SI 554 - Consumer Health Informatics

Proposal for a New CHI Intervention : "SugarCoach"

Team 4

Intended Users : **Older Adults with Diabetes with Low Health Literacy**

Health literacy among individuals aged 65 years and older is significantly lower in comparison to the general American population (Kutner et al., 2006). Advanced age is a strong predictor of low health literacy, and even those with higher education levels and good health display lower levels of health literacy (Lopez et al., 2022).Low health literacy in older adults has been linked to multiple metabolic syndromes (Tajdar et al., 2022), along with an increased likelihood Diabetes and higher fasting glucose levels (Quartuccio et al. , 2018). Age-related decline in cognitive abilities, rather than the deterioration of visual ability or language skills, is thought to be the cause for this drastic drop in health literacy (Lopez et al., 2022).

Needs of Intended Users

Older adults with low health literacy often have difficulties using technology because their literacy and numeracy skills are linked to their ability to access and use technology, and they may struggle to navigate interfaces and understand numerical information. For patients aged 65 and older with diabetes mellitus, health literacy is particularly important given that the age-related decline in cognition presents a growing disadvantage in adopting health resources that generate effective self-care and good disease outcomes, which require managing complex regimes and often contradictory dietary guidelines (Griva et. al, 2020). Diabetes can lead to health issues in older adults such as impaired vision, loss of function, and cognitive decline (Bansal et. al, 2015). They are also more susceptible to depression and may face social isolation. (Ida & Murata, 2022). Additionally, older adults may also find it challenging to adopt digital health resources and are a vulnerable population when it comes to digital health literacy (Wang & Luan, 2022).

Theory and Strategy

SugarCoach incorporates evidence-based strategies for health behavior change, as outlined in Hooker et al.'s (2018) paper, including providing education and feedback, setting goals, and offering social support. The application also draws upon the social cognitive theory to promote behavior change by emphasizing the importance of self-efficacy and reinforcing positive behaviors through a rewards system.

Platform

SugarCoach will be offered to users through the Apple App Store and Google Play Store. This will offer users the ability to access the application on a more flexible basis, based on their needs. Users will be able to access SugarCoach through mobile devices or tablets. SugarCoach's target population tends to be less technologically literate, so offering the application on easy to use platforms like phones or tablets should prove to increase the usability for users.

Features

SugarCoach offers four main pages to users: "Story of the Week", "Learn", "Share", & "Play". These different features can be accessed by users through a simplified UI located at the top of the application, that allows clear and simple navigation of the app. Additionally, each page of the application will allow users to access their account information through their profile picture in the top right corner, as well as see their current trophy count (earnable points described later). SugarCoach contains many features which aim to improve usability based on the target population, and features which provide high intervention opportunities and fill gaps within the market, based on our research. Some of our application design constraints are included with scenarios in Appendix B.

Visuals

Visuals can be helpful for individuals with low health literacy as they will provide a clear representation of complex medical concepts, making it easier for them to understand and remember important information. Examples such as charts, diagrams, and images can also help users to visualize their progress

in managing their diabetes, which will increase user engagement and motivation. Less text and more visuals can be better for individuals with low health literacy since it can improve their comprehension and retention of key information.

High contrast/Large Font

High contrast is important for individuals with low vision or visual impairments. It helps distinguish between different elements on the screen and allows the app to be more accessible. This will allow for an improved user experience and easier navigation within the app. This pairs well with incorporating large fonts since it will make the text more readable and easier to understand for individuals with low vision and visual impairments, allowing users to read medication instructions, nutrition guidelines and blood sugar levels with minimal mistakes.

Social interaction

Social interaction is important as it can help users feel supported and motivated in managing their diabetes. This can be achieved through features such as community forums and peer support networks. Community forums will create a sense of community amongst the users allowing them to share their experiences and ask questions in a supportive environment. This reduces feelings of isolation and increases the engagement with the app. Peer support networks can provide users with a source of motivation and inspiration as they see others successfully managing their diabetes, allowing users to learn from each other's experiences and offer advice and encouragement.

Learning games

SugarCoach will offer users multiple games in order to expand their health education on diabetes, located in the "**Play"** tab. These games will include trivia and memory games which are suited towards the older target user group. Completing these games will offer the users trophies (a point system) based on their performance, and can be seen at the top of the application. These games will focus on topics of diabetes including dieting choices, general diabetes information, and glucose/insulin monitoring.

Direct Medical Expert Contact

When scrolling through the **"Learn"** tab of SugarCoach users will be able to send any unanswered questions directly to medical experts and receive a response asynchronously. These messages can be sent to medical experts from partnering clinics or programs to provide users with the ability to have their questions answered. These messages would take place asynchronous in order to offer the most flexibility to users and medical experts.

Story of the Week

Every week SugarCoach will highlight a "Story of the Week" where a post from the community "**Share**" tab will be selected to be displayed on the front page for all users. This offers users the ability to see positive stories of peers overcoming challenges and to learn from the different methods that others are managing their condition. Share tab will also include identity based and culture focused suggestions, that help them relate. It can also suggest food recipes, native to their culture, but with what can be replaced with what healthy items.

Sustainability

SugarCoach will work to partner with clinics and physician offices in order to maintain sustainability and increase patient outreach. Many health systems have a large number of patients with diabetes which they wish to continue to include education and intervention post visit. By partnering with these systems SugarCoach can be provided as the opportunity for these patients to continue their diabetes education after and between visits with their physicians. This will not only allow health systems to extend their patient interventions but also allow SugarCoach to continually expand its user base.

Additionally, partnering with clinics and physicians offices will offer SugarCoach the opportunity to establish contracts with these entities to support its medical expert contact feature. These partnering physicians can then respond to user questions asynchronously to enhance the intervention opportunity of SugarCoach.

APPENDIX A

PERSONAS

Persona	James	Dabby
Background	● 67 years old, Hispanic ● Technology access: Smart Phone, iPad, Laptop ● Literacy: high ● Experience with diabetes diet restriction: <1 year ● Language: English and Spanish	● 79 years old, White ● Technology access: Smart Phone ● Literacy: medium ● Experience with diabetes diet restriction: ~15 year ● Language: English
Technology Use	Relatively high	Relatively low
Health Literacy of Diabetes	Relatively low	Relatively low to moderate
Health Literacy Skills	Relatively low to moderate	Relatively low
Needs & User Goals	1. Putting his dietary requirements into practice 2. Manage diet plan on his own 3. Understand and track his daily nutrition intake	1. Accountable information source 2. Emotional support
Pain points & Frustrations	1. Not confident about his own ability to manage doctor's instruction such as daily diet, medicine intake, and nutrition restrictions. 2. Frustrated about managing diet plan and enjoy food with family and friends	1. Prompt help for both emotional support, health information, and new treatment are needed 2. Lose patience of personal diabetes condition
Narrative	James is diagnosed with diabetes 6 months ago and finds it hard to manage complex diet plan daily to meet the doctor's instruction for his diabetes condition. He is not entirely sure often feels not able to enjoy his meal or enjoy	Dabby has about 15 years of diabetes and this is getting harder and harder to to follow the instructions for their long-term diabetes condition. She has tried several folk remedy during the process since she is so fatigued about her diabetes

	dinner parties with friends and meet his diet requirement in the meantime.	condition. As her condition turned worse in her last doctor's appointment, she started to try a new medication and want to know how other people's experience about this new treatment.

Image showing visual depiction of Persona 1.

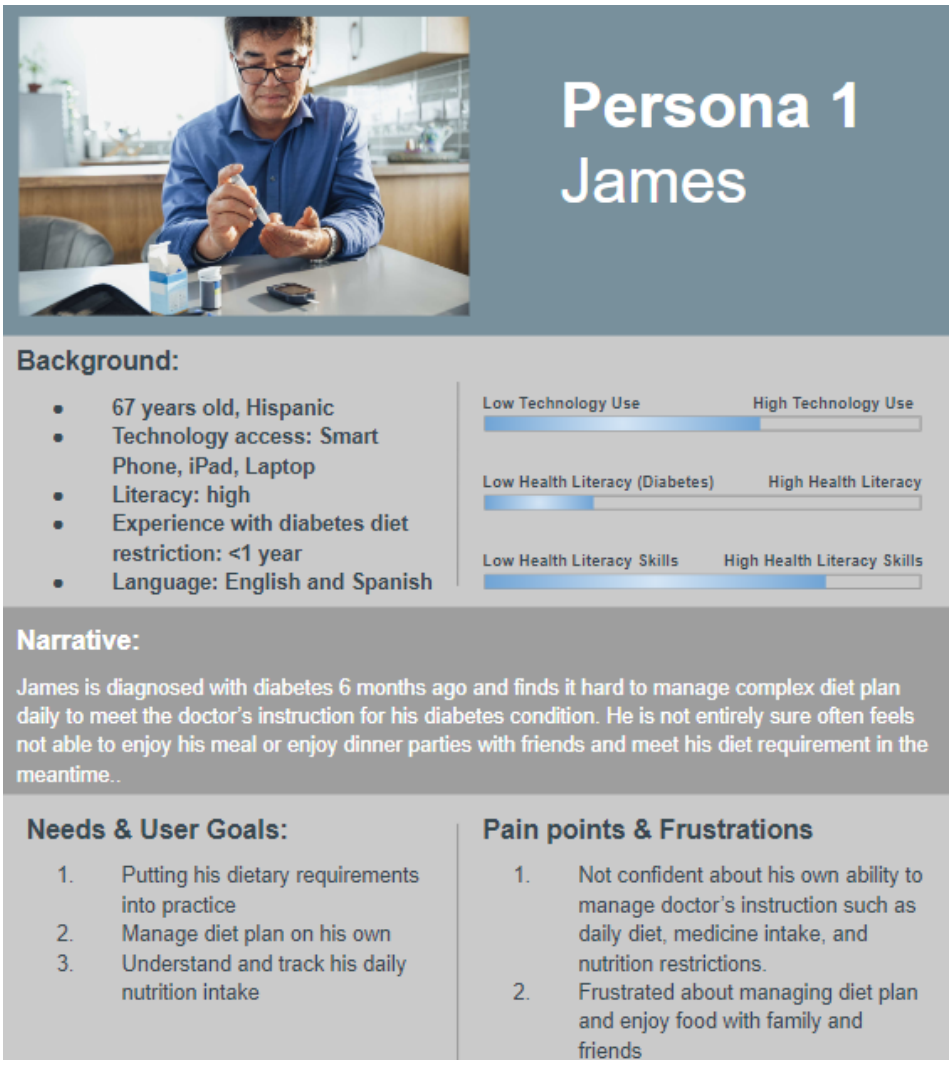

Image showing visual depiction of Persona 2.

Persona 2
Dabby

Background:

- 79 years old, White
- Technology access: Smart Phone
- Literacy: medium
- Experience with diabetes diet restriction: ~15 year
- Language: English

Low Technology Use — High Technology Use

Low Health Literacy (Diabetes) — High Health Literacy

Low Health Literacy Skills — High Health Literacy Skills

Narrative:

Dabby has about 15 years of diabetes and this is getting harder and harder to to follow the instructions for their long-term diabetes condition. She has tried several folk remedy during the process since she is so fatigued about her diabetes condition. As her condition turned worse in her last doctor's appointment, she started to try a new medication and want to know how other people's experience about this new treatment.

Needs & User Goals:

1. Accountable information source
2. Emotional support

Pain points & Frustrations

1. Prompt help for both emotional support, health information, and new treatment are needed
2. Lose patience of personal diabetes condition

APPENDIX B
SCENARIOS

Scenario 1

For the past month, James has used SugarCoach to aid in the management of his diabetes. He enjoys the "Learn" tab in particular since he can obtain accurate and trustworthy information on his condition there. He finds it simple to navigate through the many features. He still has trouble understanding and keeping track of his daily nutrient intake, though. One day, he chooses to use SugarCoach's "Play" option to try out the diet-related trivia game. James is inspired to keep playing and learning after seeing that he receives a trophy for his efforts. After finishing the game, James is more assured that he can keep track of his daily nutritional intake and manage his diet plan independently. Additionally, he gains emotional support from the community forums, where he can interact with other users who have had comparable experiences, and he feels more responsible for his source of health information. **Arroz con Gandules**, is his favorite dish, but he couldn't have it due to his diabetes. Now using the above resources, he found a diabetic friendly version, where he could switch regular white rice in arroz con Gandules, with brown rice or quinoa can be used. Additionally, instead of using regular flour tortillas in tacos, low-carb tortillas or lettuce wraps can be used.

However, James is waiting for an updated version of it, where he wants to see language options like Spanish as well as hopes that there is customer support for any possible technical issues he encounters.

Scenario 2

Dabby has been having difficulty controlling her diabetes for a few years and is dissatisfied with her current course of therapy. She chooses to ask a medical professional a question on a novel treatment she learned about via SugarCoach's "Learn" page. Within a short period of time, Dabby receives a response from a medical professional with useful details on the novel treatment, including possible risks and side effects. The prompt and trustworthy response from a medical professional relieves Dabby and she is inspired to keep using SugarCoach to control her diabetes because of this. Later on, she suggests the application to her friends, and appreciates the usability by saying, "Michelle, the text is so perfect, I could read it without my glasses on, Haha!" She loves the High contrast and large fonts in the application. She then goes on to show her, the current graphs and charts of her progress while internally feeling proud and empowered.

Dabby, however is worried that her personal information will be shared without consent and is afraid of data leak. There is also a talk within the app community that some new features in the update might not be free and could not be affordable to some.

APPENDIX C

APPLICATION DESIGN MOCK-UP

Image 1 showing "Story of the Week" feature, and Image 2 showing the "Talking to your Doctor" feature under the "Learn" Tab.

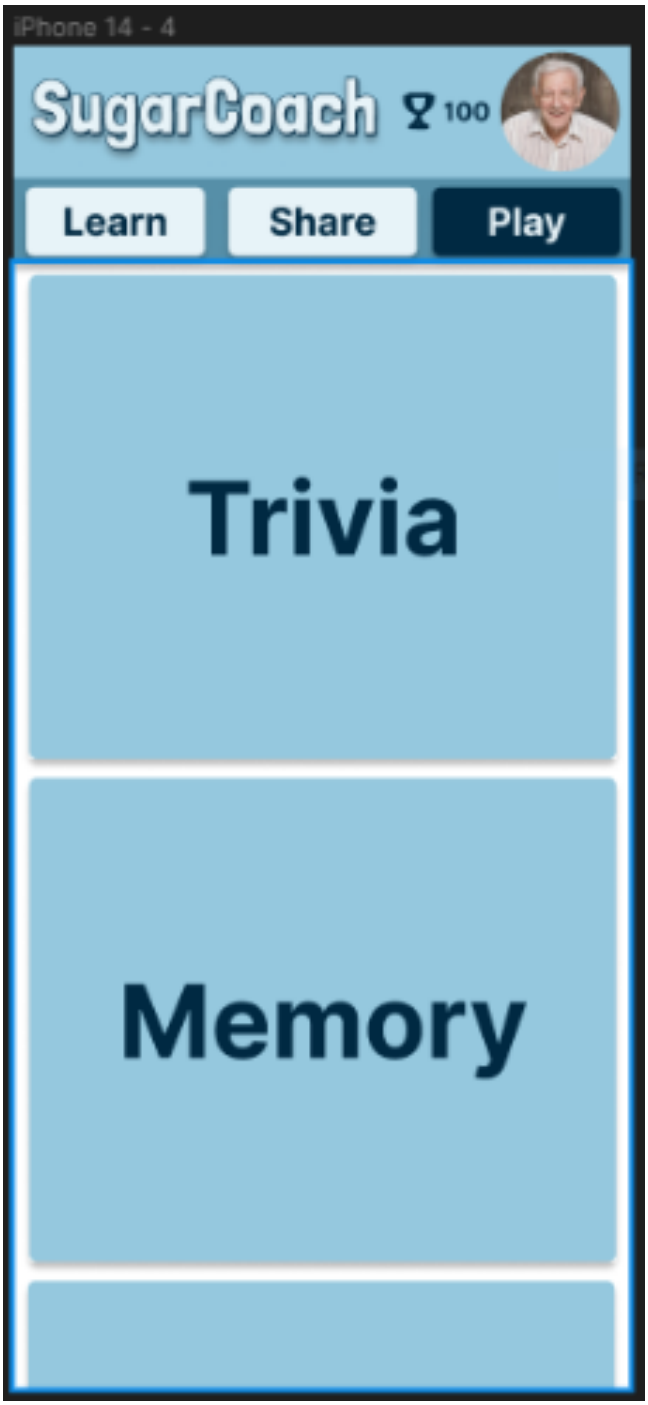

Image 3 showing the “Share” tab which helps build community engagement, and Image 4 shows games under the “Play” tab.

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