanding of users' needs. Across both studies, participants provided diverse opinions of how they could be best supported by messages, particularly around when to engage users in more passive versus active ways. They also proposed ways of adjusting message length and content during periods of low mood. Our findings provide design implications and opportunities for context-aware mental health management systems.

CCS CONCEPTS

• **Human-centered computing → Empirical studies in HCI**.

KEYWORDS

text messages, mental wellbeing, contextual factors, JITAI, daily schedule, mood, energy

ACM Reference Format:
Ananya Bhattacharjee, Joseph Jay Williams, Jonah Meyerhoff, Harsh Kumar, Alex Mariakakis, and Rachel Kornfield. 2023. Investigating the Role of Context in the Delivery of Text Messages for Supporting Psychological Wellbeing. In *Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23), April 23–28, 2023, Hamburg, Germany.* ACM, New York, NY, USA, 19 pages. https://doi.org/10.1145/3544548.3580774

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1 INTRODUCTION

Digital mental health (DMH) tools enable users to access resources and strategies for managing their psychological wellbeing at their own convenience [9, 86]. However, a common concern about these tools is that they often deliver interventions that are mismatched to users' needs at a particular time [31]. This is of particular concern for push-based tools that initiate interactions with the user, such as text messages and notifications. Push-based DMH tools can potentially support users at moments when they may not have the motivation or forethought to proactively engage, yet they risk being perceived as insensitive to the user's current mental state or availability [31, 87]. These issues can cause frustration and eventually contribute to quitting or disengaging from digital interventions altogether [61, 94].

Incorporating information about a user's context has the potential to overcome this fundamental challenge of disengagement with push-based tools, helping DMH systems deliver interventions that will be perceived as timely, appropriate, and relevant [48, 80, 88]. While *context* is a broad term that can have many interpretations [20, 22], HCI researchers generally acknowledge contexts by dividing them into several contextual factors (e.g., location, time of day, activity level). HCI researchers generally integrate context into their work by gathering data about dynamic situational factors and using them to inform the delivery of an intervention. These dynamic factors may be calculated (e.g., time of day) [6, 75], gathered through sensors and digital traces (e.g., location, movement, social proximity, engagement with the phone) [48, 80], or actively reported through brief assessments (e.g., mood, energy) [27]. For just-in-time adaptive interventions (JITAIs), these contextual factors are incorporated into algorithms and machine learning models that personalize the timing and content of an intervention [35, 87].

Although JITAIs have shown promise for sustaining engagement and motivating health behavior change in more personalized ways, HCI literature has argued that they are still far from accounting for the dynamic changes in people's lives [118, 129]. This may be particularly true in a mental health context, where contextual factors like social interaction and movement can have complex and

How does the paper argue that its topic is worthy of study?

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williams@cs.toronto.edu
Computer Science, University of Toronto
Canada

Jonah Meyerhoff
jonah.meyerhoff@northwestern.edu
Preventive Medicine, Northwestern University
USA

Harsh Kumar
harsh@cs.toronto.edu
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Canada

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mariakakis@cs.toronto.edu
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Canada

Rachel Kornfield
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- **Common DMH tools often deliver interventions that are mismatched to users' needs at a particular time**
- **JITAIs are still far from address the dynamic changes in people's lives**
- **Designed through a top-down process -> Lack of nuanced understanding of users' perspectives or preferences**
- **Lack of users' input in on how they perceive contexts to shape their need for and receptivity to support as they go about their day-to-day lives**

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- **Articulating importance of the topic:**
  - "The combination of self-care tasks for individuals with MCC can be overwhelming leading individuals with MCC to prioritize certain self-care tasks over others [86]. Much of this daily work and prioritization by patients is not visible to healthcare providers."
  - "However, as patients deal with multiple chronic conditions, the number of collaboratively defined problems rises, resulting in an often-overwhelming set of self-care tasks for patients to manage.
  - "Individuals with chronic conditions felt overwhelmed with the task of collecting, combining, and making sense of the large, varied sets of information (both personal and generic) to understand normality within their condition and personal illness experiences [68]."

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CCS CONCEPTS

• **Human-centered computing** → **Empirical studies in HCI**; **Empirical studies in visualization**; **Empirical studies in interaction design**; • **Applied computing** → **Health informatics**.

KEYWORDS

multiple chronic health conditions, reflection, sensemaking, patient-clinician communication, visualization, patient priorities care, values

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- **Prior Research/Work:**
  - "Recent work has sought to broaden the range of personal values to encompass values that are important to people with MCC but have not been incorporated significantly into clinical contexts [12, 55]."
  - Recent work has argued that promoting reflection is important for individuals with MCC to gain awareness and articulate their values [19, 54].
  - "A notable previous study tested interactive visualization prototypes to investigate how to support individuals with MCC's reflection on these complex relationships [15]. The previous study was a single reflection, done in a research environment with research staff."

How does the paper argue that its topic is worthy of study?

"You Can See the Connections": Facilitating Visualization of Care Priorities in People Living with Multiple Chronic Health Conditions

Hyeyoung Ryu
hyryu115@uw.edu
University of Washington
Seattle, WA, USA

Andrew B. L. Berry
andrew.berry@northwestern.edu
Northwestern University
Chicago, IL, USA

Catherine Y. Lim
catherine.y.lim@gmail.com
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Andrea L. Hartzler
andreah@uw.edu
University of Washington
Seattle, WA, USA

Tad Hirsch
tad.hirsch@northeastern.edu
Northeastern University
Boston, MA, USA

Juanita I. Trejo
juanita.i.trejo@kp.org
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Zoë A. Bermet
bermetz@uw.edu
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Brandi Crawford-Gallagher
brandi.l.crawford-gallagher@kp.org
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Vi Tran
vitran18@gmail.com
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Dawn Ferguson
dawnmferguson@gmail.com
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

David J. Cronkite
david.j.cronkite@kp.org
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

Brooks Tiffany
brooks.t.tiffany@gmail.com
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

John Weeks
john.m.weeks@kp.org
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

James D. Ralston
james.d.ralston@kp.org
Kaiser Permanente Washington
Health Research Institute
Seattle, WA, USA

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Individuals with multiple chronic health conditions (MCC) often face an overwhelming set of self-management work, resulting in a need to set care priorities. Yet, much self-management work is invisible to healthcare providers. This study aimed to understand how to support the development and sharing of connections between personal values and self-management tasks through the facilitated use of an interactive visualization system: Conversation Canvas. We conducted a field study with 13 participants with MCC, 3 caregivers, and 7 primary care providers in Washington State. Analysis of interviews with MCC participants showed that developing visualizations of connections between personal values, self-management tasks, and health conditions helped individuals make sense of connections relevant to their health and wellbeing, recognize a road map of central issues and their impacts, feel respected and understood, share priorities with providers, and support value-aligned changes. These findings demonstrated potential for the guided process and visualization to support priorities-aligned care.

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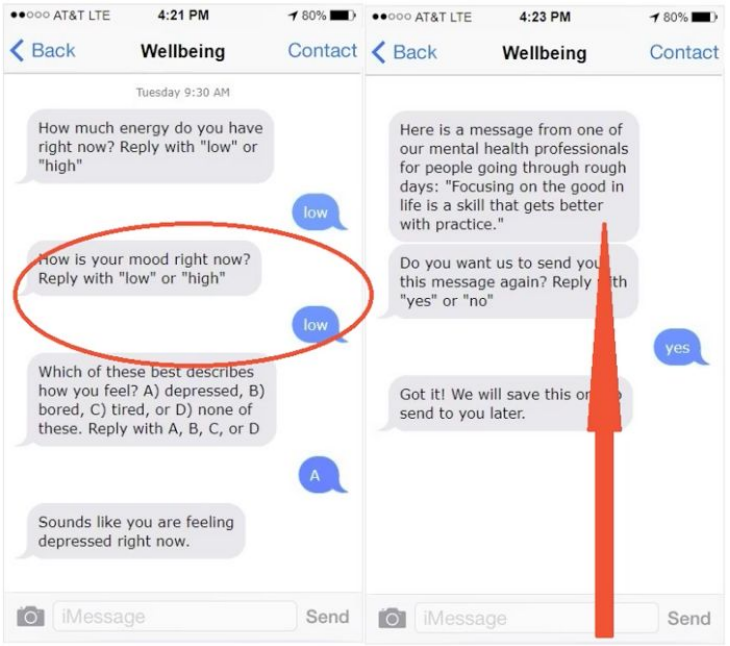
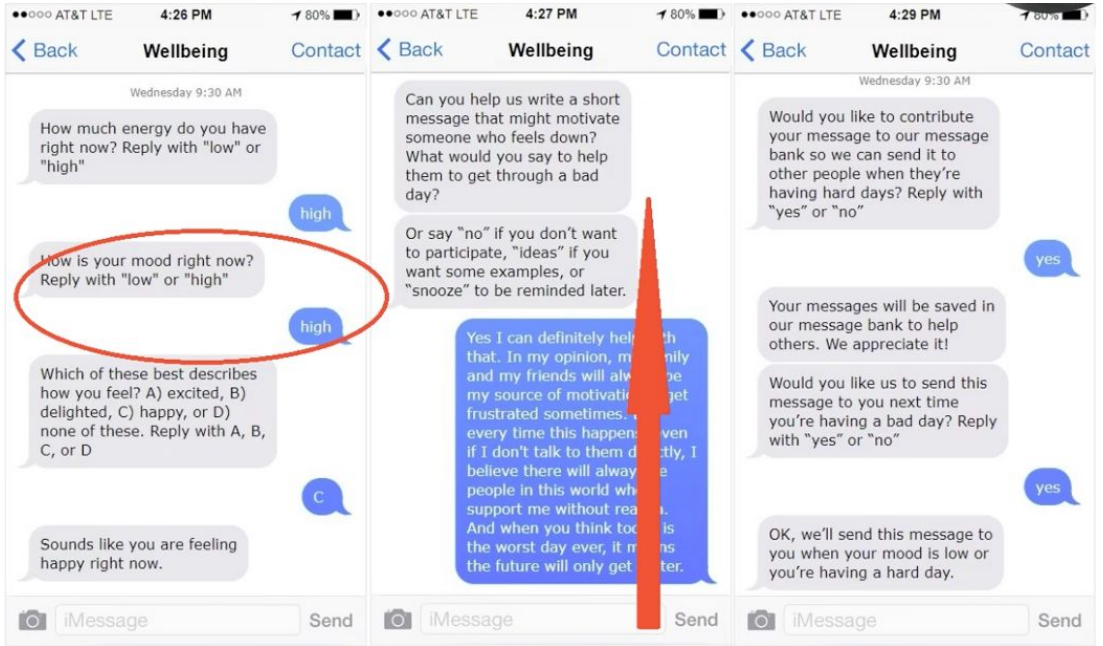
- **Gaps**
  - "However, most healthcare information technologies remain disease-focused rather than supporting awareness of what matters most to patients with MCC [37, 38, 57]."
  - "These tools, though, do not directly address the daily self-management decisions and priorities of individuals with MCC who are weighing the benefits, burdens, and tradeoffs associated with long-term management of several chronic conditions."
  - "There is a need to understand how visualization guided by interventionists may help reflect on and share complex relationships between values, self-care tasks, and health conditions."

Investigating the Role of Context in the Delivery of Text Messages for Supporting Psychological Wellbeing



Passive



Active

What areas of inquiry within HCI and outside of HCI does this paper draw from?

Areas of Inquiry the Paper Draws From

Within HCI:

- Health, Wellbeing
- User Experience
- Interactive Technologies

Outside HCI:

- Psychology, Psychiatry
- Ubiquitous Computing
- Medicine and Health

WHY does this paper draw contributions from these areas?

Within HCI:

- Health, Wellbeing
- User Experience
- Interactive Technologies

Outside HCI:

- Psychology, Psychiatry
- Ubiquitous Computing
- Medicine and Health

How does the paper expand on these areas to make its contribution?

How does the paper expand on these areas to make its contribution?

Identifies the **key contextual variables** that influence users' experiences with a **text messaging system** aimed to promote **psychological wellbeing**

Identifies **specific messaging elements** that should adapt based on those contextual factors

A set of design considerations for building **context-aware DMH tools**

Health, Wellbeing

User Experience

Interactive Technologies

Psychology, Psychiatry

Ubiquitous Computing

Medicine and Health

What are the main takeaways?

Ways of Collecting daily schedule, sleep, and physical activity information should be incorporated into text messaging systems to identify ideal time windows to interrupt users

- Mobile phone sensors
- Digital calendars
- On-demand messaging
- Privacy and security measures

Mood and energy labeling questions should be personalized

- Open-ended questions to identify users' motivation to respond
- Number of questions can adapt based on the motivation level

“You Can See the Connections”: Facilitating Visualization of Care Priorities in People Living with Multiple Chronic Health Condition

What areas of inquiry within HCI and outside of HCI does this paper draw from?

Areas of Inquiry the Paper Draws From

Within HCI:

- Patient Care and Self-Management
- Medicine and Healthcare
- Behavior Change

Outside HCI:

- Health Informatics
- Psychology and Patient Behavior
- CSCW

WHY does this paper draw contributions from these areas?

Within HCI:

Patient Care and Self-Management

Medicine and Healthcare

Behavior Change

Outside HCI:

Health Informatics

Psychology and Patient Behavior

CSCW

How does the paper expand on these areas to make its contribution?

How does the paper expand on these areas to make its contribution?

Used an interactive visualization tool with trained human interventionists to expand the sensemaking and reflection process of **individuals with MCC**, to identify connections between **patient's values**, **self-management tasks** and **health conditions**.

Illustrated how the guided process made individuals with MCC feel more empowered in their care, and **supported priorities-aligned conversations with their providers** in clinical visits toward care plans.

Demonstrated how interactive visualization tool and the **facilitated conversations** respectively and conjointly supported individuals with MCC.

Patient Care and Self-Management

Medicine and Healthcare

Health Informatics

Psychology, Psychiatry

Psychology and Patient Behavior

CSCW

Main Takeaways: Design Implications

Designs that Support

Holistic understanding of multiple care needs and roles in everyday lives

Designs that Support

Iterative behavior change and reflection over time

Designs that Support

Working through important issues one at a time and in order of priority

Success Factors for Deeper Exploration of the Connections

Use of facilitators trained in motivational interviewing

Success Factors for Deeper Exploration of the Connections

Fully functional interactive visualization

Success Factors for Deeper Exploration of the Connections

Two sequential opportunities for facilitated visualization

The Bigger Picture

Framing Papers: Core Sub-Topics

- Behavior Change
- Mental Health
- Self-Tracking
- Collaborative Healthcare Work
- Artifacts & Systems
- Hospital Spaces & Operations
- Moving Care into the Home
- Telemedicine

Framing Papers: Methodological Approaches to Doing Research

"In healthcare literature over recent years, the need for a qualitative component to healthcare technology evaluations is becoming more recognised." (Sanchez et al.)

Interviews (semi-structured or unstructured)

Surveys

Ethnography/ Observations

Lab-Based Studies

Participatory Design
Design Workshops

Outcomes:

- Design Implications
- Organizational/ Conceptual Implications

Takeaways for HCI Health Papers

Health is Complex and Diverse

Health in CHI is Multidisciplinary

Research is Grounded in Formal and Informal Contexts

Overall Goal is to Promote and Support Health and Wellbeing

THANK YOU!