

Self-Management Practices in Low SES Type 2 Diabetes Patients

Jason Dong
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Master's Thesis (March 2021-May 2022)

Students

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Advisor

- Dr. Rosa Arriaga

Project

- Self-Management Practices in Low Socioeconomic Status (SES) Diabetes Patients

Partnership

- Emory & Grady Hospital



Background

Type 2 Diabetes

- About 10% of the US population (>34 million Americans suffer from diabetes)
- Self-management practices (healthy eating, fitness, etc) are critical

Health Literacy in Diabetes Patients

- 43% of US is functionally illiterate
- Lack of inclusiveness in medical resources for general population of T2D patients

Current Diabetes Applications

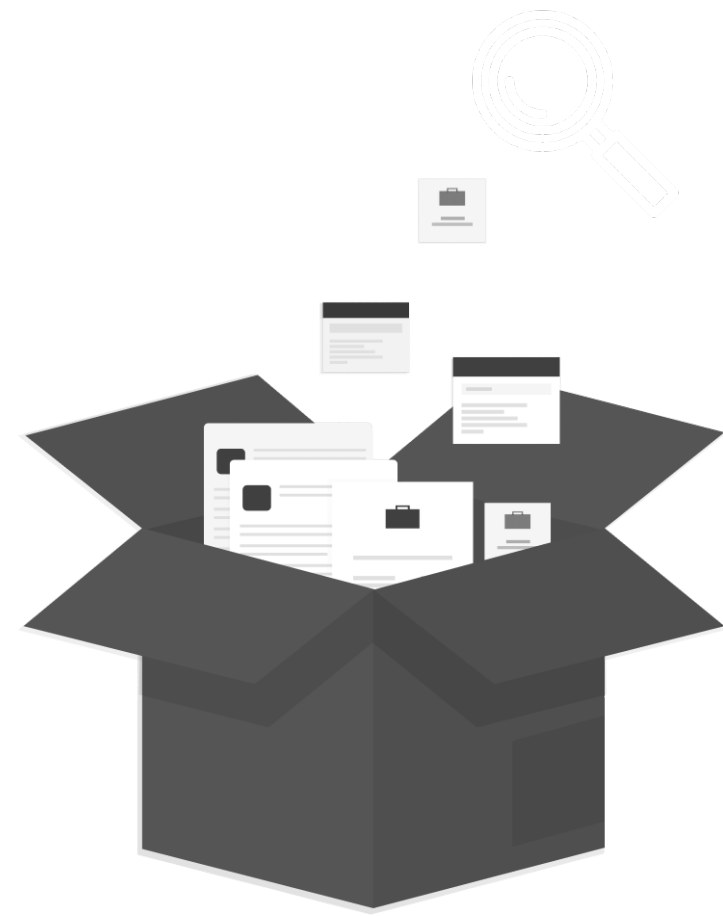
- Most popular diabetes self-management applications require advanced health literacy skills



OUR PROBLEM STATEMENT...

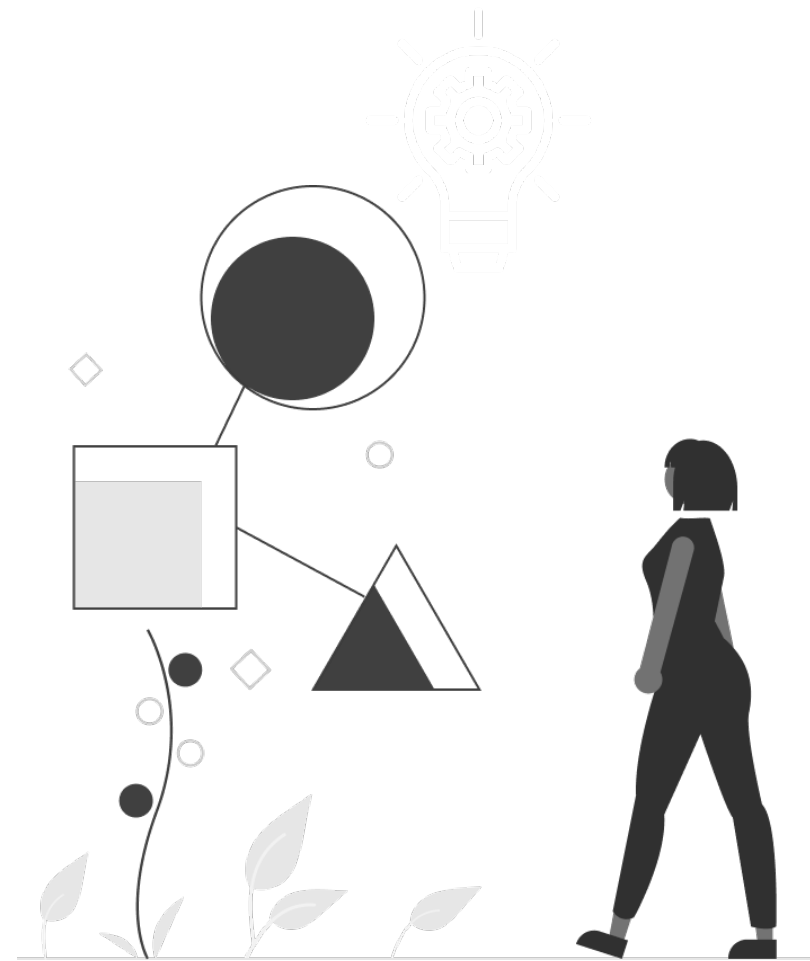
How might we use technology to facilitate self management practices in Type 2 Diabetes patients who come from low socioeconomic backgrounds?

My Process



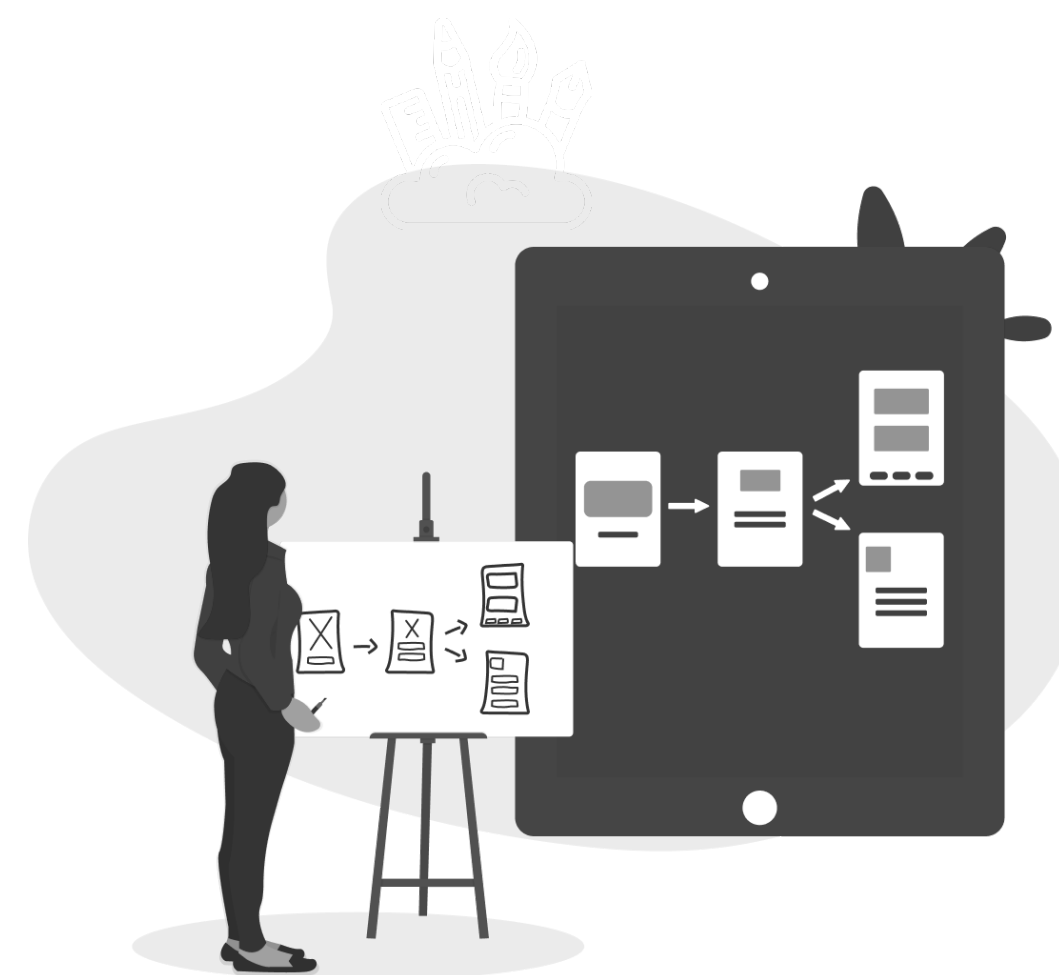
Research

Literature Review, Competitive Analysis, Semi-Structured Interview



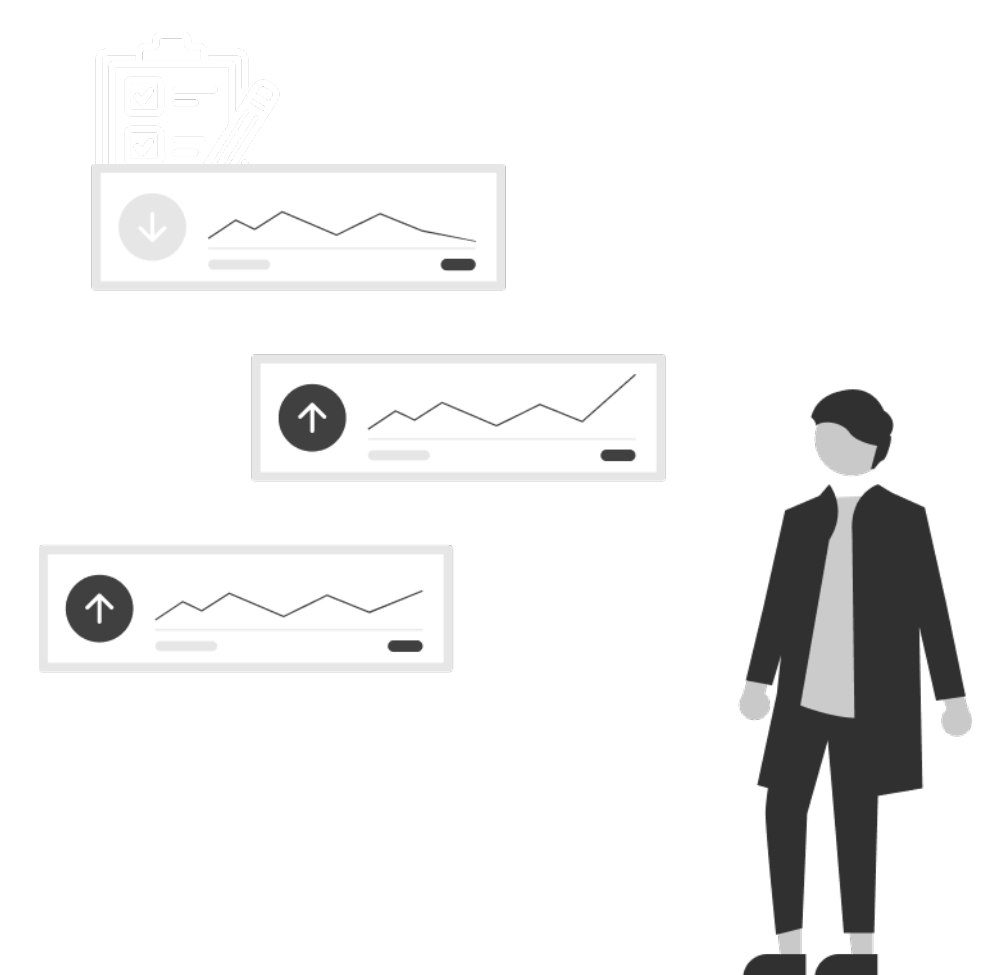
Ideation

Personas, Sketching, Concept Testing



Design

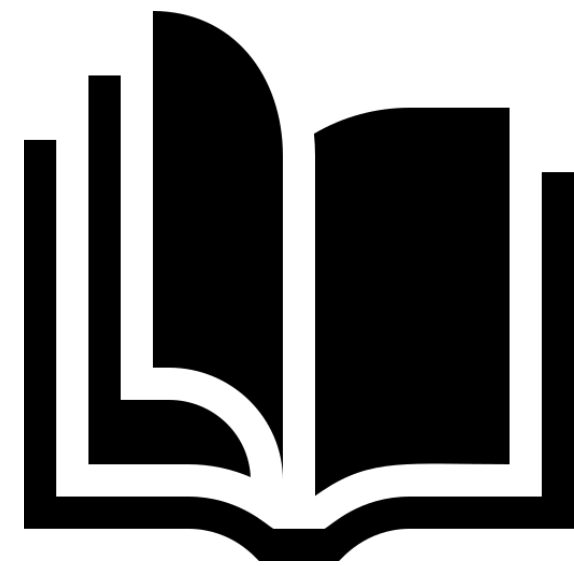
Wireframes, Mid-Fidelity Prototyping, Accessible Design System



Evaluation

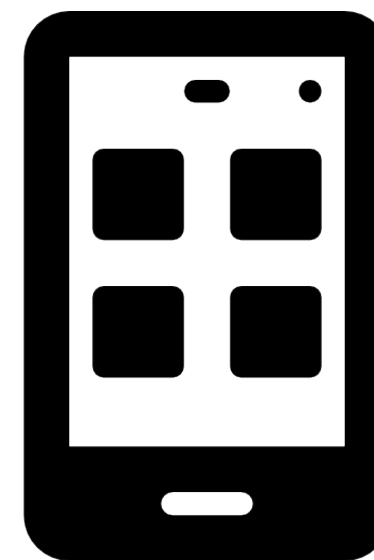
Heuristic/Expert Evaluation, User Evaluation

Research Methods



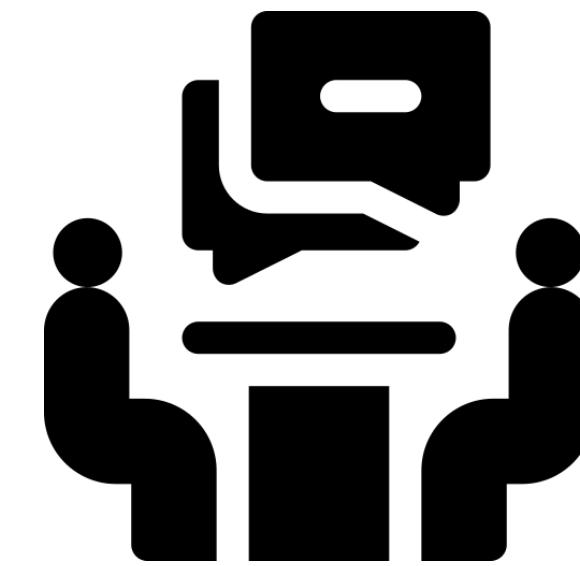
Literature Review

30 scholarly papers about diabetes self-management, health literacy, designing tech for low SES population



Competitive Analysis

Current landscape of technology that targets Type 2 Diabetes self-management practices



Interview

30-minute semi-structured sessions with 10 healthcare professionals and 2 Diabetes patients with followup survey

Literature Review Findings

1 Technology Use for Health

Poor involvement of healthcare professionals at the design stage

2 Diabetes Applications

100's of diabetes apps on the market - targeted toward higher-income users

3 Diabetes in Low SES Patients

Lack of education and low health literacy results in challenges in self-management



User Demographics



N=10 ; Healthcare Professionals

Physicians, nutritionists, diabetes educators, medical students, and nurses from Emory & Grady Hospital



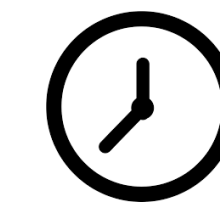
N=2 ; Type 2 Diabetes Patients

Low SES patients from Emory & Grady Hospital recruited through HCPs

Interview Objectives



Microsoft Teams



30 minutes

1 Self-Management Practices for Low SES Individuals

- How do patients currently manage their T2 Diabetes? What are some shortcomings of these practices, and what are the best practices?

2 Patient-Provider Communication

- What role do healthcare professionals (HCPs) play in assisting their patients in managing their diabetes outside of the clinical setting?

3 Technology For Health

- What are the specific technological needs and challenges of T2 Diabetes patients coming from low resource communities?

Affinity Diagramming



Semi-Structured Interviews (N=12)

Patient-Provider Communication

- 1 HCPs disperse self-management techniques and tools primarily in the form of **brochures and pamphlets**.
- 2 **Continuous education and followup** between patients and providers is necessary in underserved communities.

Diabetes in Low SES Communities

- 3 Most patients don't truly understand the full impact of their disease and the **repercussions of lack of self-management care**.
- 4 The first steps in taking proper care of one's diabetes are **understanding and accepting the diagnosis**.

Opportunities for Technology

- 5 Very **few diabetes applications** on the current market are **catered toward the needs** of low SES Type 2 Diabetes patients.
- 6 Very few patients use technology to manage their diabetes due to a lack of user-centered design on low SES patients, but are **willing to use an app if it was available**.

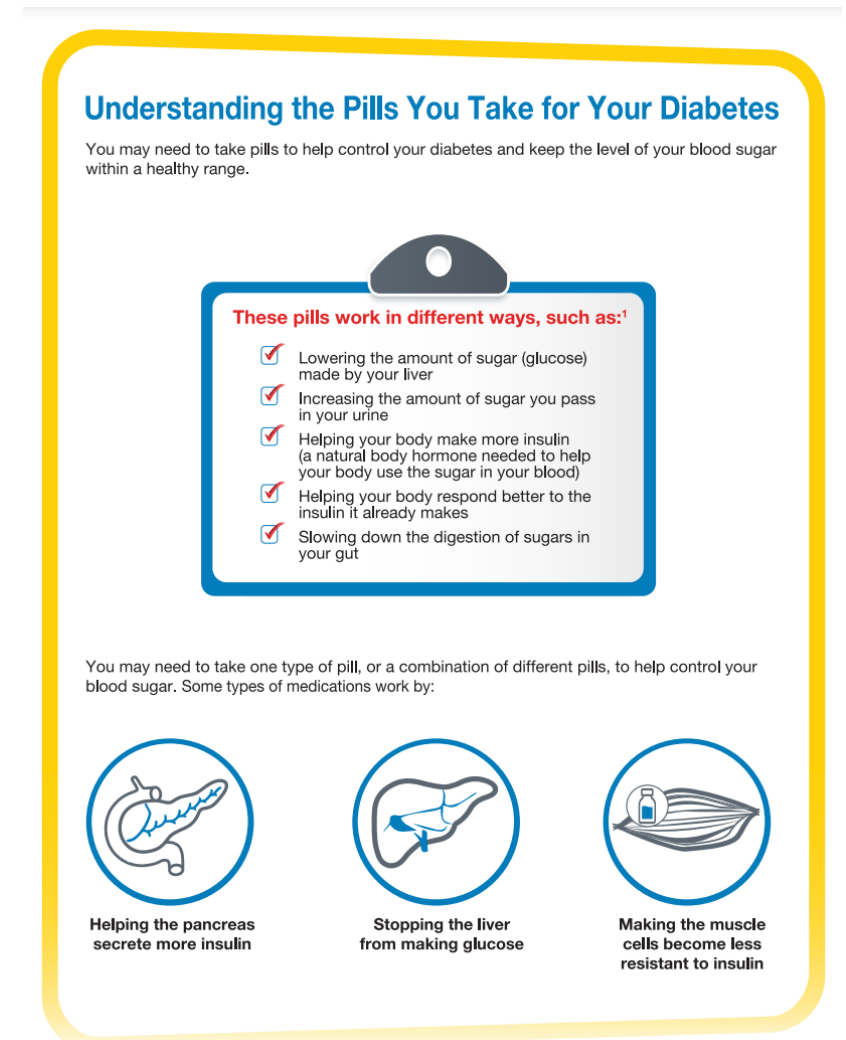
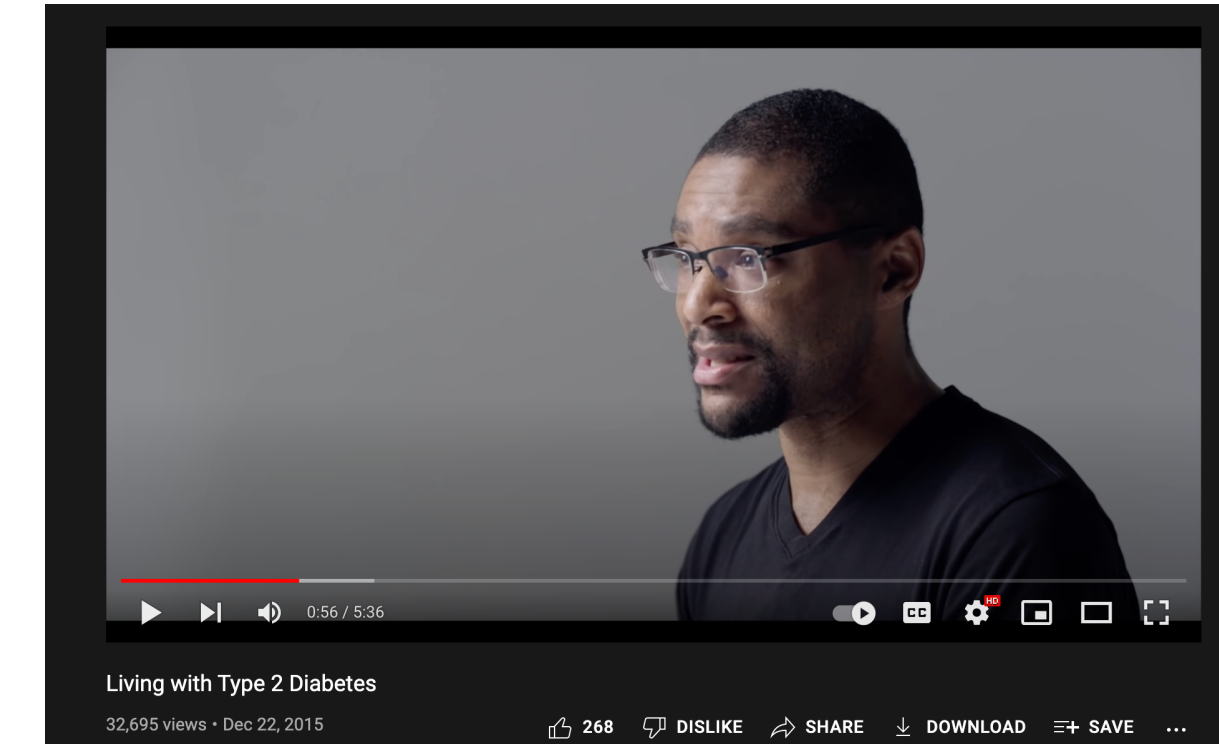
Desk Research

Papers, Youtube Videos, Blogs

- Desk research used to supplement interview findings
- Combat low sample size

“Eliciting Requirements for a Diabetes Self-Management Application for Underserved Populations: A Multi-Stakeholder Analysis”

- Diet and physical activity management most important among participants - both patients and providers
- Reminders are extremely important
- Patient literacy levels **MUST** be taken into account



Design Requirements



Necessary Themes

Should incorporate continuous education, followup, and positive reinforcement



Impact of Diabetes

Should emphasize the full impact of neglecting self-management practices



Required Features

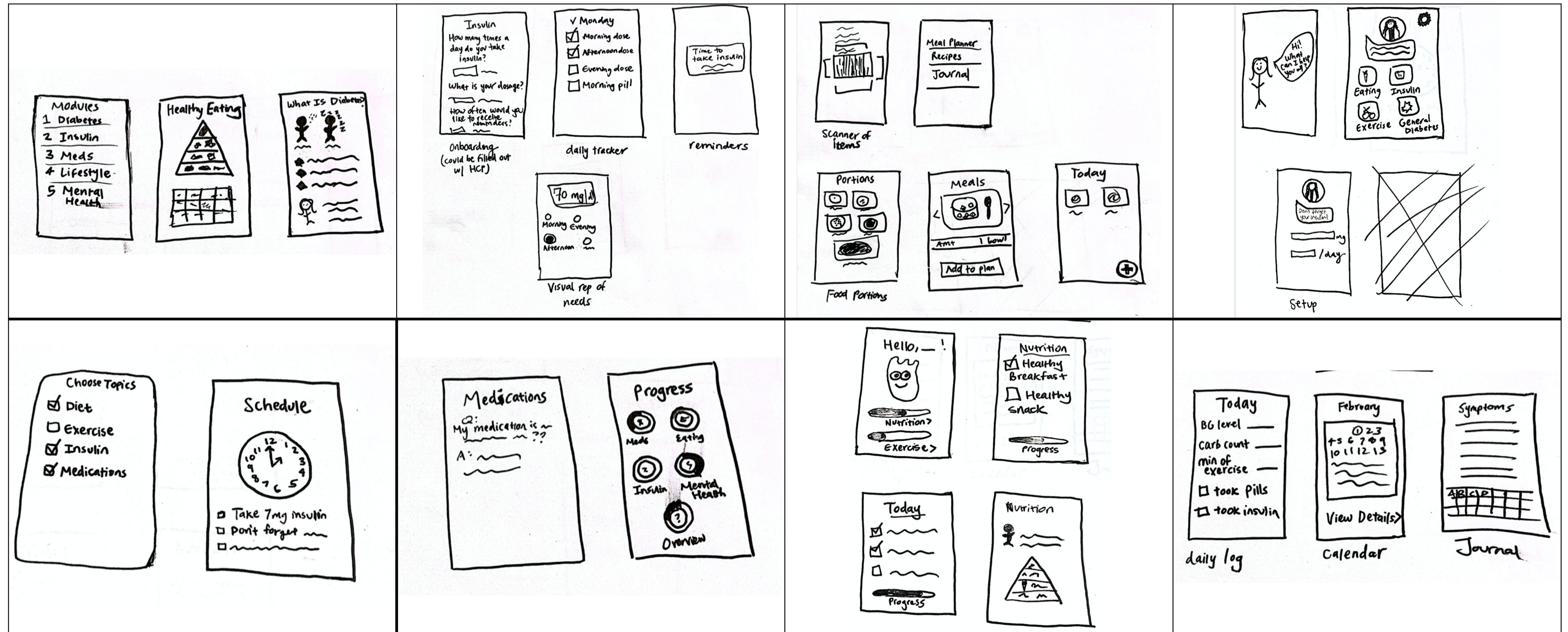
Should integrate glucose and diet monitoring, exercise regimen, and reminders



Non-Functional Requirements

Should use low literacy language levels and empathetic visuals and imagery

Rapid Sketching/Brainstorming



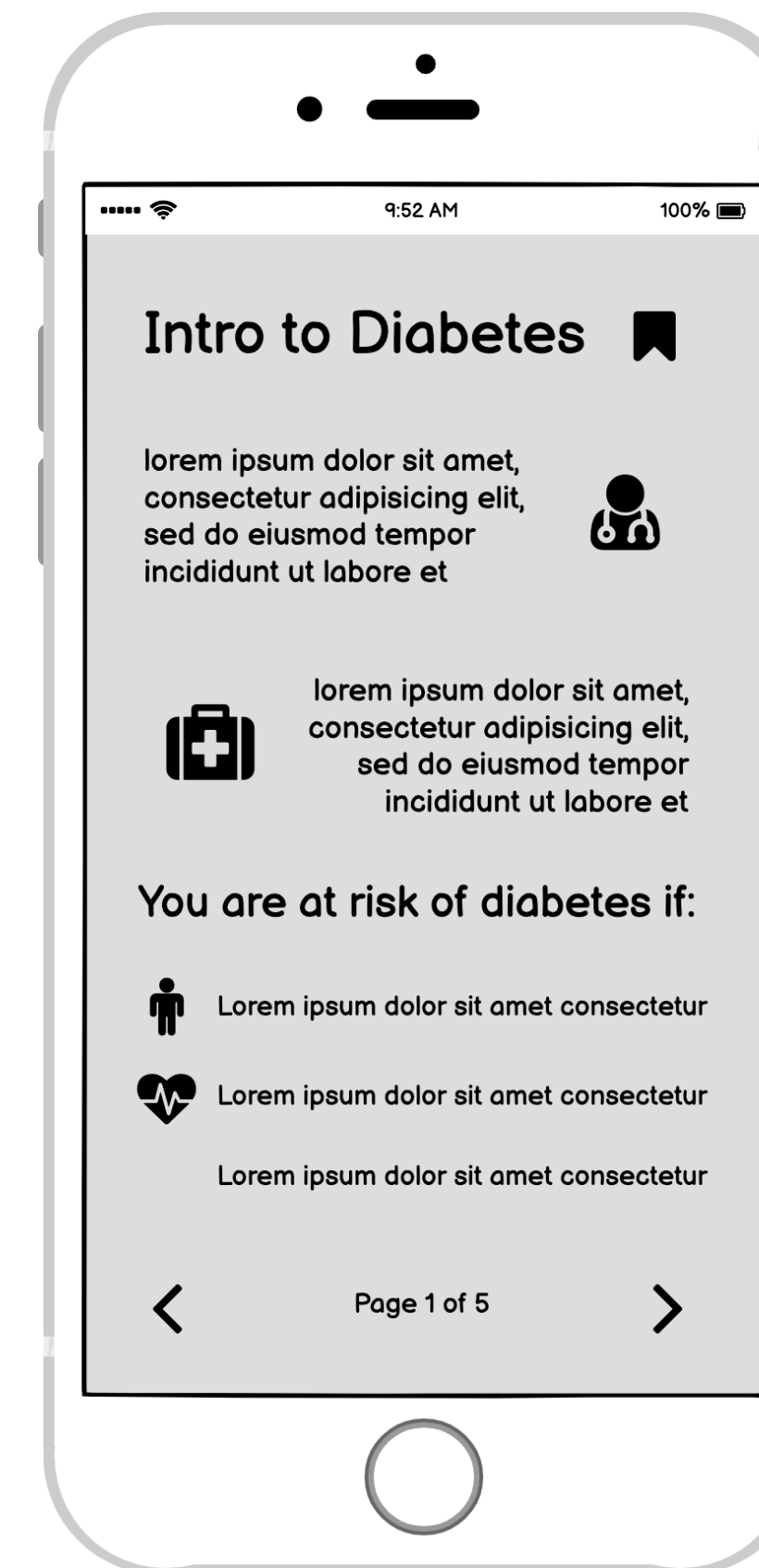
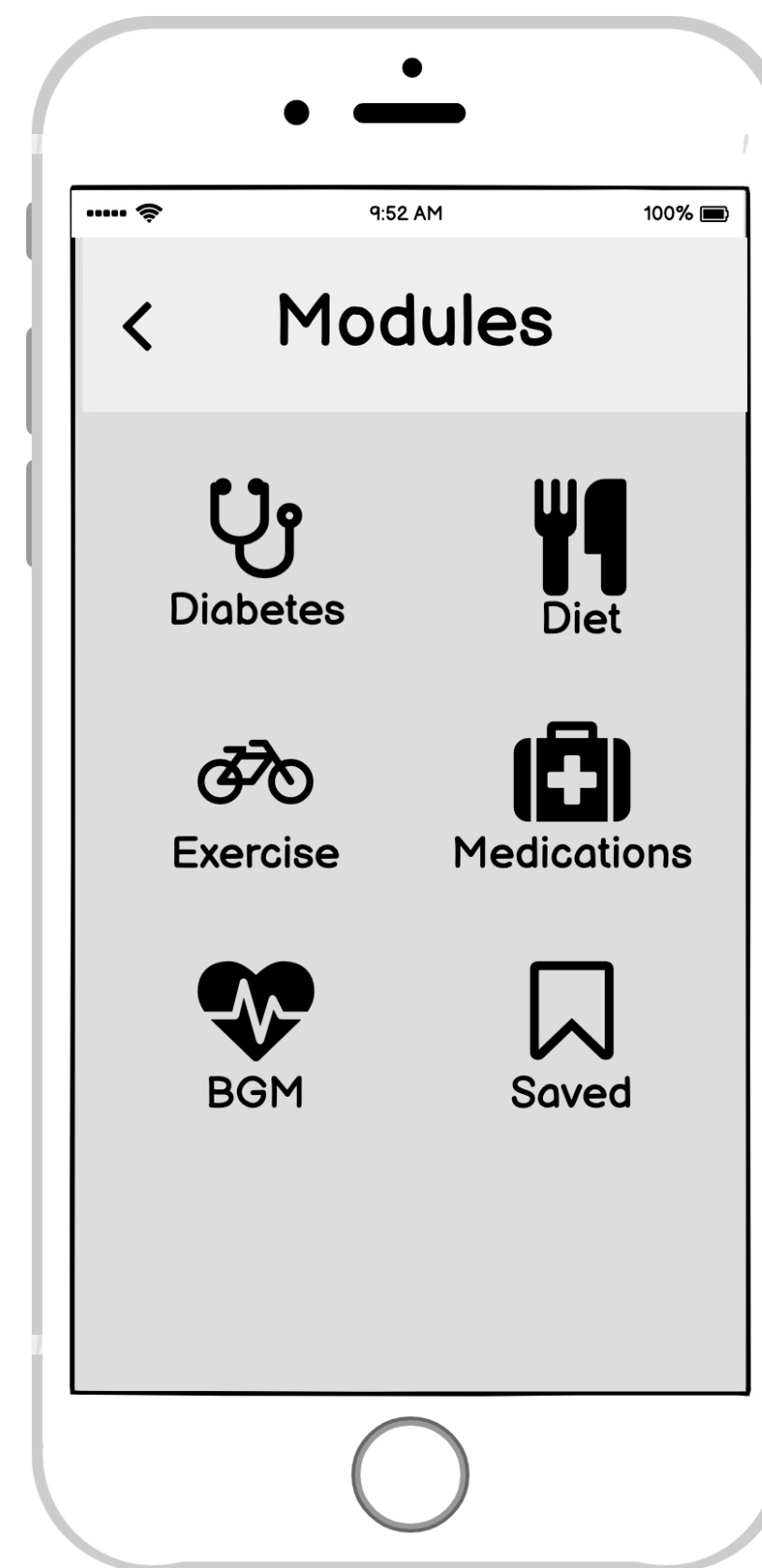
Low-Fi Design Concept #1

Educational Application

- Modules to learn more about each **category of diabetes** self-management

Minimalistic

- Information very **visual** and low-level in nature
- Quick access



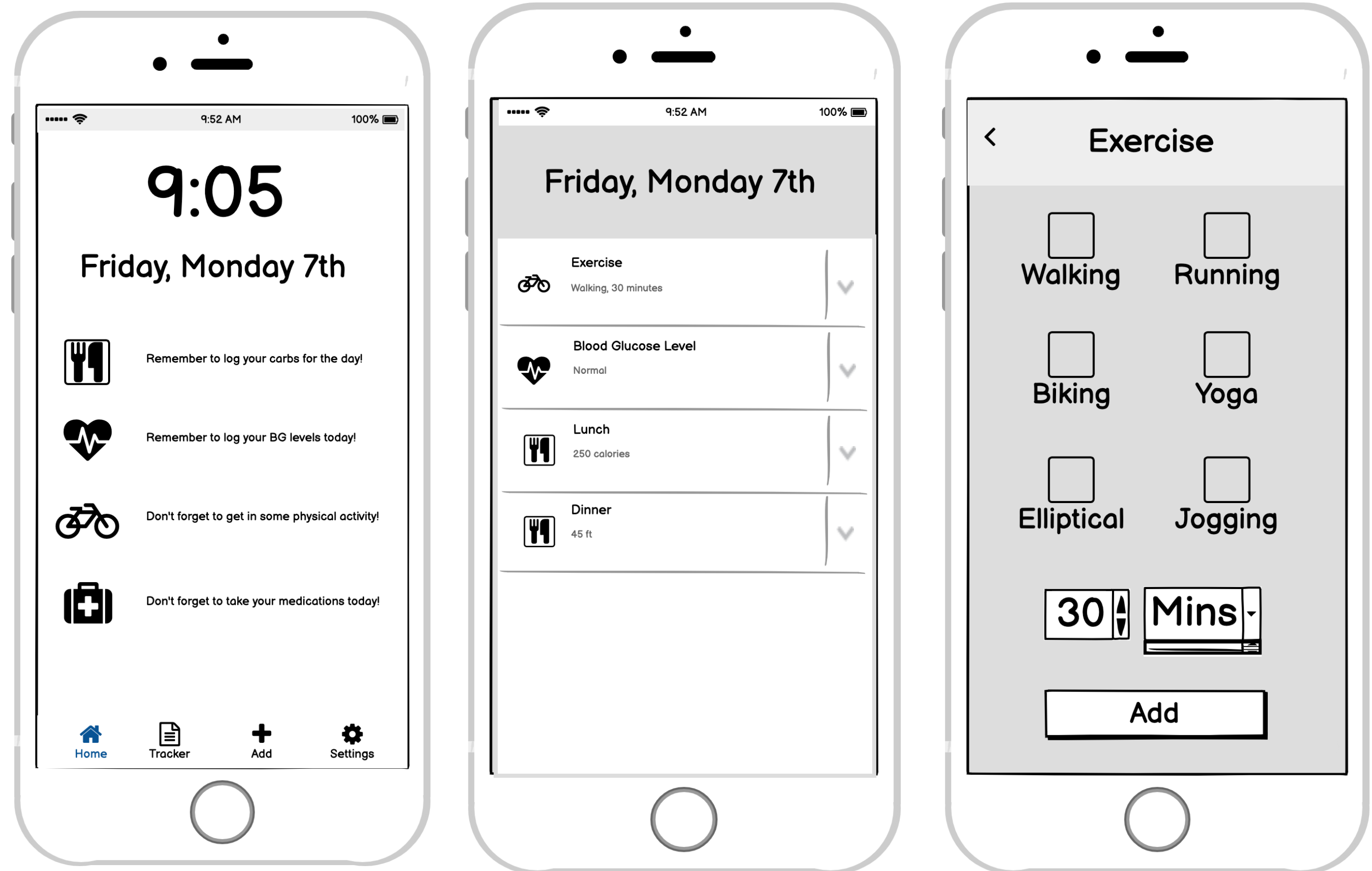
Low-Fi Design Concept #2

Tracker Application

- Patients can input **self-management actions** they have engaged in throughout the day

Reminders

- **Action item reminders** for example eating healthy, exercising, taking medications

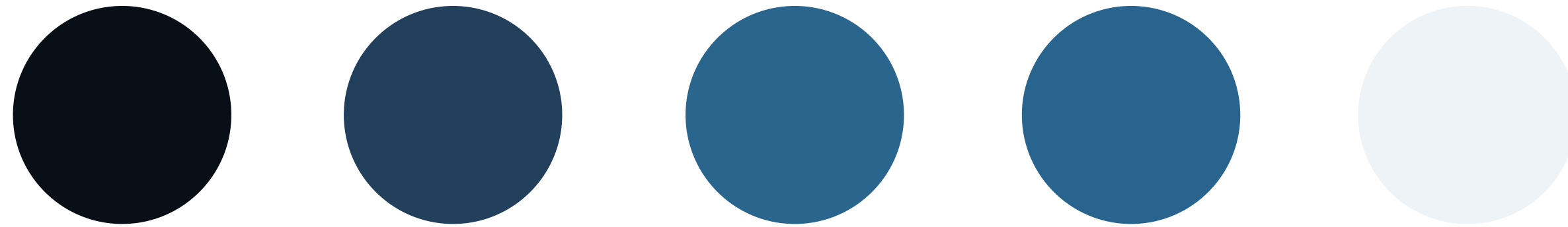


Concept Testing

- Key Benefits of Each Concept
- Feature Analysis
- Concerns & Hesitations
- Likes & Dislikes
- Likelihood of Use



Accessible Health Design System



Diet Reminders



H1 Display Bold 30px | Lato | lh 24px

H2 Display Bold 24px | Lato | lh 24px

H2 Display Bold 24px | Lato | lh 24px

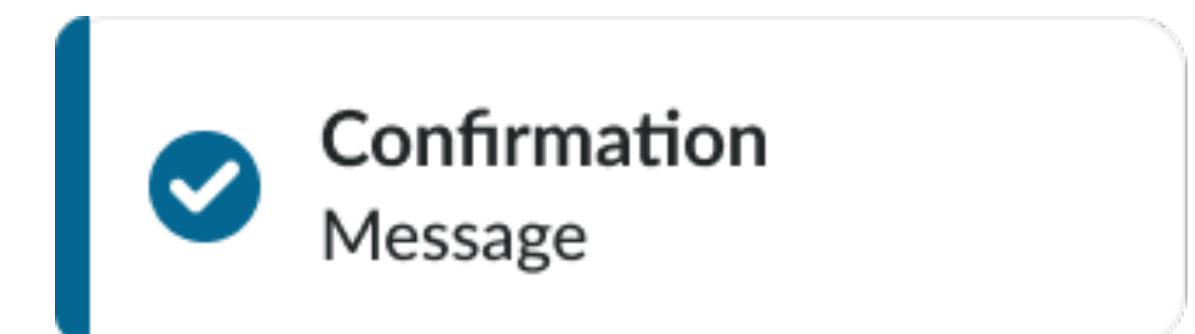
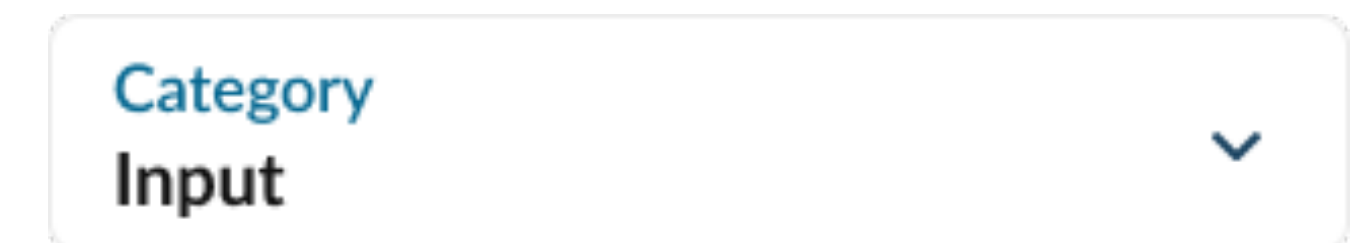
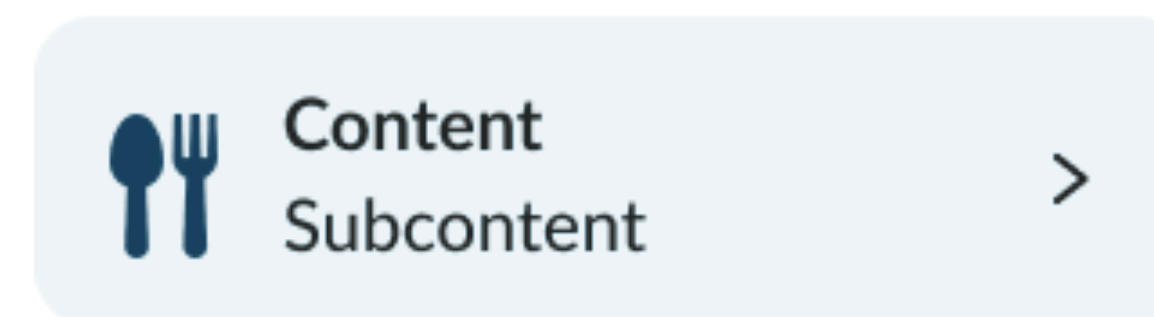
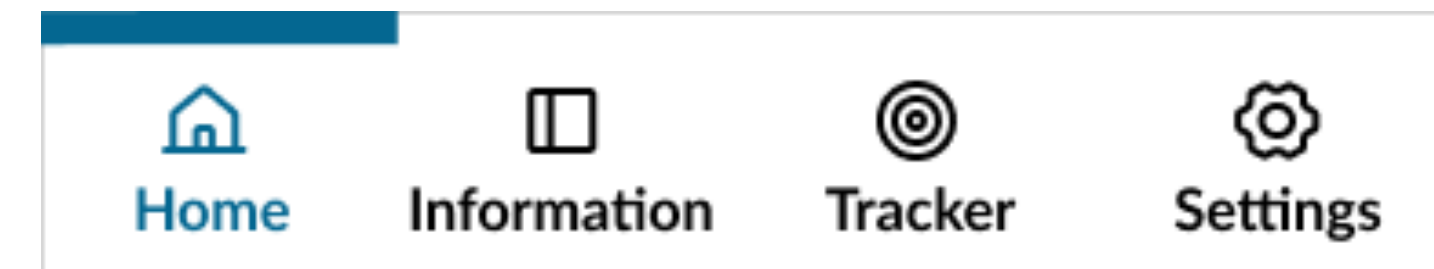
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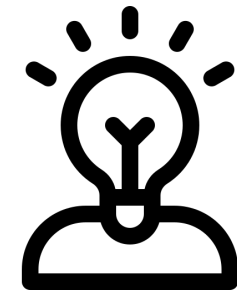
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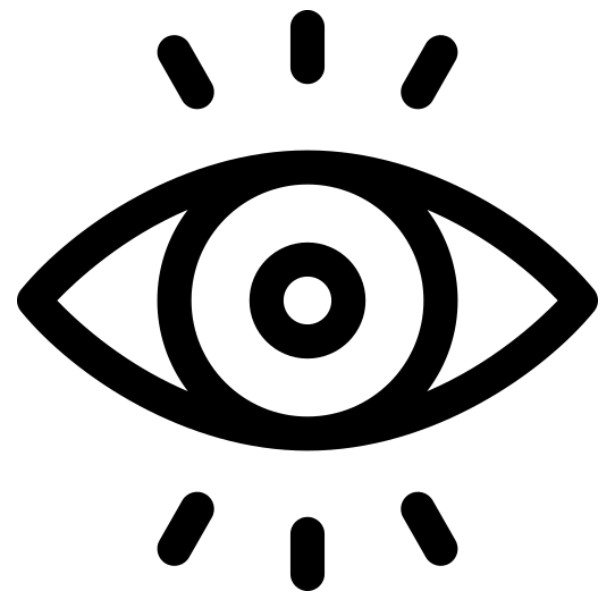
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Heuristic Evaluation



MS-HCI Faculty & Students (N = 4)



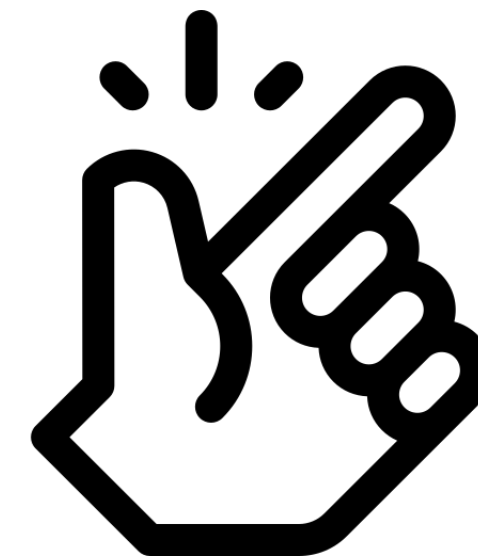
Visibility



Feedback



Error Prevention

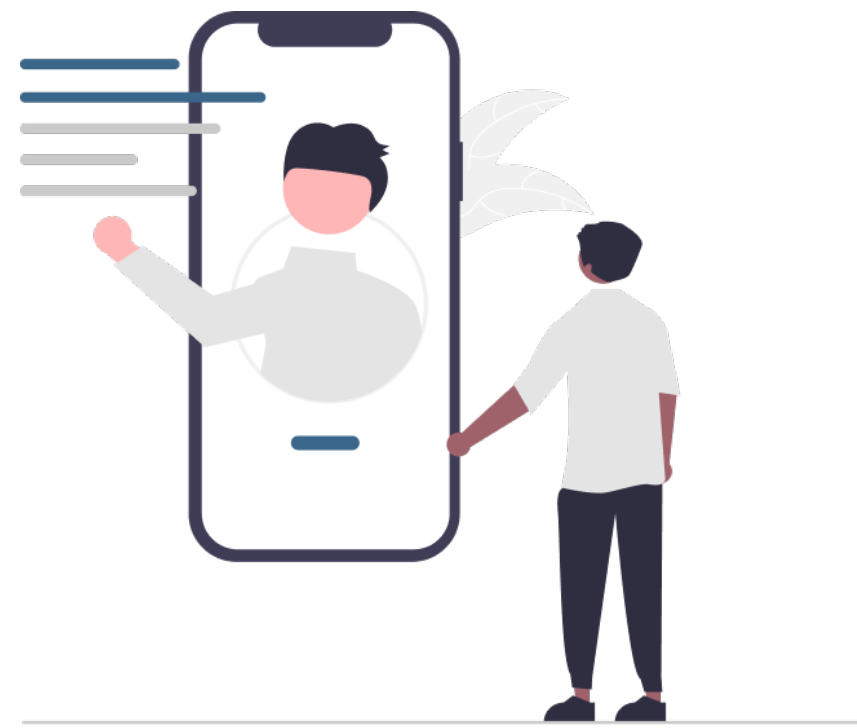


Minimalist
Design



Help &
Documentation

Heuristic Evaluation Findings



Help & Documentation

Users should receive more help on the app, as well as positive reinforcement and instructions



Feedback

The app should have more feedback for progress/completion of certain actions



Navigation

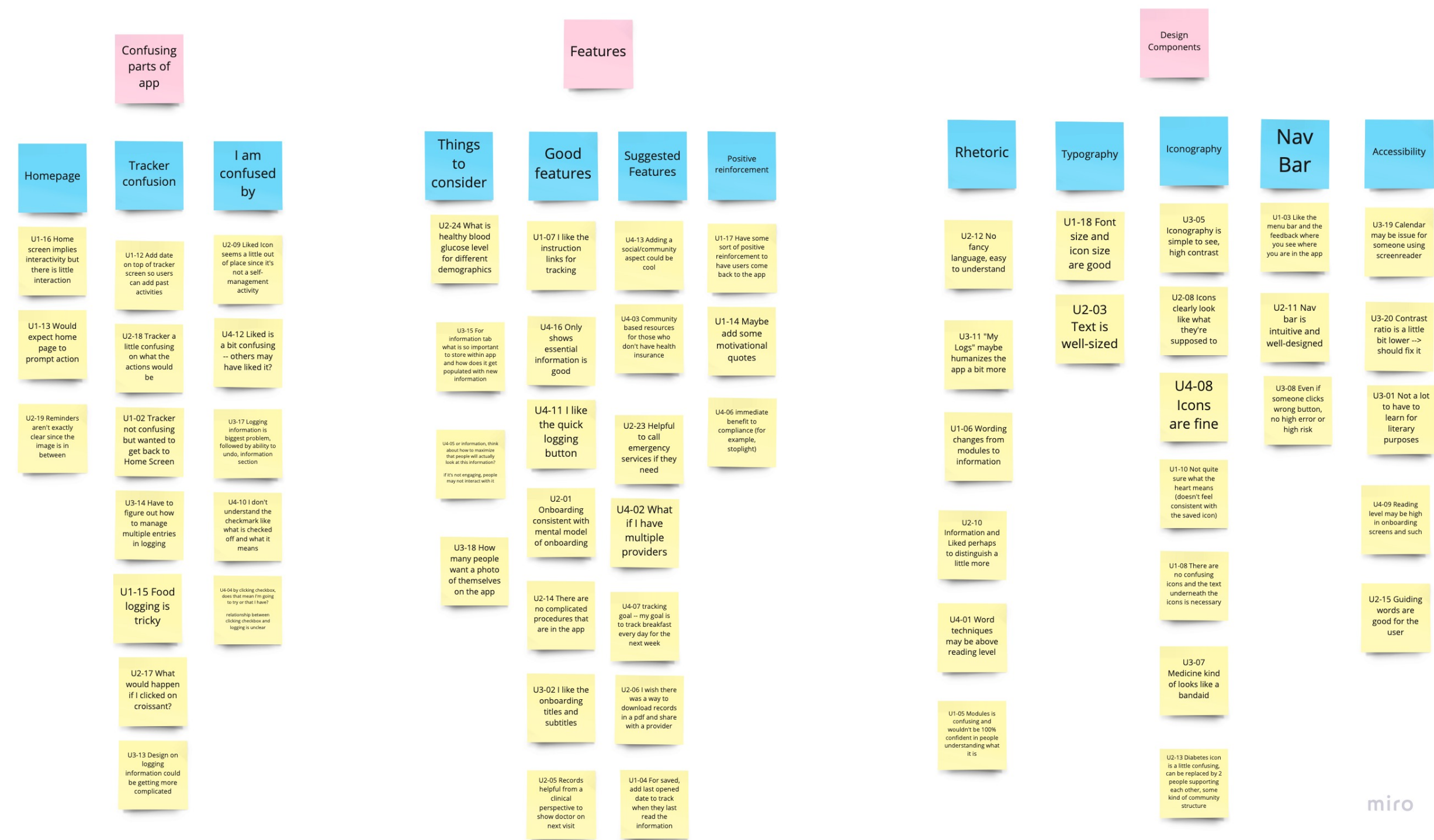
The app has an uncluttered interface and is easy to navigate/find features



Literacy

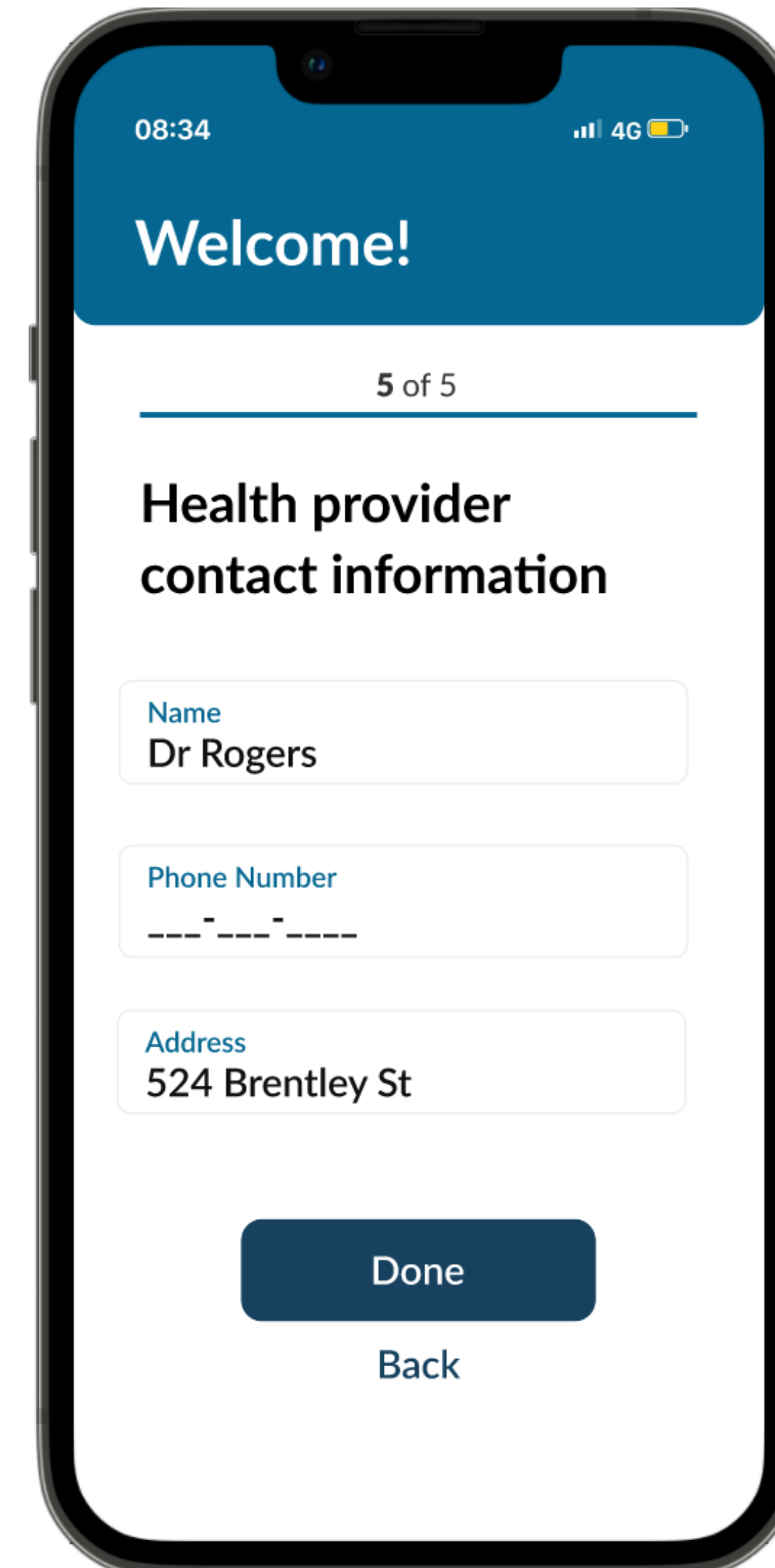
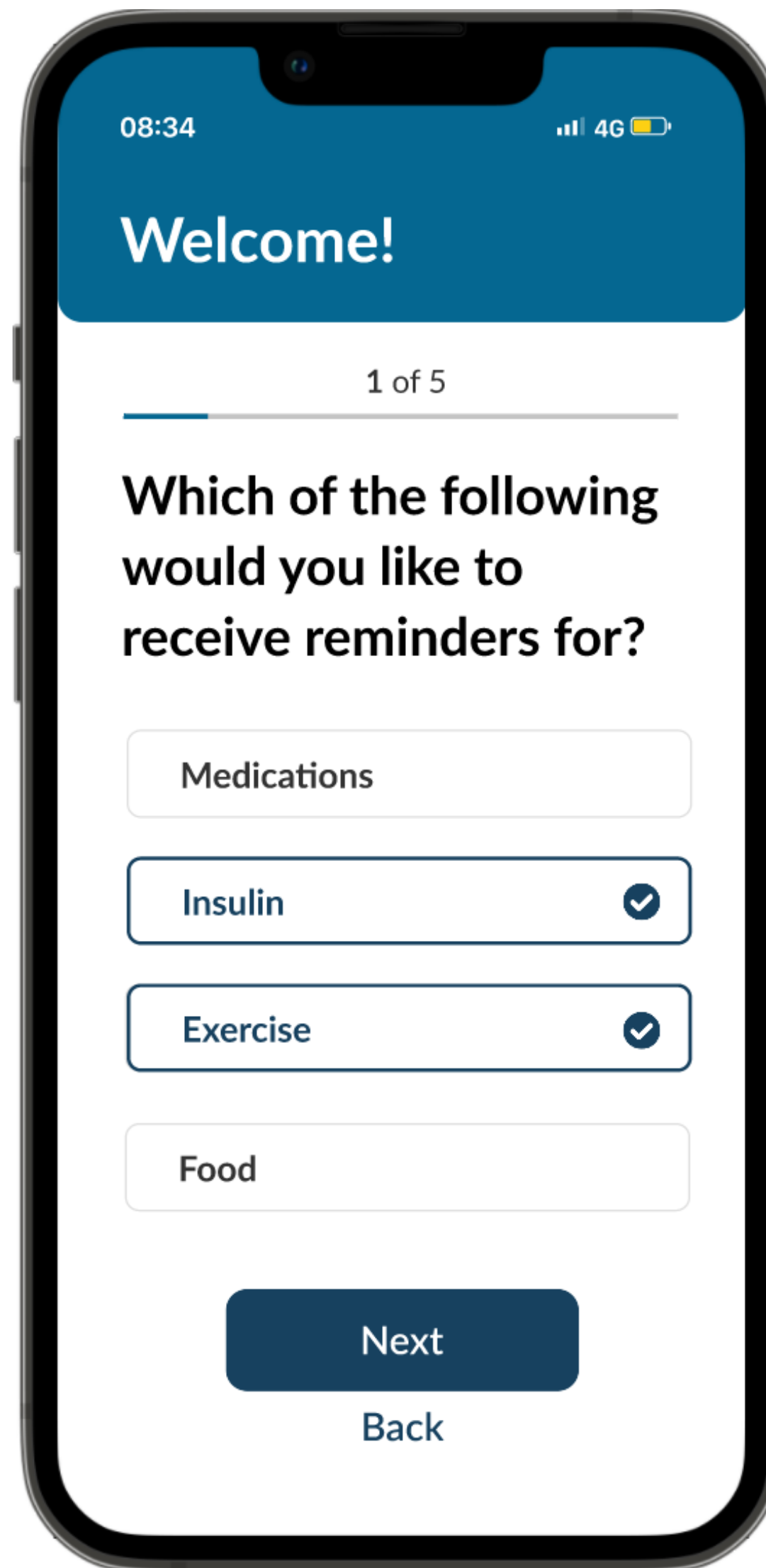
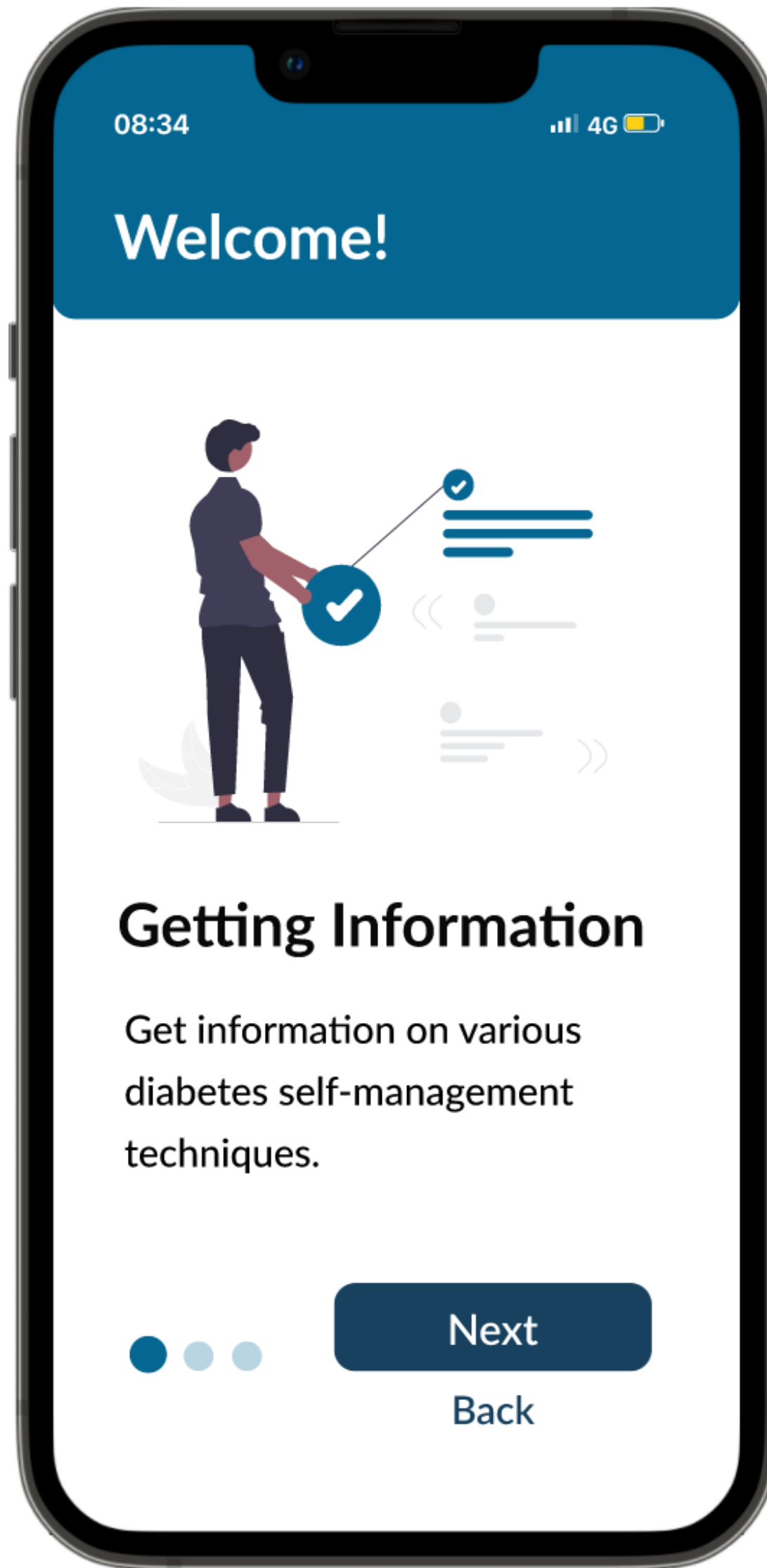
A few areas of the app do not adhere to a health literacy level of 7th grade and lower

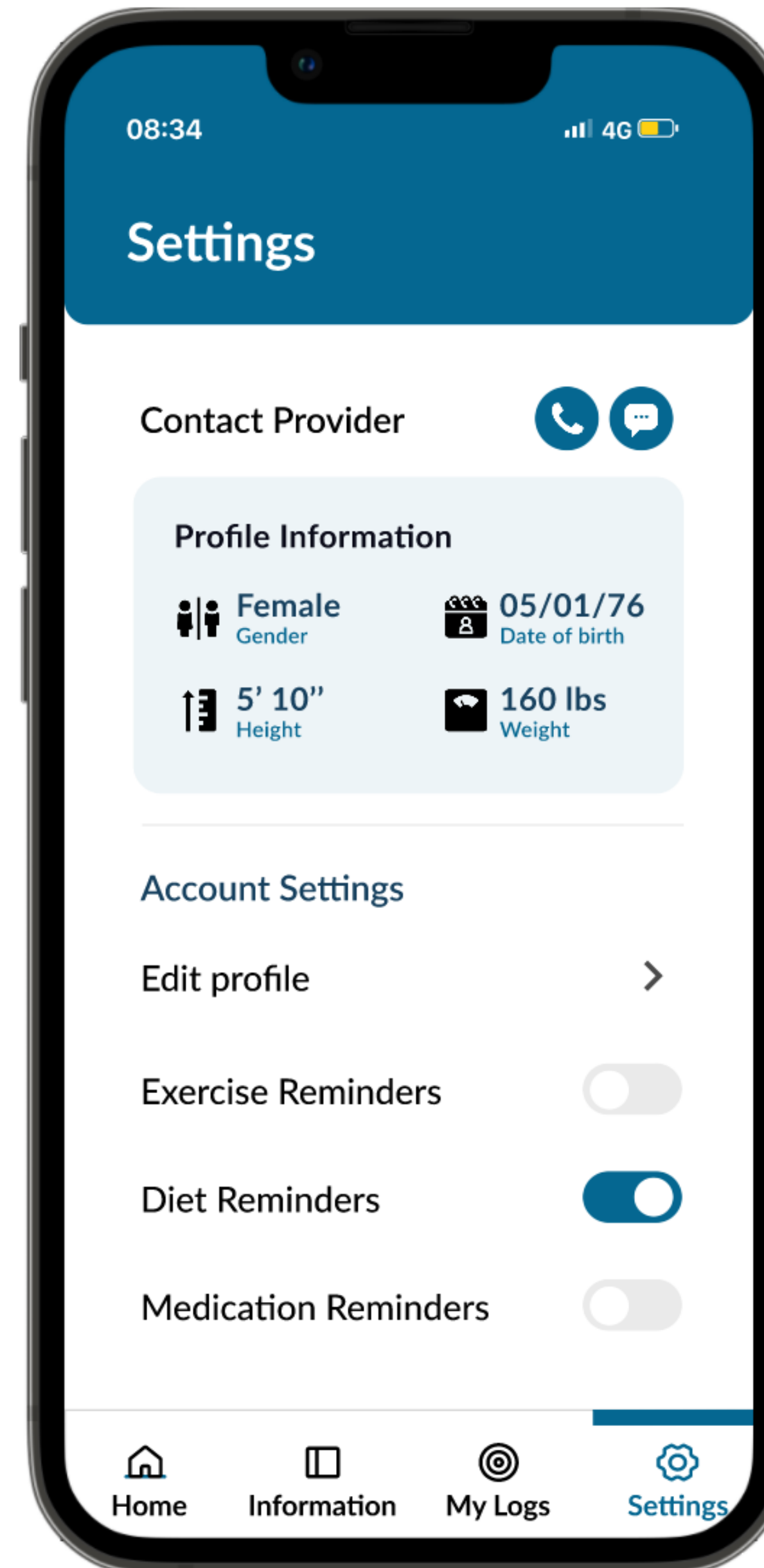
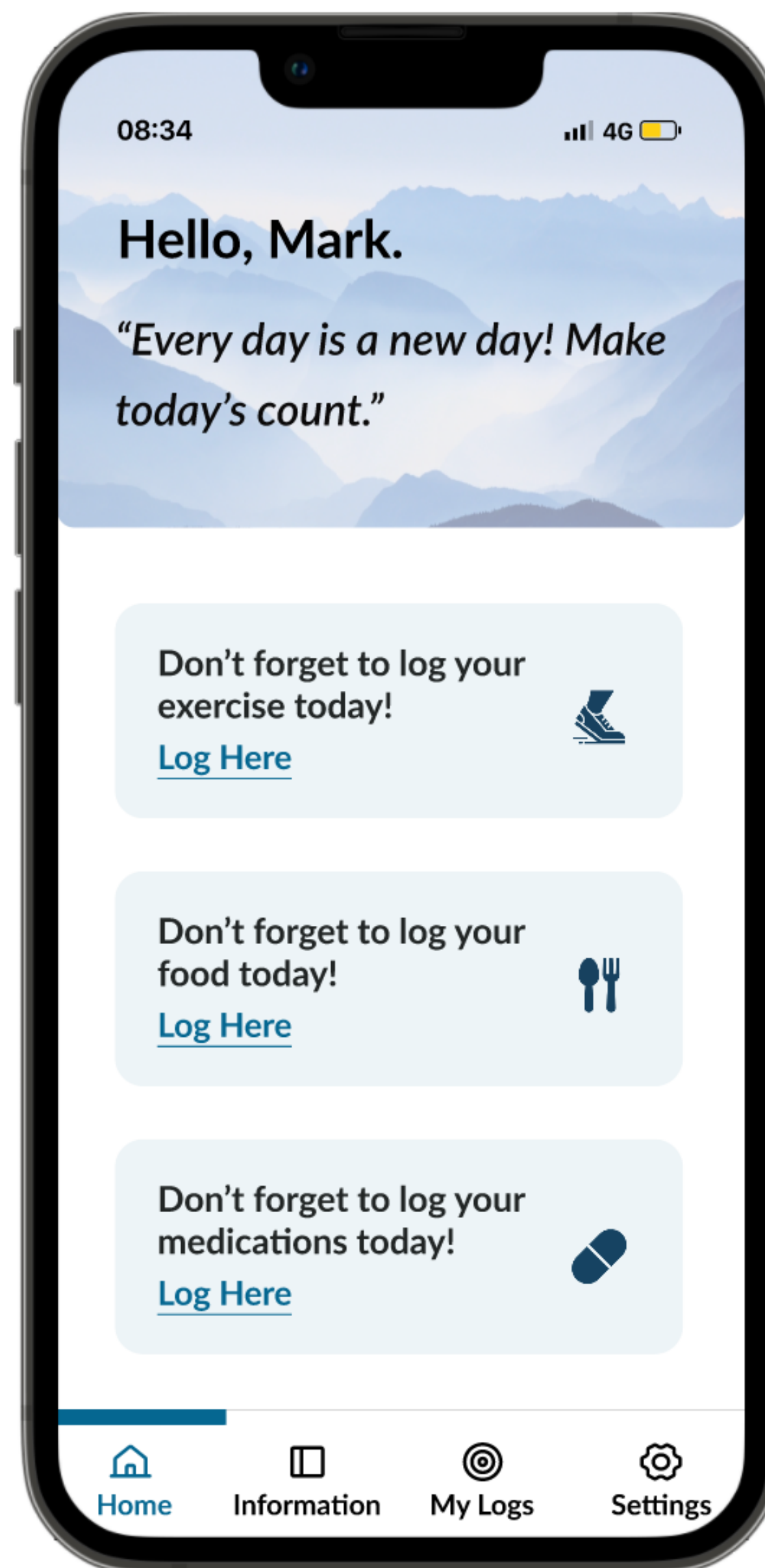
Heuristic Eval Findings Artifacts

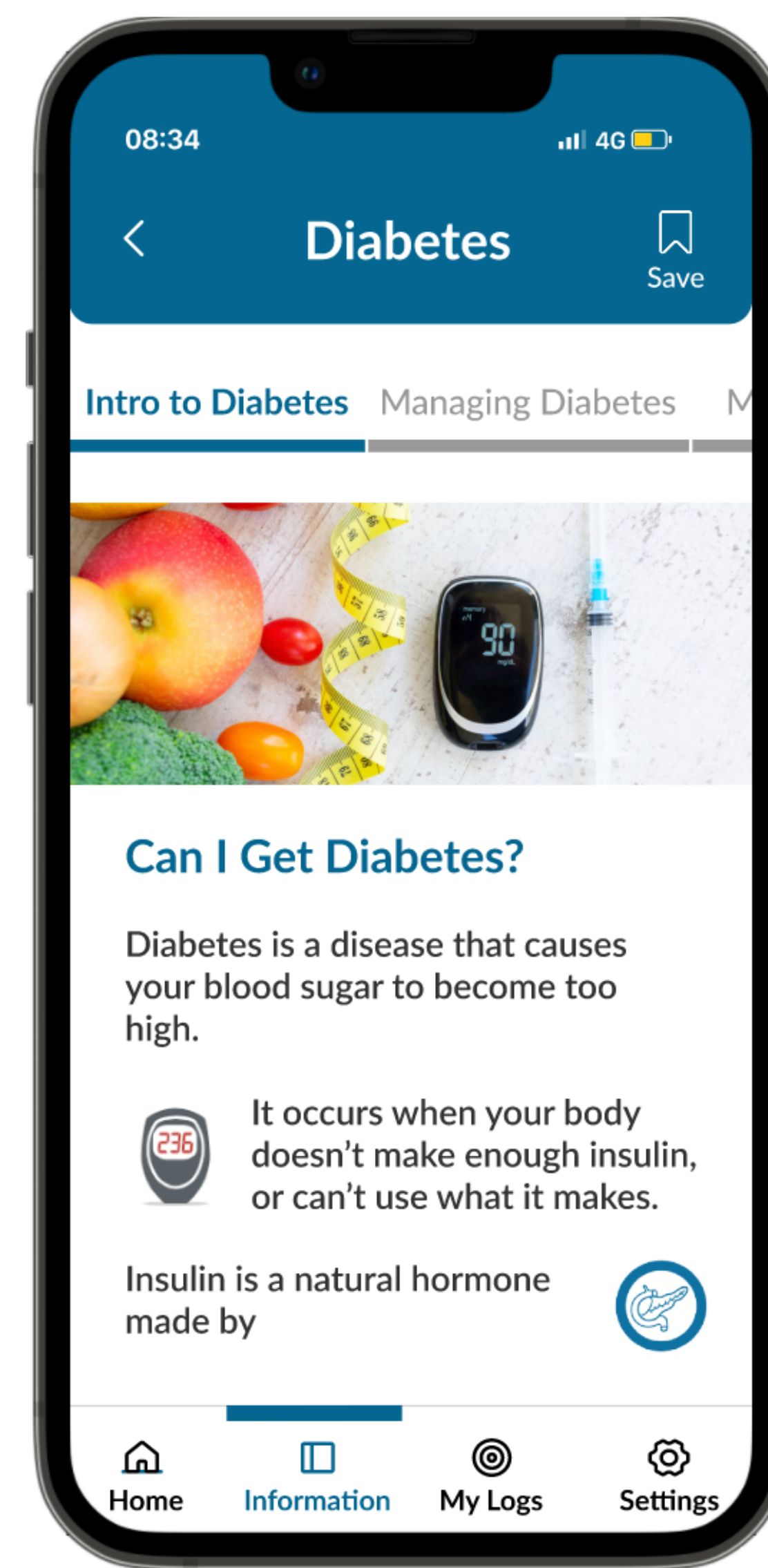
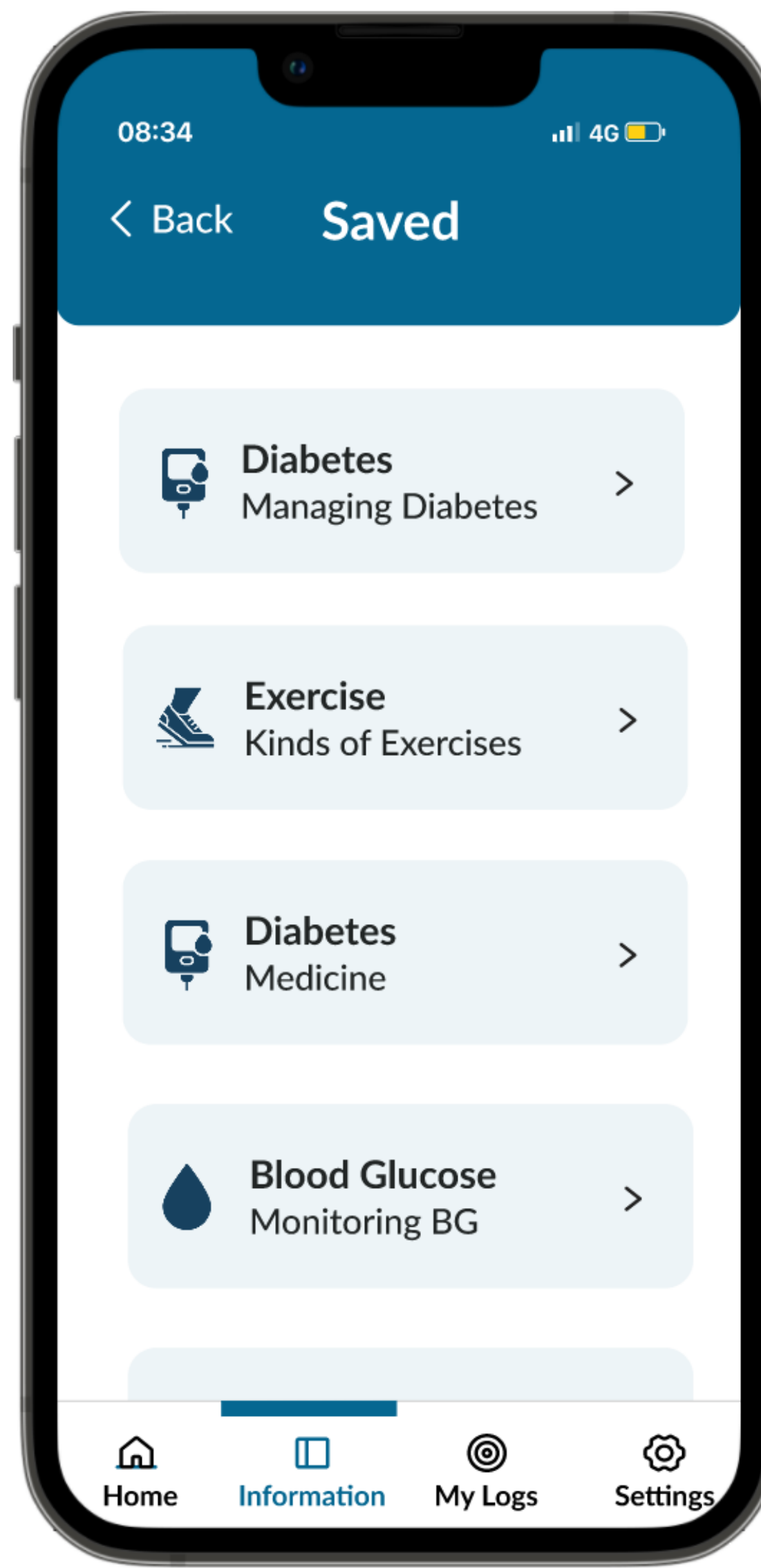


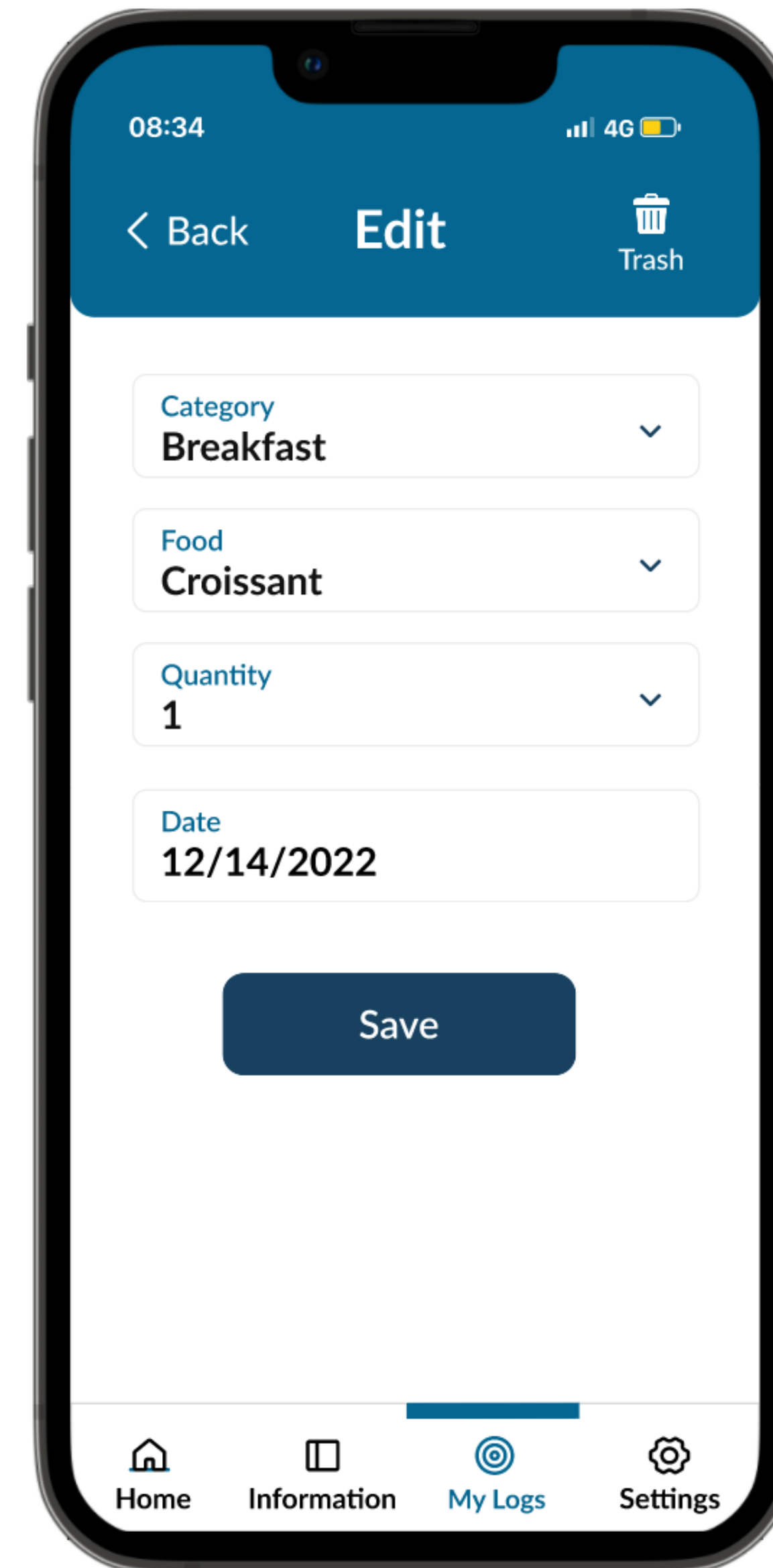
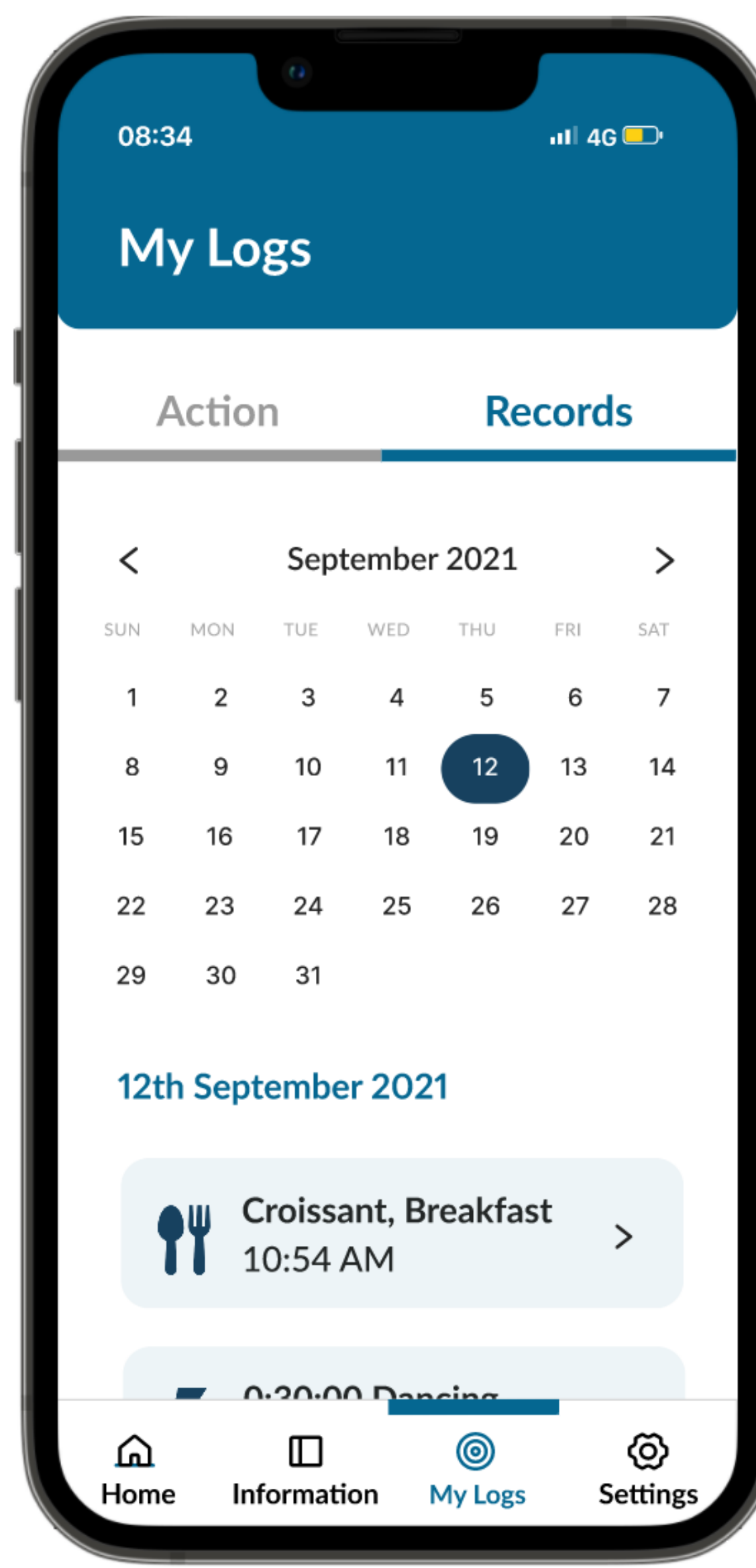
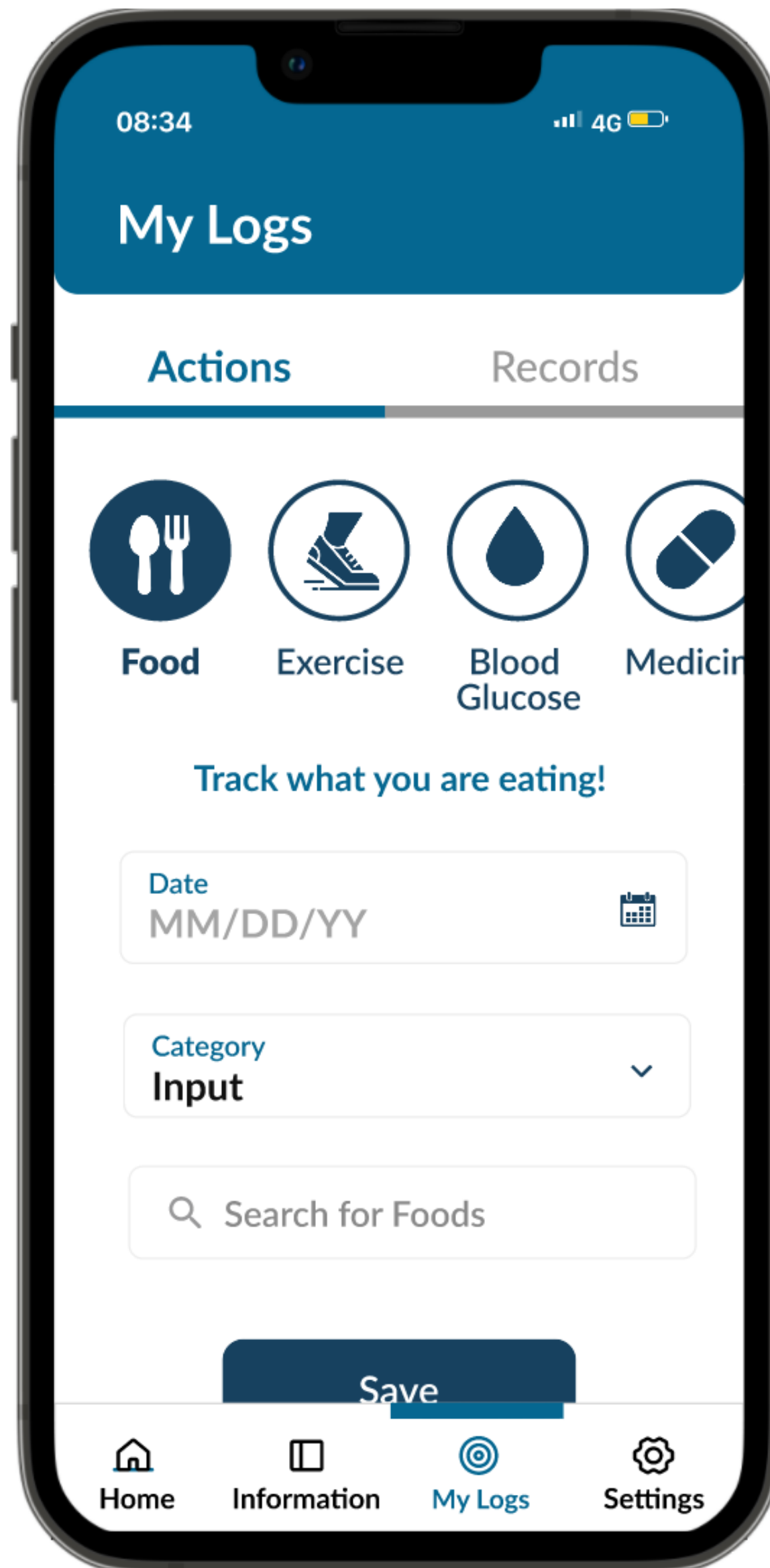
Research Finding	Design Requirement/Recommendation	Heuristic
Experts liked the uncluttered interface and found the app easy to navigate		Aesthetic and Minimalist Design
Experts stressed the importance of having some kind of help function, especially with this user group.	The application should have continuous support in the form of helpful phrases and directions throughout.	Help & Documentation
Experts expressed frustration at not being able to undo certain actions such as editing logs or checking off reminders.	The application should have an undo function when completing the primary actions that the app supports.	Error Prevention
Experts believed the feedback in the app was overall decent but wanted more indications when a user completes a certain action.	The application should add more feedback for certain completed actions (for example, checking off a reminder)	Feedback
Experts believed that the majority of the information architecture of the application adheres to conventions and supports the low literacy needs of patients.	The application should add labels to icons and visuals that in other application settings may be coupled together.	Consistency and Standards
Experts thought a few words and phrases may have been difficult to understand for our user population.	The application should adhere to a health literacy level of 7th grade and lower--this may require a pass over of current health literacy handbooks.	Match Between System and Real World

Final Artifact









Learnings and Challenges

Establishing a project timeline with clear-cut goals is crucial

Organization for a year-long project is crucial to achieving your goals and realizing all of the project needs and requirements.

Recruitment is hard

Recruiting vulnerable participants is difficult, so sometimes it is necessary to turn to more **creative ways to get user insights**.

Seek continuous and iterative feedback

For such an expansive project, it is important to **continuously gain feedback** from stakeholders, users, and experts alike.



Next Steps

Usability Testing

Test usability of application with users in person (COVID-permitting)

More Iterations

Necessary changes based on usability testing with users; continuously keep HCP's involved in the design process

Deploy To Developers

Pass on Figma designs to developers to implement application in real-world context



Thank you! Questions?

