

Usability Test Report
Migraine Monitor
Elon University
COM 691

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Executive Summary

Migraine Monitor is an application that allows individuals, suffering from migraines, to track their triggers and treatments, record their symptoms and connect anonymously with other migraine patients. Users also have the ability to allow their doctors to monitor their migraine care through an online dashboard. The purpose of our study was to examine users' impressions of Migraine Monitor (MM) within the app store as compared to Migraine Buddy (MM's biggest competitor), their engagement levels (attrition and retention), frustration points, satisfaction in regard to ease of use as well as users recognition of the iconography.

First a persona was created which embodied preliminary research conducted to establish a target audience. Research revealed the average age of health tracking application users to be between 20-50 years old, the majority of migraine sufferers to be female, and common activities for females in that age bracket to be yoga, jogging, or related social activities. The persona was used as a guide when constructing the screening questionnaire and determining participant requirements.

For this study, users were asked to first complete a screening questionnaire, to ensure they met the persona criteria to participate, before being asked to complete six scenarios and tasks that would guide them through the app unbiasedly and reveal their behaviours and needs while using the app. The results and recommendations of this study have been gathered from the data of four participants meeting the criteria of:

- Non-users (of the Migraine Monitor and Migraine Buddy app)
- Women between the ages of 20 and 50 who suffer from migraines or headaches at least once every few months.

Results found several positive aspects to the application design including:

- Migraine Monitor (MM) is easy to find in the app store. None of the participants struggled to locate the app.
- The overall presentation of MM within the app store was seen as clear and well presented. A majority of participants thought MM's color scheme & screen designs were more appealing than Migraine Buddy (MB), stating the design appeared "clean, crisp & calming."
- The iconography was seen as visually appealing and consistent in design.
- The process of registering was found to be straightforward and quick to complete.
- The process of recording a migraine was found to be easy to complete and understand.

Results found several consistent qualitative and quantitative areas for improvement including the need for more prominent app store presence, simplified tutorial navigation, succinct iconography, consistent behavior when entering migraine information, and a user-friendly detailed summary page. Recommendations given to improve user experience of the app include:

- Including in-app prompts to garner more user reviews on the app store.
- Using essential iconography that reduces icon redundancy throughout the app
- Alleviating cognitive load during the tutorial process by pairing down screens shown during the tutorial process and including interactive navigation.
- Fixing inconsistencies during the process of entering migraine data.
- Making interactions within the migraine data entering process consistent.
- Combining the Summary and Detailed Summary pages, thus simplifying the optimal path to find user migraine data.

Table of Contents

Purpose of the Study/Introduction	3
Method.....	4
Results.....	6
Findings & Recommendations.....	17
Reflection.....	24
Appendices.....	25

I. Purpose of the Study/Introduction

Migraine Monitor is an application that allows individuals, suffering from migraines, to track their triggers and treatments, record their symptoms and connect anonymously with other migraine patients. Users also have the ability to allow their doctors to monitor their migraine care through an online dashboard. Our client objectives were as follows:

- Understanding the journey of the application from the app store or google play store to installation
- How to keep users engagement levels high / dropout rates low (What will make users want to come back and continue using the app?)
- Examine the general navigation and ease of use of the application

The purpose of our study was to examine users' impressions of Migraine Monitor (MM) within the app store as compared to Migraine Buddy (MM's biggest competitor), their engagement levels (attrition and retention), frustration points, satisfaction in regard to ease of use and users recognition of the iconography by answering the following questions:

- What are users' first impression of the application based on the app store store?
- Why would a user stop using this application (based on their initial interactions with the application)?
- Why would a user continue to use this application (based on their initial interactions with the application)?
- What are common errors or frustration points that users experience when interacting with the application?
- What are common satisfaction points in regard to ease of use?
- Do users understand what the icons represent?

II. Method

Testing took place, between March 13th and April 9th, in the Innovation Lab located in the Long Building at Elon University. We conducted one testing session per participant. Each session took place at the time that was most convenient for the participant. For each session, we had a moderator, note-taker and cameraman. The moderator's task consisted of reading the briefing script to the subject at the beginning, sequentially reading the tasks out loud, and administering the post-task questionnaire. The note-taker was required to jot down notes, according to the observation coding form (See Appendix 6), and analyze the subject's reactions and nonverbal cues indicating emotions. The cameraman's job was to ensure participants verbal dialogue and the app screen were recorded by following the steps listed in the Camera Setup Document (See Appendix 7). In order to capture all data we used several pieces of equipment, they are as follows:

- A phone running on IOS 11 or later
- IOS 11 built in Screen Recording feature (this served as the main screen recording instrument)
- Canon DSLR camera (this recorded all verbal answers and will be a backup screen recorder)
- Version 4.0.3 of Migraine Monitor Application

Prior to testing, participants were asked to complete a Screening Questionnaire (See Appendix 1) to ensure they meet the target user criteria. Our target user criteria was as follows:

female, between 20 - 55 years old, experiences migraines at least once every few months, and has not used Migraine Monitor or Migraine Buddy before. Participants who met these screening requirements, were then asked to participate in our study. For those who did not meet the screening criteria, we followed up with a thank you email for taking the time to fill out the screening questionnaire. For this series of testing, there were four individual testing sessions that lasted approximately 40 minutes each. In order to discover authentic user behaviours and needs, users were given six different scenarios and tasks that guide them through the app unbiasedly.

Before starting the testing session, each participant was provided a Consent Form (See Appendix 2) to review. Upon receiving consent to proceed, testing began. Participants were first prompted with a Briefing Script (See Appendix 3). Once the Briefing Script was read, participants were provided with a phone that was unlocked with the app store pulled up. At this point, screen recording and camera recording were initiated and we began with the first task. Each participant was guided through the various tasks according to the Task Script/Standardized Instructional Phrases (See Appendix 5) and were provided with a questionnaire (See Appendix 9) and open ended questions (See Appendix 10) after each task.

For our first task, we asked participants to compare Migraine Monitor with Migraine Buddy (competing application) in the app store. Our comparison focused on storage, reviews, features, and graphical content). We used counterbalancing for this task to avoid user bias when looking at Migraine Monitor and Migraine Buddy. Once this task was complete, we began the second task. For this task, we provided participants with the Icon Sheet (See Appendix 4) and asked them to write, to the best of their abilities, what they thought each icon represented. For our third task, we had participants download the Migraine Monitor app and complete the tutorial at their own discretion. For our fourth task, we asked participants to register, create a profile, and add in medications & set a reminder to log headaches (all located within the profile component). For our fifth task, we asked participants to record and review a migraine. Finally, for our last task, we provided the participants with the Icon Sheet (See Appendix 4) and asked them to write what they thought each icon represented. Once the six tasks were completed, participants were thanked for their participation and guided out of the testing room.

For our research, we gathered both qualitative and quantitative data to capture a breadth of results. Through our data collection, we captured users' feeling, motivations, measurements of satisfaction and frustration, and initial reactions.

III. Results

This study had a total of four participants, all female between the ages of 20 - 25. On average, they experience migraines once every couple of months and rarely use health tracking apps. None of our participants had interacted with Migraine Monitor (MM) or Migraine Buddy (MB) prior to this study. During our testing, participants were the most annoyed, irritated and/or exasperated with the task of going through the tutorial (See Figure 1). Participants were least satisfied with the process of moving through the app and the layout of the screens for the migraine recording process (See Figure 1). They were the most satisfied with finding and exploring the app within the app store (See Figure 1).

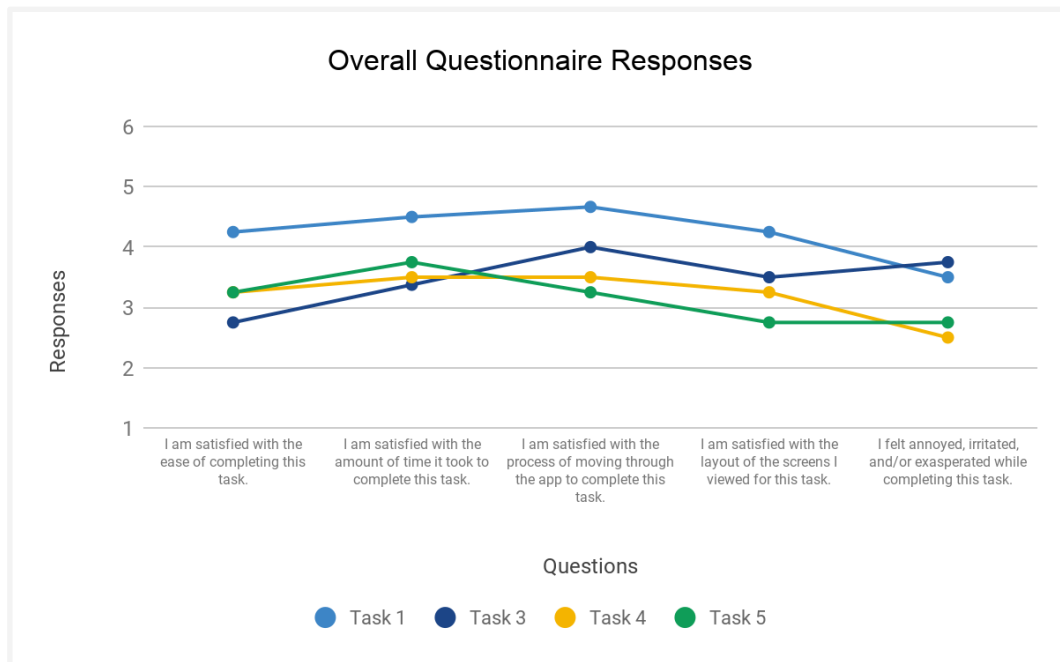










Figure 1. Mean ratings for each task as indicated by all four participants in the post-task questionnaire. Rating of 1 indicates strongly disagree and rating of 5 indicates strongly agree.

Overall, our participants found MM easy to find in the app store. Each participant was able to successfully locate the app without error. According to our participants, the four most common things they look at in the app store before downloading an app are: the most recent reviews, number of ratings, app features available & pictures/screenshots presented. While many participants noted that the size of apps are important, the current size of MM was not a deterrent to our participants.




When comparing MM and MB in the app store, three out of four participants thought MM's color scheme & screen designs were more appealing than MB, stating it appeared "clean, crisp & calming." During the task of exploring the app in the app store, all participants presented a positive and strongly positive comment towards MM. Only one participant presented a strongly negative comment. Additionally, all participants stated that they would download and test out MM based on what is presented in the app store. While the visual presentation of MM was effective and appealing to our participants, two out of four participants noted that they would likely not use the doctor component as they "don't want to interact with their doctor through an app." Each participant noted that MB has more reviews and higher ratings (MB 4.8 stars and 14.7K ratings, MM 4.1 stars and 48 ratings). However, the discrepancy between the two did not deter participants from wanting to test out both apps. Finally, one of our participants pointed out a stronger recognition of the companies/organizations who supported/sponsored MB than those who sponsored MM.

All participants correctly identified the following icons both before and after using the app:




	Home
	Logoff
	Settings
	Medication/My Most Frequent Meds

	Community
	Search
	Like (Thumbs Up)
	Like (Heart)
	News
	My Profile (with circle)
	My Profile (without circle)








The following icons were correctly identified by all participants both before and after using the app, but with notable conditions:



	<p>Calendar / Headache for a Day / Next Appointment</p> <p>Consistently identified as “calendar,” but did not lead to additional understanding of the functionalities within the calendar screen</p>
	<p>Both gender icons (male and female)</p> <p>If not identified specifically as “male” or “female”, participants still recognized that the icons were meant to represent a gender.</p>
	<p>My Provider</p> <p>While the specific language used to describe the icon changed, all participants recognized this symbol to represent some kind of doctor both before and after using the app.</p>

The following icons were correctly identified by all participants only after using the app:






	<p>Record Headache</p> <p>Requires context, but memorable. This icon had the most drastic change, with 0 participants identifying it before using the app and all participants identifying it after.</p>
	<p>Filter</p> <p>3 participants consistently identified this icon, one correctly guessed its meaning after using the app, where they had only supplied a “?” before using it.</p>
	<p>Close/Exit Menu</p> <p>3 participants consistently identified this icon, one had guessed that it would close the entire app before using it.</p>






The following icons were not correctly identified by any of the participants both before and after using the app:

	Stress Level Associated with charge/battery level, migraines.
	Terms of Service Participants guessed that this represented a checklist, chart, or notes.
	My Conversations Associated with health condition, batteries.
	Enter Appointment Associated with checklists, charts, or notes.
	Tutorial Associated with questions. 50% of participants did not have a guess after using the app.
	Help/Feedback Associated with comments, messages, or notes.
	Sort News By* Associated with graphs or menus. 50% of participants did not have a guess for what this icon meant. *Participants were not directed to perform any tasks which would utilize this icon or the screen which contains it.

	Insights Associated with announcements, notifications, news
	Say Thanks* Associated with meeting others, handshakes. *Participants were not directed to perform any tasks which would utilize this icon or the screen which contains it.

The following icons were underperforming (25%-50% recognition) after using the app:

	Resources Associated with files.
	Inspirations/Inspiration Messages Associated with ideas, news, insights
	Provider Location Generally associated with buildings/Dr's offices before using the app, but after using the app one participant did not have a guess and two did not indicate a close/correct functionality
	Mood & Stress
	Notes

	Share Associated with uploading
	View My Liked News* Associated with filtering and liking, but the combination of the two was perplexing. *Participants were not directed to perform any tasks which would utilize this icon or the screen which contains it.
	Tag* Associated with price tags/stores *Participants were not directed to perform any tasks which would utilize this icon or the screen which contains it.
	Provider Messages Associated with hospitals and more general medical concepts.
	Weather (cloudy) Associated with “the cloud” used to share/save data

In regard to downloading the app, all participants found process of downloading and opening the app easy and straightforward. All participants noted that the process matched their expectations based on other experiences with downloading apps. In regard to the tutorial, all participants found the tutorial thorough, it's content easy to understand, and enjoyed the color scheme and consistency of the design. The average time to download the app and complete the tutorial was 3 minutes(m) 30 seconds(s), with the shortest time being 2m 06s and the longest time being 5m 01s. The discrepancies in time varied based on user thoroughness with reading and reviewing the tutorial. During this process, participants noted that they felt annoyed, irritated and/or exasperated and were unsatisfied with the ease of completing the task (See Figure 2). Three out of the four participants stated that the tutorial was overwhelmingly long and were

surprised that the tutorial was presented before they were logged into the application. Additionally, two out of the four participants were initially confused as to what they were supposed to do when they were presented with the tutorial. They thought the tutorial was the application itself and attempted to interact with it.

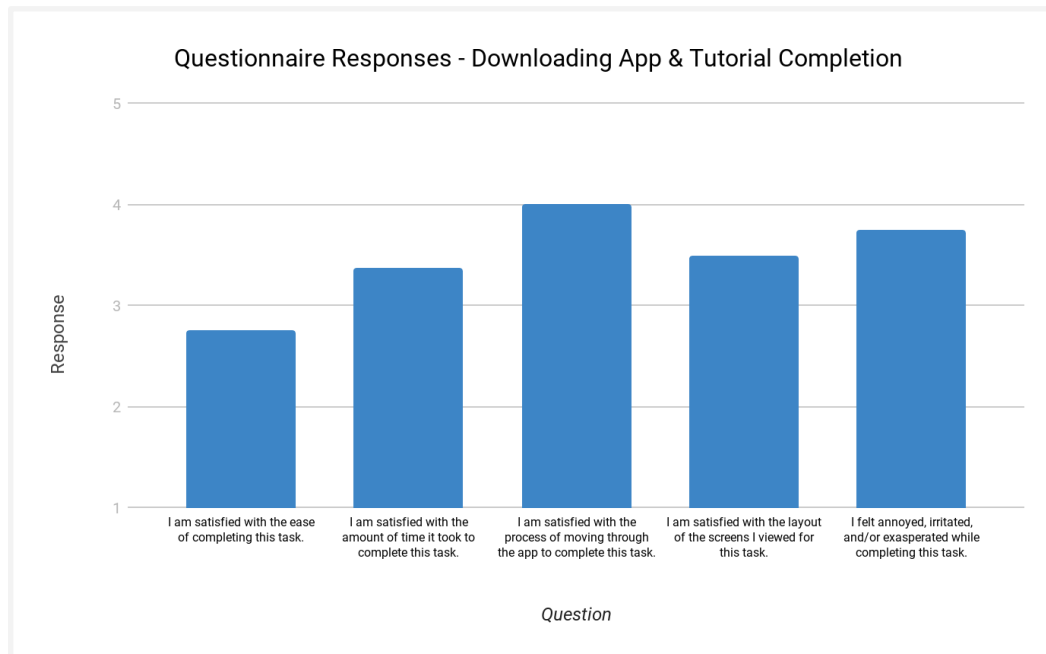


Figure 2. Mean ratings for each question for the task of downloading the app and completing the tutorial as indicated by all four participants in the post-task questionnaire. Rating of 1 indicates strongly disagree and rating of 5 indicates strongly agree.

There were some commonalities in the errors participants encountered in the registration process (See Table 1). All participants had to recreate their passwords two or more times when creating their profile because they experienced errors such as “invalid password” or “passwords did not match.” For the task of adding medications, two out of four participants thought adding medications would have been located in the provider menu. They spent time looking around in various places within the app before they found the “Add Medications” button that was located in the profile. Lastly, while half of the participants struggled to find the reminder to log headache toggle, the other half were able to turn it on immediately after they had finished adding their medications. Despite the discrepancies in ability to find the reminder location, all participants mentioned the reminder to set headache toggle was too small and blended in with the other visual aspects.

Table 1

Individual Errors by Participants			
1	2	3	4
<p>Error 1: Logging in 3 times before realizing need to register first</p> <p>Error 2: Entering invalid password 2 times - Spelling ibuprofen incorrectly</p> <p>Error 3: Selecting popover menu before finding reminder to log in profile</p>	<p>Error 1: Entering invalid password 3 times</p> <p>Error 2: Selecting provider tab, notes and then popover before finding “Add Medications” button in profile</p>	<p>Error 1: Entering invalid password 2 times</p> <p>Error 2: Selecting community tab and provider tab before finding “Add Medications” button in profile</p>	<p>Error 1: Going back home, to the recording triggers screen and selecting calendar before finding reminder to log in prof</p>

Two participants displayed furrowed brows and concentration while adding in medications. One participant let out a deep sigh and groan expressing frustration for not being able to see what characters were entered for password fields and not having any of the requirements to create a password listed. The optimal time for completing this task is 2 minutes, yet all participants exceeded the optimal path (See Table 1.) The average time for completing the registration/profile setup was 3m 44s, with the shortest time being 3m and the longest time being 4m 44s (See Figure 3).

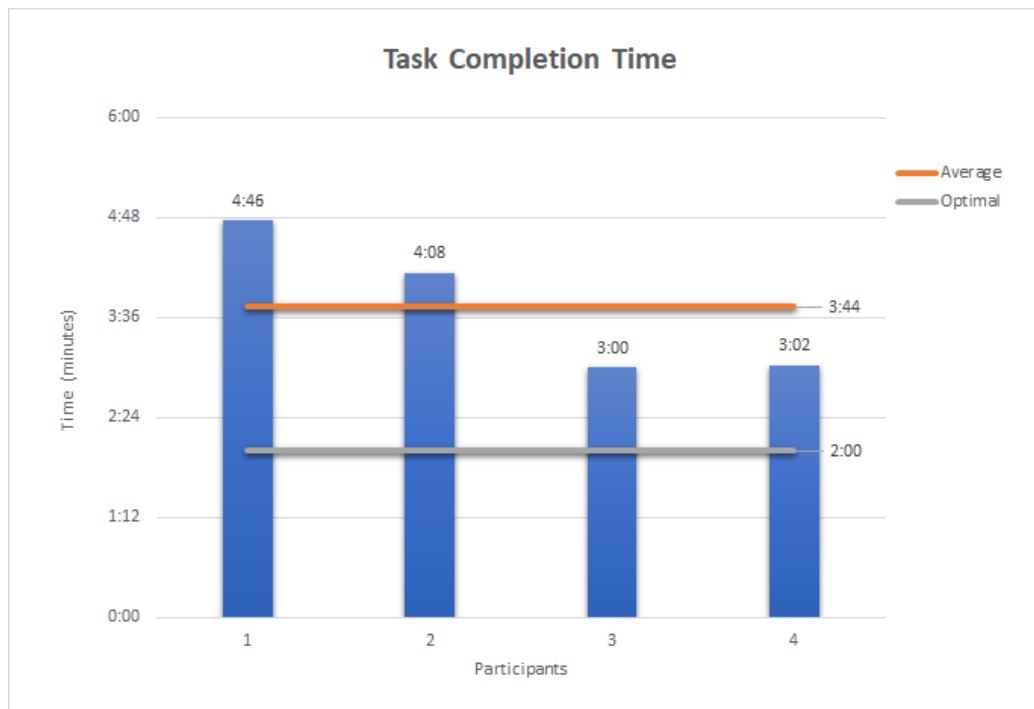


Figure 3. Time to complete the task of registering, creating a profile and adding medications.

The average time to complete the task of recording a migraine and then finding the summary of that data, was 3m 56s, the shortest being 1m 07s and the longest being 5m 09s. Commonalities were found in three of the four participants when locating the detailed summary of the migraine after it was recorded. three of the participants found locating the detailed summary to be very difficult, frustrating, or impossible (See Figure 4). Three of the four participants also experienced a bug when entering personalized medication, when returning to the medications screen, previously entered meds are unselected. Another commonality found was that participants often went to the footer icons when searching for the headache summary, then the menu, then searched on the homescreen, then back to the footer icons. Half of the participants noted that common medications were missing from the list and that the text could be larger. Observation of the participants noticed that physical signs of impatience were present in three of the four participants. Half of the participants noted that the linear structure of entering migraine details was helpful. All participants found starting a headache recording simple and easy.

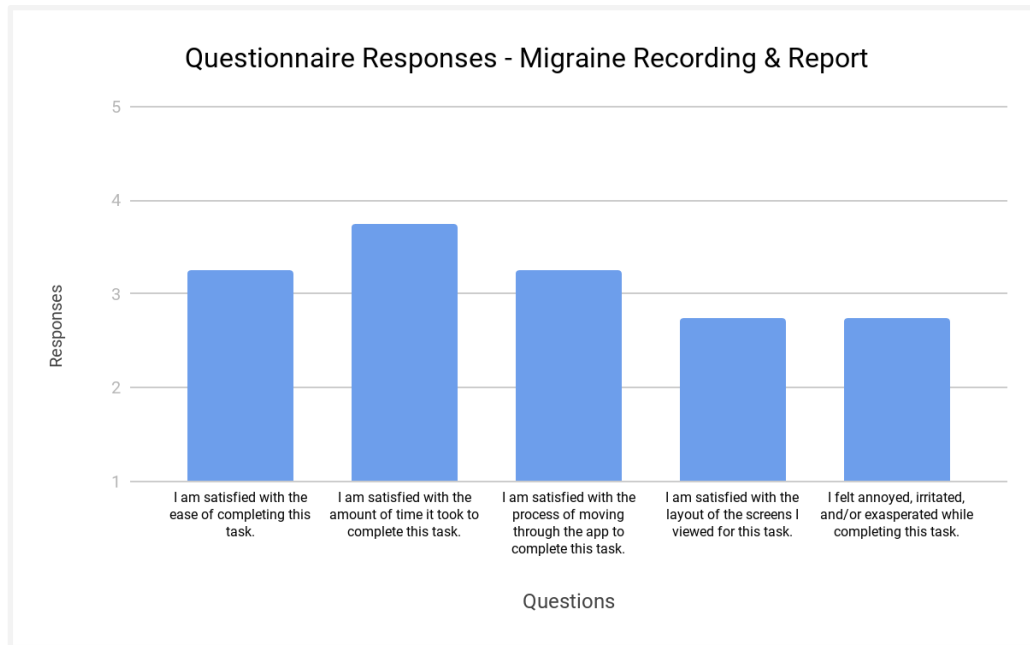


Figure 4. Mean ratings for each question for the task of recording a migraine and finding the summary for that migraine as indicated by all four participants in the post-task questionnaire. Rating of 1 indicates strongly disagree and rating of 5 indicates strongly agree.

IV. Findings & Recommendations

Based on our findings, we found several areas of MM that indicate no need for changes/redesigns. First, being that MM was easy for all participants to find in the app store and because the process was consistent to participants' prior experiences, we do not recommend making changes to this process. Additionally, with a majority of our participants enjoying the presentation of MM within the app store, we do not recommend making changes to the presentation components included in the app store (i.e. screenshots, bulleted details etc.). In regard to the iconography, we do not see the need to change the visual design as a majority of participants found them visually appealing and consistent in their design. As for registration, the process was straightforward and quick to complete. Thus, we do not recommend making changes to the overall registration process. Finally, the process of recording a migraine was easy to understand and complete. Therefore, we do not recommend making changes to the overall process of recording a migraine.

Based on our research, we also found several consistent qualitative and quantitative areas for improvement. These include need for more prominent app store presence, simplified tutorial

navigation, succinct iconography, consistent behavior when entering migraine information, and a user-friendly detailed summary page. Based on these findings, we have developed design recommendations to improve users' experiences with MM.

IV.1 App Store

In regard to the size of the application, while it is currently not a deterring factor, we would recommend minimizing the size, when possible, as the app is further developed as it could become an issue in the future. With the visual appeal being positive, we would not recommend changing the overall presentation of the app within the app store. However, with some participants stating that they would likely not want to use the doctor component, we recommend ensuring that this is presented as optional, not a required, component. Giving users the full understanding of each component is very important. With the ratings and reviews of MM being lower and fewer than MB, we recommend trying to get the name out there to get people to explore the app and encourage users to leave reviews. Whether it be an in app popup or email, encouraging users to leave reviews could increase appeal and credibility. Finally, in regard to credibility, it is important for first impressions. In lieu of getting the name out there, presenting the app to well known institutes would be beneficial.

IV.2 Iconography

The iconography of the app overall is aesthetically pleasing, however the meanings and/or functions of the icons tends to be unclear. We recommend streamlining the app's use of icons, using a single icon for each function or concept it is supposed to represent (See Image 1). In addition, this smaller pool of icons should contain distinct visual representations; for example, many of the current icons mimic the appearance of a notepad, checklist, or document, and these types of similarities are confusing for users.



Image 1.

Furthermore, the functionality of each of these icons should match the expectations of the users upon viewing them. By maintaining awareness of how some icons may be used in other contexts, such as with the provider messages' "Red Cross" icon often used to represent hospitals or other urgent medical aid, MM can utilize these contexts to either reinforce the functionality of its icons or avoid unnecessary conflicts with users' expectations. Continued use of established standard function-based iconography such as home, search, like icons would best serve this purpose, as these were a large portion of the most successfully recognized icons within the app. The iconography unique to MM is most effective when it represents a major function of the app, as is shown with the successful recognition of the "record headache" icon after using the app.

Icons representing users' most frequently used functions should be located on the screen where they will be easy to find and within reach. Other adjustments to be considered include adjusting the iconography to match target female demographic, such as changing the profile icon to a female-associated silhouette.

IV.3 Tutorial

While viewing the tutorial, the participants initially appreciated the visual representations of how to navigate the app's interface, as well as the overall layout and color palette. However, once they began to navigate through the tutorial, they noted some opportunities for improvement.

One opportunity for improvement is the timing of the tutorial. Participants were surprised and frustrated by the tutorial being their first interaction with MM. We recommend postponing the appearance of the tutorial so that it either comes after registration and/or to make it optional. Currently there are 21 slides that detail some of MM's main functions.

We further recommend reducing the number of slides in the tutorial displayed on a user's first visit, only including vital information such as the migraine recording process, navigating to where information on migraines is stored, and the location of the "Tutorial" option within the hamburger menu for additional guidance (See Image 2). The existing, more detailed tutorials should remain as they are within the "Tutorial" hamburger menu option. This consolidated tutorial should start with the information most important to successfully utilizing MM and follow in order of highest-to-lowest priority.

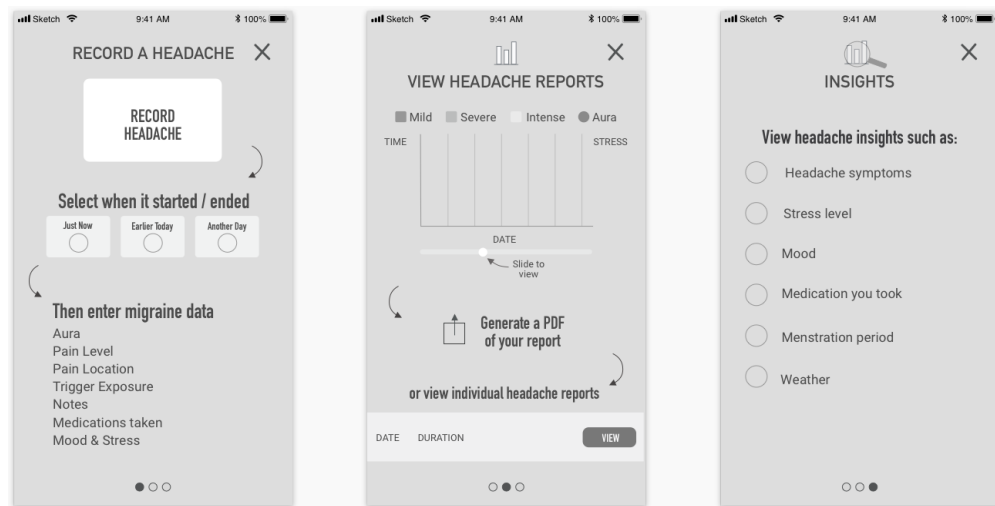


Image 2.

IV.4 Registration & Profile

For the task of registering and creating a profile, there were some common errors that took place. When creating a password for the profile, participants had to retype password several times due to unspecified password rules. We would recommend defining and clearly outlining rules specifying credentials required to have in the password, as well as adding the option to show/hide the password so that users are able to see any mistakes they may have made while typing (See Image 3).

 The image shows a registration form. At the top is a password input field with a strength indicator showing '***a'. Below the field are three requirements: 'Have at least one special character' (marked with an 'X'), 'Have at least one number' (marked with an 'X'), and 'Have at least one upper case letter' (marked with a checkmark). Below these is a 'Repeat Password' input field. At the bottom is a 'REGISTER' button.

Image 3.

Additionally, the option to login with Facebook is currently unusable. We would like to suggest that this feature should either stay and be fixed or be removed, but should not mislead the user. All of the participants pointed out that the reminder to log was really small and difficult to see, thus was overlooked and lacked in terms of findability. We recommend increasing the font size and ensuring that it stands out from surrounding elements (See Image 4).

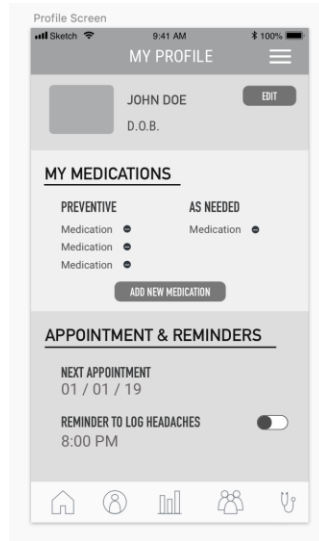


Image 4.

Through this task, we were able to gain insight into a widely used medication, Ibuprofen, which was missing. As a solution, curating a larger list of common medications will be beneficial for users and can save users time. Within the list we recommend ensuring that the terminology, brand name followed by medical name, is consistent within medications list.

IV.5 Recording Migraine & Migraine Report

Due to the trends found in recording a migraine and locating the report, recommendations concern the location, navigation, and layout of the detailed summary page. Locating the detailed summary page was found to be particularly difficult and frustrating for all participants.

Recommendations for solving this issue include:

- Making iconography more succinct across the application, thus eliminating navigation confusion when attempting to locate the summary.

- Making the detailed summary page available and prominently featured on the overall summary page as well as on the home screen.
- Restructuring the information architecture on the detailed summary page to make reading and understanding migraine data approachable and quickly consumed (See Image 5).

The next recommendation pertains to the bug found by all participants when entering medication details; wherein previously selected medications would deselect unprompted. Fixing this bug to ensure a seamless and fluid experience during the process of entering migraine details will alleviate user frustration, time spent entering information, and confusion. The last recommendation would be to resize or redesign the typographic information in both the summary and during the migraine details process, as the majority of participants found the text to be crowded, cluttered, and difficult to read (See Image 5).

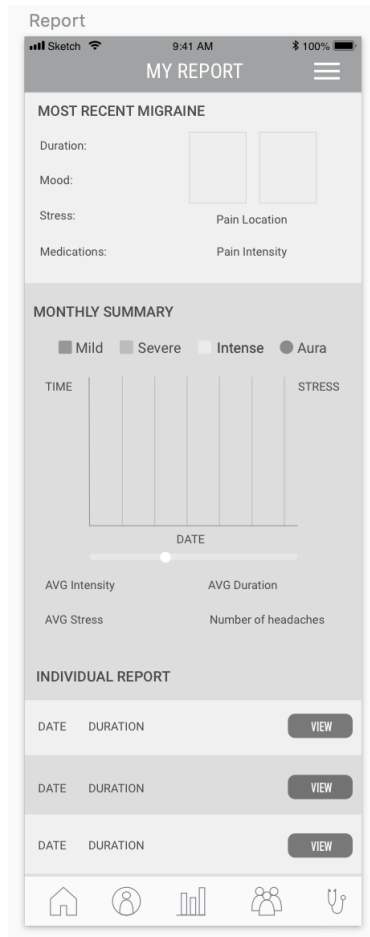


Image 5.

V. Reflection

If we were to redo this study in the future, there are a few things we would change. First, we would ensure that the tools needed for testing were readily available. Given that we had a short time frame and limited number of potential participants, having the tools needed for testing available at all times is extremely important. This way, if a participant says they can participate the day of, we don't have to scramble to get things together. Second, we would clearly define what we could and couldn't answer when participants asked questions. While it is impossible to predict what they will ask, we could have done a better job of determining what we could tell the participant for each task without giving them the solution and/or answer to their problem. Third, testing the task script and questions before going into testing. While we tested two participants before our actual study, it would have been beneficial to use the material we were planning on using. This would have allowed us to work out the kinks before official testing began.

Also, it's important to always have back ups. For one of our participants, we weren't able to capture video so we had to go off of her audio and our notes. While we were able to make do with what we had, in the future, we would make sure we would have a backup for all screen recording before we proceed with testing. Lastly, the short time frame of the study didn't allow much time for us to gather participants and gave us the most challenge. If we were to redo this test, we would ensure to start the process of finding participants as early as possible, keeping the incentives to increase likelihood of participation.

VI. Appendices

Appendix 1 Screening Questionnaire

Screening Questionnaire for Migraine App.

The information on this form will be used for research purposes only and any personal information given will be kept private and only seen by the Elon University students conducting this study.

* Required

Email address *

Your email

Name *

Your answer

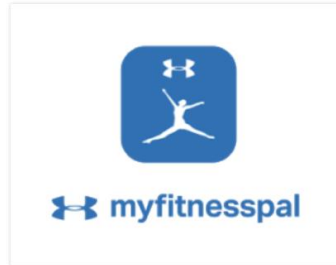
Age? *

- ☐ 18-24
- ☐ 25-29
- ☐ 30-35
- ☐ 36-40
- ☐ 41-46
- ☐ 47-52

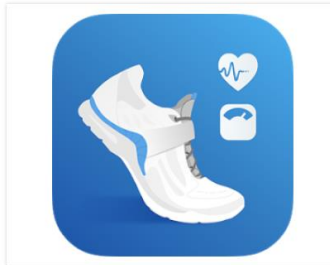
How frequently do you use apps that track or monitor habits? *

Choose

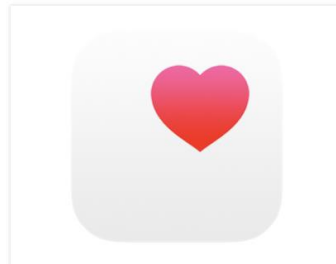
Please indicate any of the applications below that you use:



☐ MyFitness Pal



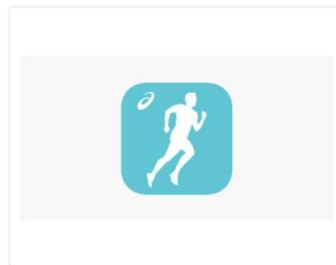
☐ Pacer



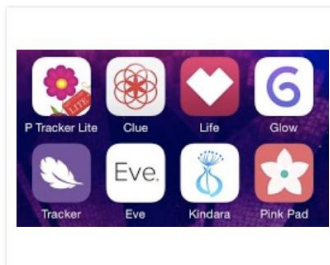
☐ Apple Health



☐ Migraine Buddy



☐ RunKeeper



☐ Period (Menstrual) Tracking
Apps such as Flo, Clue, Eve,
Spot On, or similar.



☐ Other:

☐ Migraine Monitor

How frequently do you suffer from migraines? *

- ☐ Every couple days
- ☐ Weekly
- ☐ Every couple weeks
- ☐ Monthly
- ☐ Every couple months
- ☐ Several per year
- ☐ Never

Thank you for your participation in this study!

SUBMIT

Never submit passwords through Google Forms.

Migraine Monitor Consent Form (Adult)

I agree to participate in the study conducted by the students of Elon University. Conducting this study today will be Claudia Jensen, Katie Jostes, Sneha Kulkarni, Shay Carlson, and Sandra Ferguson. If you have any questions after today, please contact Dr. Amy Hogan, Lecturer of Psychology at Elon University, at ahogan4@elon.edu.

During this usability test I agree to participate in this session using the phone provided for me as well as consent to being filmed and/or have audio an audio recording made during the session. During the session I will be interviewed about the application, asked to find information or complete tasks using the app and asked to complete an online questionnaires about the experience.

I understand and consent to the use and release of the recording by the students of Elon University. I understand that the information and recording are for research purposes only and that my name and image will not be used for any other purpose. I relinquish any rights to the recording and understand the recording may be copied and used by the students of Elon University facilitating this study without further permission.

I understand that participation in this usability study is voluntary and I agree to immediately raise any concerns or areas of discomfort during the session with the study administrator.. At any point during this test you are free to leave and are welcome to enjoy a free donut without completing this test.

Please sign below to indicate that you have read and you understand the information on this form and that any questions you might have about the session have been answered.

Date: _____

Please print your name: _____

Please sign your name: _____

Thank you!

We appreciate your participation.

Hi, _____. My name is _____, and I'm going to be walking you through this experiment today.

Today we'll be testing an app that monitors migraines to see what it's like for people to use it.

We'd love to get your feedback on the application. All of your feedback is valuable.

We want to hear exactly what you think about the experience. We want to improve it, so please give us your honest thoughts.

As we go through the tasks, I'm going to ask you to **think out loud** to tell me what's going through your mind. For example, if you're frustrated trying to complete a task, verbalize that frustration. Or, if you really like a particular feature of the app, verbalize that as well. This will help us with our research.

If you have questions, you can ask, and I will provide clarification where I can.

There's a camera _____ (*fill in location*) and screen capture on the phone. With your permission, we're going to record both you and the phone's screen so we know what you have to say, and what you're looking at when you say it. The video will be used only to help us figure out how to improve the app and it won't be seen by anyone except the people working on this project.

The screen recorder is active when the narrow bar at the top of the screen is red. If you accidentally tap this, a prompt will pop up asking if you would like to stop the recording. Please press cancel and continue with your task if this happens.

_____ will be briefing you on each task, _____ will be taking notes, and _____ will be operating the camera.

If you would, I'm going to ask you to sign this consent form for us. It simply says that we have your permission to tape you, but that it will only be seen by the people working on the project.

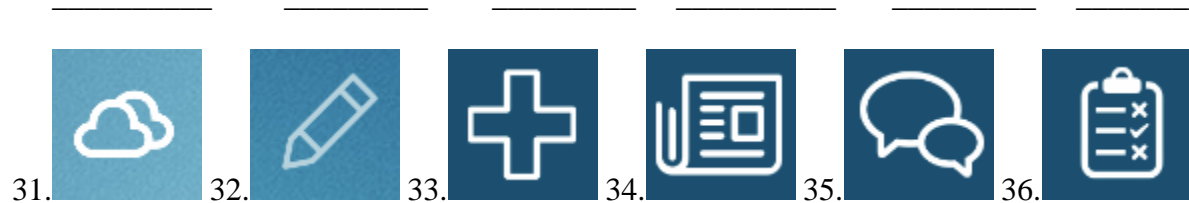
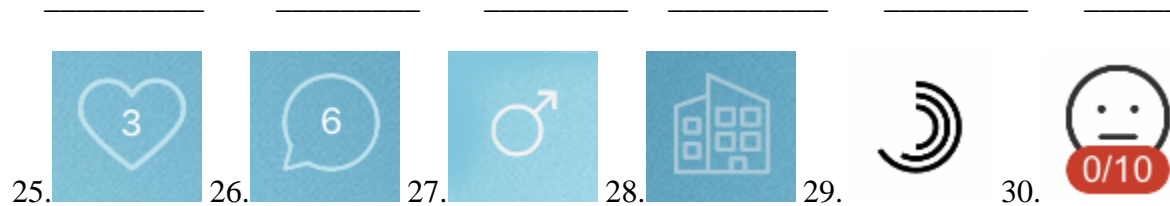
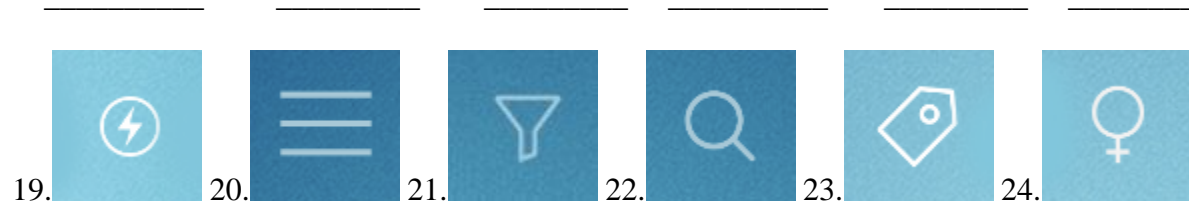
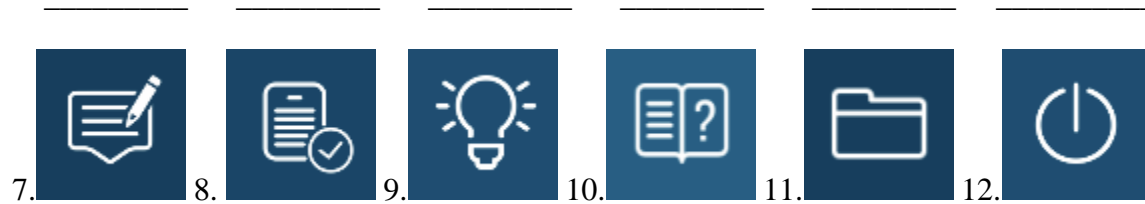
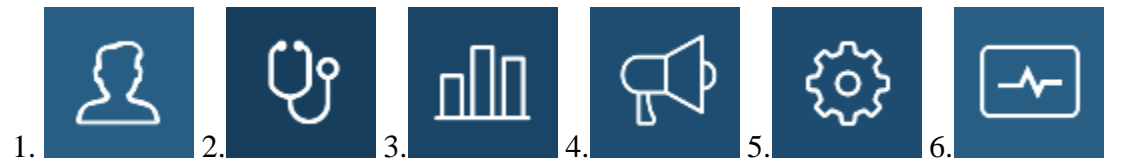
You are free to leave at any time should you feel the need to do so.

You will receive your donut once you leave the room.

Do you have any questions before we begin?

Name: _____ Date: _____ Task #: _____

Please write what you expect the meaning and/or function of each of these icons to be.



37.



38.



39.



40.



41.



42.



Appendix 5
Task Script/Standardized Instructional Phrases

INTRO

Read briefing script & answer any questions participant may have

TASK 1 (Version A - 3 Participants):

Say: “Great, now we will begin with the first task.”

(hand participant the phone - should be unlocked and app store should be pulled up)

Say: “You have been suffering from migraines for a few months now and need something to help track your symptoms. Your friend has told you about two applications, Migraine Monitor and Migraine Buddy. You want to learn more about both of them to determine which one you will use. Please go to the app store on your phone, search for and find Migraine Monitor, and explore its store page to see what it has to offer.”

(wait until they have explored ~2-3min)

Prompt if needed: “Please remember to think aloud to tell me what’s going through your mind. For example, if you’re frustrated trying to complete a task, verbalize that frustration. Or, if you really like a particular feature of the app, verbalize that as well.”

(task questions for Migraine Monitor)

Say: “We have a few questions for you to answer. Please respond to the best of your abilities.”

(once questions are answered)

Say: “Now that you have explored Migraine Monitor, please search for and find Migraine Buddy and explore its store page to see what it has to offer.”

(wait until they have explored ~2-3min)

Prompt if needed: “Please remember to think aloud to tell me what’s going through your mind.”

(end of task questions for Migraine Buddy)

Say: “That was the end of task one, we have a few more questions for you to answer. Please respond to the best of your abilities.”

(hand participant the post-task questionnaire sheet)

(once questions are answered)

Say: “Is there anything else you’d like to add before we move on to the next task?”

TASK 1 (Version B - 2 Participants):

Say: “Great, now we will begin with the first task.”

(hand participant the phone - should be unlocked and app store should be pulled up)

Say: “You have been suffering from migraines for a few months now and need something to help track your symptoms. Your friend has told you about two applications, Migraine Buddy and Migraine Monitor. You want to learn more about both of them to determine which one you will use. Please go to the app store on your phone, search for and find Migraine Buddy, and explore its store page to see what it has to offer.”

(wait until they have explored ~2-3min)

Prompt if needed: “Please remember to think aloud to tell me what’s going through your mind. For example, if you’re frustrated trying to complete a task, verbalize that frustration. Or, if you really like a particular feature of the app, verbalize that as well. ”

(task questions for Migraine Buddy)

Say: “We have a few questions for you to answer. Please respond to the best of your abilities.”

(once questions are answered)

Say: “Now that you have explored Migraine Buddy, please search for and find Migraine Monitor and explore its store page to see what it has to offer.”

(wait until they have explored ~2-3min)

Prompt if needed: “Please remember to think aloud to tell me what’s going through your mind.

(end of task questions for Migraine Monitor)

Say: “That was the end of task one, we have a few more questions for you to answer. Please respond to the best of your abilities.”

(hand participant the post-task questionnaire sheet)

(once questions are answered)

Say: “Is there anything else you’d like to add before we move on to the next task?”

TASK 2:

Say: “Great, now we will begin the second task.”

(hand participant the icon sheet)

Say: “Please guess, to the best of your ability, what each icon symbolizes and record your responses for each item.”

(end of task questions)

Say: “That was the end of task two, we have a few questions for you to answer. Please respond to the best of your abilities.” *(note: only open ended questions for this task)*

(once questions are answered)

Say: “Is there anything else you’d like to add before we move on to the next task?”

TASK 3:

Say: “Great, now we will begin the third task.”

Say: “You have found a new application called Migraine Monitor and you want to experience the app for yourself. Please download the app and proceed until you are through the tutorial.”

Prompt if needed: “Please remember to think aloud to tell me what’s going through your mind.”

(end of task questions)

Say: “That was the end of task three, we have a few questions for you to answer. Please respond to the best of your abilities.”

(hand participant the post-task questionnaire sheet)

(once questions are answered)

Say: “Is there anything else you’d like to add before we move on to the next task?”

TASK 4:

Say: “Great, now we will begin the fourth task.”

Say: “Now that you have completed the tutorial, please register and create a profile.”

(once participant has entered demographic information and taps Register)

Say: “Please indicate that you don’t have a provider and that you would rather not say how you heard out about the app.”

Note: Participant should allow for app to access location.

(once participant gets to home screen)

Say: “Please add the following two medications, ibuprofen and acetaminophen and allow for a reminder to be sent to log your headaches at _____ am/pm.”

Note: Specify the reminder time to be within the expected completion time for the test.

(end of task questions)

Say: “That was the end of task four, we have a few questions for you to answer. Please respond to the best of your abilities.”

(hand participant the post-task questionnaire sheet)

(once questions are answered)

Say: “Is there anything else you’d like to add before we move on to the next task?”

TASK 5:

Say: “Great, now we will begin the fifth task.”

Say: “You are currently experiencing a migraine and need to track it so you can be prepared to explain the symptoms and conditions surrounding its onset to your doctor. Please begin to record a migraine that is is happening “Just Now.””

(once they have started the timing)

Say:

“Tap “OK,” indicate that you had an **Aura** and check the **Visual** and **Numbness** Boxes, Tap “Next.”

“Indicate the Intensity Level as **Moderate (4-6)**, tap “Next”

“Indicate the location of the headache on **both front sides of forehead** and **front right cheek/eye** area and **both skull areas** on the back of the head, tap “Next”

“Indicate triggers **Skipped Meal, Stormy Weather** and **add** your own trigger ‘**Loud Noise**’, tap “Next”

“Add a **Note: ‘third migraine this week’** and indicate for **light sensitivity**, tap “Next”

“Indicate medications **Amerge** and **Periactin** and **Add** your own medication ‘**Fibrin**’, once all selected tap “Next”

“Indicate that the migraine is over, go to the summary and submit your migraine data”

(once participant has submitted)

Say: “Please locate the migraine you just record and ensure it is accurate.”

(end of task questions)

Say: “That was the end of task four, we have a few questions for you to answer. Please respond to the best of your abilities.”

(hand participant the post-task questionnaire sheet)

(once questions are answered)

Say: “Is there anything else you’d like to add before we move on to the next task?”

TASK 6

Say: “Great, now we will begin the last task.”

Say: Now that you have explored the app, we would like to learn more about your thoughts on the iconography within the application. We have a few questions for you to answer. Please respond to the best of your abilities.”

(end of task questions, note: only open ended questions for this task)
(once questions are answered)

Say: “Is there anything else you’d like to add before we finish?”

END

Say: “That concludes our testing. Thank you so much for taking the time to participate in the study. Feel free to ask any remaining questions you may have.”

Appendix 6 Observation Coding Form

Migraine Monitor Usability Test Observation Coding Form

Date: _____ Participant: _____ Task #: _____
 Start Time: _____ End Time: _____

Verbal Behaviors

- | | | | |
|--------------------------|--------------------------|--------------------------|----------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Strongly Positive Comment |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Other Positive Comment |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Strongly Negative Comment |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Other Negative Comment |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Suggestion for Improvement |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Question |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Variation from Expectation |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Stated Confusion |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Stated Frustration |

Notes

Other: _____

Non-Verbal Behaviors

- | | | | |
|--------------------------|--------------------------|--------------------------|----------------------------------|
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Frowning/Grimacing/Unhappy |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Smiling/Laughing/Happy |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Surprised/Unexpected |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Furrowed brow/Concentration |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Evidence of Impatience |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Leaning in close to screen |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Variation from expectation |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Fidgeting in chair |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Random swiping/tapping on screen |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Groaning/Deep sigh |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Rubbing head/eyes/neck |

Notes

Other: _____

Task Completion Status:

Incomplete:

- | | |
|--------------------------|----------------------------|
| <input type="checkbox"/> | Participant gave up |
| <input type="checkbox"/> | Task "called" by moderator |
| <input type="checkbox"/> | Thought complete, but not |

Complete:

- | | |
|--------------------------|--------------------------|
| <input type="checkbox"/> | Fully complete |
| <input type="checkbox"/> | Complete with assistance |
| <input type="checkbox"/> | Partial completion |

Notes:

Appendix 7

Camera Setup Document

Step 1:

Ensure camera is in a place that will not interfere with testing (i.e. to the side or behind participant).

Step 2:

Ensure the camera is capturing screen of phone.

Step 3:

Ensure audio capture is turned on for recording.

Step 4:

Begin recording once briefing script has been read.

Step 5:

End recording at the end of task 6.

Appendix 8
Optimal Path and Completion Time

Task 3 (only time to complete)

Time to Complete:

1 minute

Task 4 (time to complete and optimal path)

Time to Complete:

2 minutes

Optimal Path:

- Tap Register
- Enter Email, First Name, Last Name, DOB, Gender, Password, Repeat Password
- Tap Register
- Tap Profile
- Tap Add/Delete Medication
- Tap Tylenol “Acetaminophen”
- Tap Add Another Medication
- Enter Ibuprofen
- Tap Done
- Tap Create
- Tap Done
- Tap Time and update
- Tap Save

Task 5 (only optimal path)

Optimal Path:

- Tap Home
- Tap Record Headache
- Tap Just Now
- Tap Ok
- Tap Aura
- Tap Visual & Numbness checkboxes
- Tap Next
- Tap Moderate (4-6)
- Tap Next
- Tap both front sides of forehead and front right cheek/eye area and both skull areas on the back of the head
- Tap Next

Tap Skipped Meal, Stormy Weather
Tap Add your own trigger 'Loud Noise'
Tap Next
Tap Add a Note: 'third migraine this week' and check for light sensitivity
Tap Next
Tap medications Amerge and Periactin
Tap Add your own medication 'Fibrin'
Tap Next
Tap Headache is Over
Tap Yes
Tap Skip to Summary
Tap Submit
Tap Done

Appendix 9
Post-Task Questionnaire

Name: _____ **Date:** _____ **Task #:** _____

Please indicate the amount with which you agree with the following statements on a scale of 1 to 5, with 1 meaning “Strongly Disagree” and 5 meaning “Strongly Agree”.

I am satisfied with the ease of completing this task.

Strongly disagree 1 2 3 4 5 **Strongly agree**

I am satisfied with the amount of time it took to complete this task.

Strongly disagree 1 2 3 4 5 **Strongly agree**

I am satisfied with the process of moving through the app to complete this task.

Strongly disagree 1 2 3 4 5 **Strongly agree**

I am satisfied with the layout of the content of the screens I viewed for this task.

Strongly disagree 1 2 3 4 5 **Strongly agree**

I felt annoyed, irritated, and/or exasperated while completing this task.

Strongly disagree 1 2 3 4 5 **Strongly agree**

I felt that the way to complete this task was clear.

Strongly disagree 1 2 3 4 5 **Strongly agree**

I was successful in accomplishing what I was asked to do.

Strongly disagree 1 2 3 4 5 **Strongly agree**

Appendix 10

Open Ended Questions

Task 1 (App download):

- How did you find the experience of searching for Migraine Monitor/Migraine Buddy?
- Can you tell me your initial impressions of Migraine Monitor/Migraine Buddy?
- What are your thoughts on using Migraine Monitor/Migraine Buddy?
- What do you pay attention to when deciding to download an app?
- Can you give me your thoughts about the ratings & reviews?
- Would the size of the application be a determining factor in deciding whether or not to download an app?
- What are your thoughts on the features Migraine Monitor/Migraine Buddy provides by the preview provided on the app store?
- How likely are you to download Migraine Monitor/Migraine Buddy?

Task 2 (Icon recognition):

- Can you tell me what your thoughts and feelings about these icons?

Task 3 (Download and tutorial):

- How did you find the tutorial?
 - What are your thoughts on the components included in the tutorial?
- What did you like the most about the tutorial? Why?
- What did you like the least? Why?
- Did you encounter any difficulties?
- How was the process of downloading the app?
- In general, what are your thoughts on tutorials? Do you find them helpful?

Task 4 (Register and create profile):

- How did you find the registration process?
- What are your thoughts on creating a profile?
- Can you tell me how you went about adding two medications?
- How did you find the layout of the content?
- How did you find the navigation?
- How did you go about setting a reminder to log your headache?

Task 5 (Recording migraine):

- How was your experience in starting a recording of a migraine?
- How would you describe your overall experience of recording the conditions of the migraine now that you've completed this task?
- How did you find the layout of the content?
- What was your experience in filling out the information?
 - Did you encounter any difficulties?

- What did you like the most? Why?
- How did you find the language used?
- How was your experience in finding the migraine that you recorded?
 - How did you find the presentation of the content?

Task 6 (Iconography after app use):

- Now that you have used the app:
 - What are your top 5 icons? Why?
 - Did you encounter difficulties in understanding the icons? Why? What would you change?
 - How do you find the layout of icons within the popover menu?
 - How do you find the colors of the icons in the popover menu (*note: tap the three bar icon in the top left corner to access the popover menu*)?

Appendix 11

Qualitative Data Summary

Task 1 - App Store Comparison

- All participants thought Migraine Monitor (MM) was easy to find & all stated that they would try out MM
- Most common things users look at in app store before downloading app:
 - Reviews, ratings, features & pictures
- Size of the app is important but not critical - current size is not a deterrent
- MM vs. Migraine Buddy (MB)
 - 3 / 4 participants thought MM color scheme & screen design was more appealing than MB - stating it appears “clean, crisp, & calming”
 - All participants noted that MB has more reviews and higher ratings than MM (MB 4.8 stars with 14.7K ratings) (MM 4.1 stars with 48 ratings)
 - 2 / 4 participants stated that they would likely not use the doctor component, they don’t want to communicate with their doctor through an app
 - Overall, all participants thought MM is presented in a clear manner
- All participant had a “strongly positive comment” and “other positive comment”
- Only one participant had a strongly negative comment

Tasks 2 & 6 - Iconography Recognition

- Before using the app:
 - Participants all took separate approaches when viewing the icons
 - Looking for and pointing out icons they recognized
 - Looking for and pointing out icons they couldn’t guess the meaning of
 - Noting the number of icons and similarity between many of them
 - Stating their need to see the app, as many icons were viewed as specific to the app’s functionality.
- “Top 5” icons after using the app:
 - All icons currently located at the bottom navigational menu of the app were mentioned.
 - Record Migraine icon was mentioned by 3 / 4 participants.
 - The News icon was mentioned by 2 / 4 participants.
- Difficulties:
 - Participants noted generally being confused by the similarity between multiple icons, as well as the use of different icons in different locations (i.e. popover menu vs. home screen) for the same function.
 - Participants also noted having not seen some icons in the tutorial, including those in the popover menu.
 - Specific icons participants said they had difficulties with included:

- Mood & Stress
- View My Liked News
- The bottom items on the home screen
 - One participant noted not recognizing these as functional buttons/navigational elements
 - Provider Messages was a major drawback for this participant; they do not associate the icon with the concepts of individual providers or messages.
- Layout & Colors:
 - Participants noted that while the varying shades of blue in the popover menu were aesthetically pleasing, the lack of a uniform pattern was problematic in terms of navigation and recognizing the icons as functional, “tappable” elements.
 - The “share” icon was pointed out by multiple participants as appearing darker than the other icons.
- Additional comments:
 - One participant noted the use of a male silhouette in the profile icons and suggested changing this silhouette to female.

Task 3 - Download & Tutorial

- Participants found Migraine Monitor thorough, easy to understand, and enjoyed the color scheme and consistency.
- All participants found that the downloading process was easy and simple to achieve.
- Participants suggested that there needs to be a more efficient manner in reference to the organizational flow.
- Participants felt that with all the information displayed, it should also match the programmed information within the application itself.
- All Participants expressed that Migraine Monitor’s tutorial was overwhelmingly long.
- The tutorial gives the option to exit out, but instead takes the user to another “jump to section” tutorial;
- Participants were confused with the interactivity of the application. A misunderstanding of being able to have a practice “migraine” to better understand the functions.

Task 4 - Register & Create Profile

- All participants had to recreate their password several times during registration
- Half of the participants chose different nav menu tabs before going to profile tab to add medication
- Half of the participants selected different tabs and feature before finding setting reminder time to log headache toggle

- Two participants displayed furrowed brows and concentration while adding in medications
- Participants lost time in scrolling to find the medications they were tasked to add.
- One participant let out a deep sigh and groan expressing frustration for not being able to see what characters were entered for password fields and not having any of the details needed to create a password
- The optimal time for completing this task is 2 minutes although participants exceeded time with the average of 3 minutes and 44 seconds

Task 5 - Recording Migraine and Finding Report

- The process of starting and recording a migraine did not cause undue irritation and was simple to accomplish.
- Participants expressed verbally that they liked the clean presentation, and that setup was easy to follow.
- A majority of participants found the linear structure of adding and recording a headache made this task easy.
- Some participants showed physical signs of leaning, frowning, and verbal frustration.
- Finding the report/details page of completed migraine was the most frustrating part of the task.