**SI 554 - Consumer Health Informatics**

**Needs Assessment and Gap Analysis**

**Team 4**

**Need/Problem Space: Resources geared at Older Adults with diabetes with low health literacy**

In this assessment, we focus on older adults (aged 65 and above) with diabetes with low health literacy and analyze their needs for digital health resources. While the U.S. Department of Health and Human Services defines personal health literacy as the degree to which individuals can find, understand, and use information and services to inform health-related decisions and actions for themselves and others. (OASH, 2020), people 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. They may struggle to navigate interfaces and understand numerical information, such as phone numbers or email addresses, which can make using devices like cell phones, computers, and the internet challenging for them (Jensen et.al, 2010). 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 from managing complex and onerous regimes that specific dietary guidelines may conflict (Griva et. al, 2020). Therefore, we summarize the needs of older adults with diabetes with low health literacy into adopting health information through digital content that meets their age-related decline in cognition for their health-related decisions and actions for diabetes treatment.

**User Group: Older Adults with Diabetes with Low Health Literacy**

According to the National Assessment of Adult Literacy, adults aged 65 and older were found to have the largest proportion of low health literacy among the general American population, 88% of whom were found to have health literacy inadequate to navigate the healthcare system and promote their well-being (Kutner et al., 2006) Low health literacy is more strongly correlated with advanced age than any other predictor, as even older adults with good health and higher education levels tend to exhibit lower levels of health literacy. (Lopez et al., 2022). Low health literacy has a proven association with a number of metabolic syndromes (Tajdar et al., 2022), and is related to a greater likelihood of Diabetes and higher fasting glucose levels in older adults (Quartuccio et al. , 2018). The most probable explanation for the decline in health literacy among older adults is the age-related deterioration in cognitive abilities rather than the loss of visual acuity or vocabulary (Lopez et al., 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). Improving health literacy among older adults with diabetes has implications not just for clinical care, but also for initiatives to increase awareness among patients.

**Existing Applications:**

* MyHealthFinder

It is a free tool offered by U.S. Department of Health and Human Services and providing users a variety of health information which they can learn about. It provides personalized wellness check to inform users of screenings and lifestyle recommendations they should be aware of based on their age and sex

* Veri

It helps in finding the right food and habits for your body to lose weight, reverse insulin resistance and extend your healthspan. It has features like continuous glucose monitoring in the form of a tiny device worn in your hand, recommended food items based on metabolism, as well as varied representations of your data to better understand.

* Glucose Buddy

It allows users to track their blood sugar levels, medications, and other health information. It also includes a food database to help users make healthy eating choices and provides reminders to take medications.

* MySugr

It provides users with a simple and easy-to-use interface for tracking blood sugar levels, medications, and other health information. It also includes personalized coaching to help users improve their health literacy and make better decisions about their diabetes management.

* One Drop

It allows users to track blood sugar levels, medications, and other health information. It also provides personalized coaching and support to help users manage their diabetes and improve their health literacy.

* Glucosio

It is designed to help users track their blood sugar levels, medications, and other health information. It also includes educational resources and personalized coaching to help users improve their health literacy and manage their diabetes more effectively.

Based on our research about the existing CHI applications for our targeted populations, we found that most of them are designed to provide these individuals with user-friendly and accessible tools for managing their diabetes. These applications typically include features such as easy-to-use interfaces, reminders to take medications, tracking of blood sugar levels and other health metrics, and educational resources tailored to the user's individual needs. Additionally, many of these applications offer personalized coaching and support to help older adults with diabetes improve their health literacy and make better decisions about their diabetes management.

**Proposed Solutions for Existing Gaps:**

* Tracking health information

provide users with an easy way to track their blood sugar levels, medications, and other important health information. By keeping track of this information, users can better understand how their lifestyle choices are affecting their diabetes management.

* Educational resources

provide users with educational resources, such as articles and videos, to help improve their health literacy. This can include information about healthy eating, exercise, and medication management.

* Personalized coaching

provide personalized coaching to help users manage their diabetes and improve their health literacy. This can include advice on lifestyle changes, medication management, and other aspects of diabetes care.

* Reminders

send users reminders to take their medication, test their blood sugar, or make other important health-related decisions. This can help users stay on track with their diabetes management and avoid potentially dangerous situations.

**Gap Analysis**

**Need/Problem Space:** Support for older adults with diabetes with Low Health Literacy

**User Group:** Older adults with Diabetes with Low Health Literacy

**Rationale for Need/Problem Space and User Group:**

Diabetes is a very serious long-term medical condition that raises the risk of cardiovascular disease, nerve damage, and kidney, eye, and skin issues. In the United States, 37.3 million people have diabetes as of 2022, according to the Centers for Disease Control and Prevention (CDC) and this number is expected to increase with the aging population. As individuals age, their risk of developing diabetes increases due to a combination of factors, including changes in insulin sensitivity, decreased physical activity, and increased rates of obesity. Older adults with diabetes may have multiple comorbidities, such as hypertension, heart disease, or stroke. These comorbidities can impact diabetes management and require a more comprehensive approach to care. Consequently, we require a tailored, personalized application that provides them with integrated information, in a clear and understandable manner. In some cultures, aging is viewed as a natural process that is embraced and respected. In others, aging may be viewed more negatively, with older adults seen as a burden on society. These cultural attitudes can impact how older adults view their diabetes diagnosis and how willing they are to manage it. An interactive platform will assist them in overcoming the stigma and motivate them to get assistance.

The user group identifies a sizable population having trouble using and accessing health tools and services for managing diabetes. This user group has issues understanding and navigating complex treatment regimens, adhering to dietary guidelines, and using technology effectively. Additionally, the disease's additional symptoms make it harder for them to use technology. Patients with advanced illness will have worsened vision and difficulty using the interface due to problems with touch perception brought on by nerve damage. To effectively address these requirements and challenges, the application should have high-quality usability and aids.

| **Potential/ideal application characteristics**  (based on literature review) | **Competitor 1**  MyHealthFinder | **Competitor 2**  Veri |
| --- | --- | --- |
| 1. ***Design Principles for User Group*** | | |
| **Clear and simple language**  (Stableford & Mettger, 2007) | Included | Included |
| **Visual aids**  (Garcia-Retamero & Cokely, 2017) | Not Included | Included |
| **Easy to navigate user interface**  (Lewis et al., 2010) | Included | Included |
| **Cultural nuances** (Dube et al., 2013**)** | Not Included | Not Included |
| **Personalization**  (Giuse et al., 2012) | Included | Included |
| **Interactive design**  (Jacobs et al., 2016) | Not Included | Included |
|  |  |  |
| 1. ***Theory-based Intervention Strategies and (if relevant) behavior change techniques that should be employed*** | | |
| **Gamification -** In populations with low health literacy, gamification of health education applications can create increased intervention success rates and reduce barriers to entry for health learning.  (Priesterroth et al., 2019) | Not Included | Not Included |
| **Social Support -** Social support systems can support health education in populations with low health literacy by forming a community connection with those who have similar conditions. This creates a sense of community which increases desire and effectiveness of learning.  (Jo et al., 2020) | Not Included | Included |
| **Visual Aids and Clear Communication -** One of the barriers for health education for low health literacy populations is a lack of understanding of medical terminology for being overwhelmed by large amounts of hard to digest information. Creating applications which use simple language and visual aids to create easy to digest information can increase health education in these populations.  (Kripalani et al., 2006) | Included | Included |
|  |  |  |
| **Behavior change techniques (see handout from class)** |  |  |
| **Instructions on how to perform certain tasks** | Included | Included |
| **Credible Sources** | Included | Included |
| **Goal setting** | Not Included | included |
| **Social support** | Not Included | included |
| **Personalization** | Included | included |
|  |  |  |
| 1. ***Technological platform that should be used, and platform features actually used*** (e.g., web browser, texting, digital camera, accelerometer, GPS, Video playback) | | |
| **Text-to-voice** | Not Included | Not included |
| **Camera Use -** The use of camera technology can be used to allow users to use their camera to identify issues they have rather than having to compare physical symptoms with technical terminology | Not Included | Not Included |
| **Mobile-Friendly -** Mobile friendly application offer the user more flexibility for accessing health interventions | Included | Included |
| **SMS or Messaging Integration -** SMS messaging is the most commonly used mHealth technology. Typical application involves creating awareness and promoting health. (Abaz et al. 2017) | Not Included | Not Included |
| **Direct Medical Expert Contact -** Telehealth implementation within the app to allow users to directly talk to medical professionals when needed  (Haleem et al., 2021) | Not Included | Not Included |
| **Wearable Health Technology Integration -** Application which can integrate wearable health technologies such as glucose monitors or smart watches allow the users to enhance their health education based on their health data, and better understand the information about their bodies  (Nittayathammakul et al., 2021) | Not Included | Included |
|  |  |  |
| 1. ***Ideal features of application*** | | |
| **Reduced Medical terminology which is present in easy to digest formats, such as graphics or videos** | Included | Included |
| **Social Support systems** | Not Included | Included |
| **Easily Navigable User Interfaces** | Included | Included |
| **Custom Reminders** - reminders to help users remember to take their medication, check their blood sugar levels, and attend medical appointments. **(Kim et al., 2018)** | Not Included | Included |
|  |  |  |
| 1. ***Ideal content of an application*** | | |
| **Positive Stories of those who have successfully managed chronic conditions** | Not Included | Not Included |
| **Allow Glucose Level tracking and provide guidance on how to manage low and high levels** | Not Included | Included |
| **Provide guidance on physical activity, including recommendations for exercise routines and tips for staying active.** | Included | Included |
| **Provide motivational content, such as inspiring quotes, success stories, and tips for staying motivated.** | Included | Not Included |
| **Provide guidance on healthy eating habits, including information about portion sizes, food choices, and meal planning.** | Included | Included |

**Major gaps across applications: Highlight**

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