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THE PROCESS AND DEVELOPMENT OF A
UNIVERSITY HEALTHCARE MOBILE APPLICATION.

By

Makenzie Scott

B.F.A., Southern Illinois University, 2013

A Research Paper
Submitted in Partial Fulfillment of the Requirements for the
Master of Science

Department of Mass Communication and Media Arts
in the Graduate School
Southern Illinois University Carbondale
December 2014

RESEARCH PAPER APPROVAL

THE PROCESS AND DEVELOPMENT OF A
UNIVERSITY HEALTHCARE MOBILE APPLICATION.

By

Makenzie Scott

A Research Paper Submitted in Partial

Fulfillment of the Requirements

for the Degree of

Master of Science

in the field of Professional Media and Media Management

Approved by:

Katherine Frith, P.h.D., Chair

Graduate School
Southern Illinois University Carbondale
October 22, 2014

AN ABSTRACT OF THE RESEARCH PAPER OF

MAKENZIE SCOTT, for the Master of Science degree in Professional Media and Media Management, presented on OCTOBER 22, 2014, at Southern Illinois University Carbondale.

TITLE: THE PROCESS AND DEVELOPMENT OF A UNIVERSITY HEALTHCARE MOBILE APPLICATION.

MAJOR PROFESSOR: Katherine Frith, P.h.d

In this project, I've researched the impact of M-Health among smartphone use in today's society. Smartphone habits have been researched as well as what type of health care information college aged students are seeking out. This research, including a survey of uses and perceptions of mobile apps and interests in healthcare topics, will help with the creation of a university health center mobile app. This app will fulfill the needs of the students and the university while creating a healthier campus environment.

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CHAPTER 1 INTRODUCTION

College campuses are choosing to integrate more technology throughout their campuses as a way to connect and communicate with their students. 90% of college students spend their time on some type of mobile or computer device (Kim, H., Park, S., & Bozeman, I., 2011). M-Health is a low-cost platform that engages patients by communicating actionable information to health care providers in a manner that fits into the day-to-day lives of patients (Runkle, D., 2013). Searching for help with common symptoms like a runny nose, a rash, or the flu becomes easier now that M-Health information is available versus driving to a pharmacy or doctor's office. Patients log on to a website and describe their symptoms to a doctor or nurse practitioner and are given results almost instantly. Patients are now interacting with their doctors via video, messaging, informational websites, and even mobile applications. It is anticipated that about 500 million smartphone users around the world will use M-Health services by 2015 (Mosa, A. S., Yoo, I., & Sheets, L., 2012). Health care providers are choosing to interact virtually instead of face-to-face. Some 4000 apps were available within the Apple App Store aimed at patient end-users, and mobile health was named one of the top ten applications for 2012 (Boulos, M., Wheeler, S., Tavares, C., & Jones, R., 2011).

While mobile devices are being more widely used there are still difficulties with this new media. One of those difficulties is accessing websites through mobile screens. Currently SIU Carbondale students can only access their health center information through a default web browser on their mobile device. This makes it difficult to read because of the smaller text and to use the navigation to access multiple pages. With my

research I'm developing a mobile application that students can use to access information about their health center and stay better connected with their health. Using a survey I was able to gather information based on behaviors and perceptions of mobile applications and student's thoughts on health care information. Additional research was done through studying the health center's current website for the content and information that will be present in the app. I also used multiple university mobile apps to help with the design and function process of developing the structure of this mobile application.

CHAPTER 2 LITERATURE REVIEW

Mobile Access vs. Computer Access

Accessing information online is ever evolving while living in the digital age. Computer screens are getting larger and more adapted to entertaining while smart phones are being optimized for video playback and interactivity. As mentioned on designer-daily.com, mobile phones are always on, have 24/7 online access, and are more personal (designer-daily.com, 2012). Using mobile devices is an entirely different user experience than using a computer and therefore user behavior varies with the devices.

One large difference in the way we as users interact with these devices is clicking versus touching. When using computers we use a mouse and arrow to guide over and click what needs to be selected while on a mobile device we use our fingers to tap what needs to be selected. With smaller screen sizes in mobile devices we are more likely to miss click on a smartphone versus using a mouse on a computer. Similarly, a computer uses a keyboard for text and data entry while smartphones most commonly use a touch keyboard on their screen. Some smartphones do have a slide-out keyboard feature but again this is significantly smaller than a computer keyboard and can still be difficult to use.

Other differences users have to consider when choosing between mobile and computer are things like portability, storage, and connectivity. In terms of portability, mobile devices are lightweight and can fit in a pocket. Having access to almost anything online from anywhere at any time is what makes smartphones so appealing to users.

Laptops also give users the power of a desktop computer but with more portability but yet not as much portability as a mobile device because of size, weight, and the need for Wi-Fi connection to browse online. Storage is another characteristic to consider.

Computer hard drives are continuing to get larger, even the most basic computer comes with a 250 gigabyte (GB) hard drive built in (Computer vs. Smartphone., n.d.).

Smartphones come with built-in 8 GB to 64 GB (Computer vs. Smartphone., n.d.). Like computers, smartphones also provide outlets to add additional storage through memory chips. Finally, connectivity is another thing users will face with both mobile devices and computers. Generally, computers rely on a Wi-Fi connection to connect online.

Smartphones can also connect online through a Wi-Fi connection but also have the capability to connect to the Internet through a data plan.

App Design and Capabilities

When working with mobile devices and mobile apps the first factor that decides the structure and design is the screen size. The screen sizes vary when you compare smartphones and tablets but mobile phones themselves come in different sizes. Based on a chart from gigaom.com, iOS platform smartphone screens have begun to get larger. The iPhone 4/4s and earlier models have a standard size of 960x 640 pixels. Two new models, iPhone 6/6+, were released in September of this year and have the largest screen size to date. The iPhone 6 has a resolution size of 1334 x 750 pixels, while the iPhone 6+ has a resolution of 1920 x 1080 pixels (Goetz, 2014). When looking at android platform smartphones it's a little more difficult because this market is more

fragmented. This requires designers to code multiple versions of the app to fit into multiple ranges of screen sizes.

When you have a smaller screen, you must limit the number of features to those that matter the most for the mobile use case (Nielsen, J., 2011). Limiting the number of features also helps with the mobile devices' processor. Processors generate a lot of heat which can melt the inside of the device and so developers limit its speed which then results in a slower performing phone (Processors: Computer vs mobile, 2013).

Smartphones and M-Health

Smartphone apps are self-contained software applications that can be downloaded and run from smartphones or mobile devices such as tablets. The leading smartphone operating systems include iPhone, Android, and Windows. Each has an associated app store where individual users can select and download apps of interest. Mobile health care apps are programs that run on smartphones or mobile tablets. These programs are medical devices that allow users to manage their own health and wellness. With the use of Wi-Fi, mobile apps can connect to Internet resources and users are able to link to additional M-Health tools like web sites. The development of mobile applications are very popular because of the amount of patients who use them and the number of different health issues you can target with them. Many mobile health care applications have common characteristics such as recording critical medical data, solving health issues, and daily SMS reminders (Paschou, M., Sakkopoulos, E., & Tsakalidis, A., 2013). Mobile health applications focus on serving the needs of the user by providing widespread access to relevant information and remote data capture, which

eliminates the need for the user to be physically linked to a network or restricted to a specific location. The “always on” status, and data transmission are the qualities of mobile phones that have made them reach a larger population than computers and the internet (Aranda-Jan, C. B., Mohutsiwa-Dibe, N., & Loukanova, S., 2014).

There are many ways health care facilities are taking advantage of M-Health applications. M-Health can be broken down into multiple subcategories of digital health applications. The most commonly used application is web sites. Patients can use personal computers or laptops to manage their personal health or search for health care information through health web sites. This form of M-Health is easily accessible but has a lack of mobility compared to other options. Another application is SMS text messaging. This process is accessible to nearly everyone with a cellphone and is used on a daily basis by those who do. SMS is great for daily reminders or tracking things for health but is slowly becoming dated due to the advancement of technology.

Finally, the more modern application is mobile health apps. With literally thousands to pick from; the market is over saturated. These apps do provide direct and personal health care and information to the patient. The current downside to this option is that not everyone has a smartphone, which is the only way to access the app, but this is changing as smartphones become more available to demographics. The number of people using their mobile phones to access health-related information has grown by 125%, since 2011 (Gheorghe, 2013). These mobile apps will be the main topic of this research paper as they are the least discovered application process. Research is still being done to discover how successful these mobile apps can really be.

Patient vs. Physician Apps

The embrace of mobile health apps have many positives and negatives for both health care facilities and health care patients. 56% of physicians use apps in their clinical practice (Velsen, L. V., Beaujean, D. J., & Gemert-Pijnen, J. E., 2013). "For clinicians, the smartphone offers an alternative to many health IT [information technology] formats that have been cumbersome and costly to adopt, and that may interrupt their workflow," (Smartphones Altering Health Care, 2010). In a study provided by Mihaela Gheorghe in 2013, the research focuses on the physician's point of view regarding mobile apps. Gheorghe suggests that mobile apps should be more widely adopted because of the flexibility of use, accessibility, portability, and reduction of time spent in an office. Additional points Gheorghe makes based on positive contributions include an increased speed of data transfer, optimization of employees and day-to-day operations, and reduction of time and human error. Gheorghe also gives several flaws when working with mobile apps. These include limited computer power, low data input speed, small screen display, limited memory space, limited battery life, reduced bandwidth, and limited user interface. Clearly, these examples are based on design and function when using mobile applications.

Besides physicians, patients are another user of health care mobile apps. Similar to physicians, patients experience their own set of positives and negatives when interacting with mobile apps. Patient centered health care apps support patients in their changing roles of passive recipient to active by putting the decision-making process directly in their hands. What we do know from research is that basic usability functions such as convenience play a big role in the willingness of patients to accept and use

health care applications. Giving patients the tools they need to determine whether to schedule an appointment with their doctor is one of the biggest ways hospitals can improve value.” (Williams, J., 2012). Focusing on condensing and personalizing the information is key with successful application use because people are looking for quick and easy access to information (Velsen, L. V., Beaujean, D. J., & Gemert-Pijnen, J. E., 2013). Some cases have found that digital diaries, SMS texts for behavioral change, and GPS-enabled applications are beginning to find substance in health care applications (Boulos, M., Wheeler, S., Tavares, C., & Jones, R., 2011). A recent study has spent a lot of time focusing on mobile applications and behavioral health care (Luxton, D. D., Mccann, R. A., Bush, N. E., Mishkind, M. C., & Reger, G. M., 2011). This is just one small niche market in health care that is using mobile health care apps. With all things there are also negative attributes that can be a drawback to using this type of tool. Similar to physicians the negative drawbacks to using mobile health care apps are the same and are based on technological errors. Also, with patients there is much more room for user error when it comes to interacting with mobile health care apps.

Physicians are usually more well-trained in working with these types of medical devices and aren't as leery to input data. Many people still don't know how to properly use their mobile devices or like many health care apps, they require you input your own personal data in order to get the full benefits of the app which many patients can forget to do.

This leads to the biggest drawback patients have with using mobile health care apps, which is entering into a device their personal and private information.

CHAPTER 3 MATERIALS AND METHODS

To gather my data for this research I focused on collecting quantitative research through the use of a survey. This survey was created using Google docs. The survey was then circulated through email solicitation and posted on social media sites to gain participants. All questions were pertaining to the participant's interaction with mobile devices and what types of health care information they access through mobile/computer devices. It consisted of twenty questions that were a mixture of long answer, yes or no, and rating questions. Since I solicited through public emails I attached a cover letter with my email providing a full explanation on what the survey is, what information I am collecting, how the information is being used, confidentiality, and how the whole process is voluntary. The participant will have the ability to opt from taking the survey at all times and can decline to answer any question but by submitting answers they are agreeing to participate in the survey. The participant will be able to access the survey from any location as long as they have access to a computer and an internet connection. There is no funding or expenses that needs to be covered during this research.

Choosing quantitative research through the use of a survey is an effective way to gather data for this particular research because we're looking to target the topics that the majority of our selected audience states are most important to them. Using this gathered information we can better design an application that discusses those topics and uses the preferred application characteristics and attributes that students want. The participant's mobile device habits and relationships will help to build a better structure for the application. All this collected data helps with the overall design of the application

as well. Secondary research will come from analyzing five mobile applications from similar four-year universities scattered around Illinois. The five universities I've chosen to study are the University of Illinois at Urbana-Champaign, Northern Illinois University, Southern Illinois University of Edwardsville, Western Illinois University, and Illinois State University. When analyzing these apps I'm looking at the design, function, characteristics, and structure of other local university mobile apps.

This collected information gives me an inside look at how other universities are adapting to connect with their students through digital tools. It also shows how these universities have created mobile access points for selected departments on their campus. Students no longer have to deal with searching these department websites on their phone's default web browser. This will also help in the development of my own mobile application for SIU Carbondale's health center. Taking in account the layout, design, user interface, and content selected by these universities, I am able to see what is successful and what is not.

Lastly, when developing the mobile app I used several standard materials such as a computer (MAC or Windows), Adobe Creative Suite, and a Wacom tablet. First though, I developed a series of wireframes through pen and paper sketches and then moved over into digital sketches. When working with the overall layout and design I created my structures using Adobe Illustrator. Some additional design elements are photographic which were created using a Nikon D3200 and a Canon Rebel T3. Also, creating a mobile app for an auxiliary on SIU's campus meant I had to conform to SIU's branding guidelines. This required me to use the school's brand guidebook and follow rules set for copywriting, color, typography, and photography.

CHAPTER 4
RESULTS

Mobile Device and App Use

TABLE 1

Do you use a mobile phone?

	N	%
YES	26	100%
NO	0	0%

TABLE 2

What type of device do you most frequently access mobile apps?

	N	%
Mobile phone	24	92%
Tablet	2	8%
Other	0	0%

TABLE 3

Totally, how often do you use your mobile apps in a day?

	N	%
Less than 30 minutes a day	4	15%
An hour a day	9	35%
3 hours a day	8	31%
More than 3 hours a day	5	19%

TABLE 4

Rate on a scale of 1 to 5, how much you agree with this statement,

“I am more likely to check things on my mobile device versus a computer or laptop.”

1 = Strongly Disagree, 5 = Strongly Agree

	N	%
1	0	0%
2	4	15%
3	4	15%
4	14	54%
5	4	15%

TABLE 5

What activities are you most likely using your mobile device for? (check all that apply)

	N	%
Text Messaging	25	96%
Phone Calls	22	85%
Social Media	23	88%
Sending/Receiving Emails	19	73%
Searching the Internet	20	77%
Streaming Music	17	65%
Streaming Video	9	35%
Taking/Sharing Photos	21	81%
Reading Books, Articles, Etc.	10	38%
Playing Games	12	46%
Taking Notes	6	23%
Navigation	14	54%
Other	0	0%

In each section there was a narrative portion where respondents could answer in their own words. In regards to mobile devices I asked respondents, do you find mobile device notifications helpful or distracting? Approximately forty-six percent of respondents said notifications were helpful and approximately twenty percent of the respondents said they were distracting. The remaining thirty-four percent were indifferent and said it more depended on the type of application that was alerting them such as social media versus a gaming app. Respondents were asked to answer, in their own words, what app attributes they consider before downloading a new mobile app. Only twenty-three out of the twenty-six respondents provided answers to this prompt. After reviewing the responses the top characteristics mentioned by sixty-nine percent of respondents include usefulness, functionality, capability, and design. Characteristics like

price, reviews, and ratings were mentioned by thirty percent of those respondents.

Finally, a few others mentioned include popularity (thirteen percent), interest (eight percent), and security (four percent).

Health care Information and Apps

TABLE 6

Do you ever search for health/medical/wellness/fitness information?

	N	%
Yes	14	54%
No	2	8%
Sometimes	10	38%

TABLE 7

How do you get your health/medical/wellness/fitness information? (Check all that apply)

Websites	22	85%
Mobile Apps	5	19%
Healthcare facilities or clinics	12	46%
Primary Healthcare Provider	18	69%
Magazines	6	23%
Television	4	15%
Brochures & Pamphlets	4	15%
Other	2	8%

TABLE 8

Which topics are most interesting to you? (Check all that apply)

	N	%
Dietary & Nutrition	22	85%
Fitness	20	77%
Vaccinations	3	12%
General Health	19	73%
Mental & Emotional Health	15	58%
Sexual Health	14	54%
Drug & Alcohol	3	12%

Other	0	0%
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TABLE 9

On a scale of 1 to 5, how often do you search or seek out health/medical/wellness information with your mobile device? 1 = Never, 5 = Always.

Very Interested	3	12%
Somewhat Interested	9	35%
Neutral	9	35%
Not Very Interested	4	15%
Not Interested At All	1	4%

TABLE 10

What health/medical/wellness/fitness apps are you familiar with? (Check all that apply)

	N	%
Web M.D.	24	92%
Fooducate	1	4%
My Fitness Pal	16	62%
Epocrates	1	4%
Medscape	1	4%
Calorie Counter	5	19%
Lose It!	2	8%
Nike+ Running	13	50%
Fitbit	6	23%
RunKeeper	2	8%
Other	1	4%

TABLE 11

What reasons would you use a healthcare app? (Check all that apply)

	N	%
Track weight and diet	19	73%
Look up symptoms	21	81%
Search treatments	15	58%
Read articles	5	19%
Search for local locations to get treatments, medication, help/assistance	6	23%
Schedule/Cancel appointments	13	50%
Message your primary provider	8	31%
Look up workshops, classes, or programs being offered	3	12%
Search contact information and building hours for local facilities	11	42%
Get to know your local facilities' staff	4	15%
Other	1	4%

In this narrative response section I asked respondents to answer if they had ever used a health/medical/wellness/fitness app and to describe it. Only nineteen of the twenty-six respondents provided answers. Health/medical/wellness/fitness apps had been used before by seventy-nine percent of respondents and twenty-one percent answered they had not. My Fitness Pal was the most widely used app by forty-seven percent of the respondents. Other mentioned apps included Calorie Counter (sixteen percent) and Lose It (ten percent).

SIUC and Student Health Services

TABLE 12

Which ways do you most likely gather information about SIU's Student Health Services?
(Check all that apply)

	N	%
Posters/Flyers around campus	12	46%
Social Media	7	27%
Website	14	54%
When I'm there for an appointment	16	62%
An event or workshop	1	4%
Word of mouth	8	31%
What's Student Health Services?	1	4%

In the last narrative response section I asked respondents to describe SIUC's Student Health Center's presence on campus. Only twenty-two out of the twenty-six respondents submitted answers to this prompt. Interestingly the responses were split 50/50 on whether SIU's Health Center has a presence on campus or not. Those who responded that there was a presence based it on a successful website, social media use, monthly email blasts, and having the SIU's Health Center as their primary care provider. Those who responded that there was no presence based it on that students go there when they are sick but are not aware of the other resources the Student Health Center provides.

Lastly, I asked respondents to provide benefits and drawbacks to SIUC's Student Health Center having a mobile app. Twenty-three out of the Twenty-six respondents provided answers about the benefits of the app. Scheduling and canceling

appointments was a top benefit to sixty-one percent of respondents. Faster and easier access was another benefit to thirty-nine percent as well as having access to up-to-date healthcare information. Being connected with their provider was an important benefit to thirty percent of respondents. Additional benefits mentioned included being able to refill prescriptions easier and becoming more health conscious. Only three (thirteen percent) of the respondents stated that there were no benefits to having a mobile app.

Nineteen out of the twenty-six respondents provided answers about the drawbacks of the app. Having too many notifications and a buggy interface was a top drawback to sixteen of the respondents. Another drawback to ten percent of the respondents were security issues, app maintenance, and the possibility of never being used. Additional drawbacks mentioned include too much data usage and an overload of information for the device. Only nine (forty-seven percent) of the respondents stated that there were no drawbacks to having a mobile.

CHAPTER 5 DEVELOPING A MOBILE APP – A CASE STUDY

When creating a mobile app for an existing website there is a lot of thinking and research to be done. All information from or about the health center needs to be considered and condensed to fit with the objective of the app. The objectives of the facilities, the website, and the mobile app are each tailored to their own needs and requirements. Research into what information is most important to students and the facility and its staff should be thought about to create a successful and usable app. Also, the university itself will have restrictions or guidelines to follow while creating this app. While in the process of developing this mobile app all these things were considered thoroughly.

Whenever thinking about design or user interfaces you should always keep your target audience in mind. The target audience for using this mobile app will be college aged students, though anyone can have access to it through mobile app stores. This means we can widen our secondary audience to people like faculty and staff or parents of students at the university. The app will be accessible anywhere through Wi-Fi or where data rates allow. The app will also be available for any mobile device platform such as iOS, android, and Windows.

Personas

Personas are created in the beginning stages of developing the health center mobile app because it helps the developer think about the structure, design, and function of the app in the eyes of a potential user. Personas are invented people or personalities created to give insight into the attitudes, beliefs, and lifestyles of multiple

users. This style of brainstorming then helps with the design of the user experience or user interface because the designer is thinking how others are interacting with the mobile device and app.

The first persona is our primary target audience, a university student. Matt is a 23 year old graduate student studying animal science. Matt holds a job within his department as a student worker and spends most of his time on campus. He is excellent at online research and using computer software like Microsoft Office. When Matt finds downtime he spends most of it outdoors fishing and hiking. He uses his smartphone for sharing photos of his catch of the day or for navigation while hiking in the wilderness. Matt believes the easy access of information through mobile phones is what makes them most useful.

The secondary persona is the parents of current students. Regina has an only child named Emma. She works full time as a Lab Technician at a local hospital. Her family lives in a small suburb outside of town. In her spare time, Regina bakes and enjoys reading non-fictional books. Even though she spends quite a lot of time on her computer at work her daughter still has to help her with more modern technology such as mobile apps and social media.

These personas help with developing the user interface because when thinking about design we must consider users from all different backgrounds and skill levels. Most students like Matt have accepted mobile devices into their everyday activities and appreciate the ease of accessibility they offer. This tells us that our target audience engages in mobile app use and enjoys quick action functions. This also indicates that a

simple navigational app will be more welcomed by active students and users who are newer to this type of user experience.

Design and Structure

In my survey results, sixty-nine percent of the respondents mentioned that usefulness, functionality, capability, and design were their top attributes when deciding to download mobile apps. One respondent answered that they looked for design first, then ratings/reviews, functionality, and getting multiple capabilities within one app. The design plays just as much of an important role as the functionality. Design not only enhances the experience when using the app but it helps with the navigation of the app. Bad design can lead to confused users, loss of interest in the app, and to cause students to believe it is unreliable.

Building wireframes were the foundation to creating the overall design and structure of the app. Wireframes are like architectural blueprints (Lim, W., 2012). These are basic black and white sketches that help determine the overall layout of your screens. This type of brainstorming allows you to not only decide on placement and function but user interaction. Pushing the wireframes a step further I created them on notecards that were the same dimensions of a standard phone screen. This allowed me to actually visualize button sizes to the size of my finger and standard smartphone actions like swiping and tapping. (See Figure 1)

When moving to the digital stages of creating the designs for the mobile app the SIUC branding guidelines were an important factor to consider. Following the same guidelines that are present for the other SIU auxiliaries helps keep the brand association for students. While this adds perimeters to things like color and fonts the rest of the design

is open. Photography isn't as dominate in the mobile app as it is to the website because of the small screen sizes of mobile devices and the longer loading time creates less of an easy and quick experience. Photography will be used for Staff and Faculty imagery because students want to see what their physician looks like before an appointment. This not only makes the student comfortable and confident for their appointment but it allows them to better remember what specialist or physician they see. One of my survey respondents reiterated this claim when asked what benefits they would get from having a health center mobile app,

“... I want to know which doctors I have seen. I have a favorite doctor there, (I don't remember her name), and every time I try to see her I mix it up with the wrong one! It upsets me so much because she was so efficient with me, she diagnosed me quickly and got me on my way. I want her again.”

Photography will also be used inside the Events section where students will be able to swipe through current promotional flyers for events, classes, and workshops that are associated with the Student Health Center. The rest of the app will utilize graphic icons and typography. The icons used will be simple, clean, and universally acknowledged. Generally, they will signify buttons or clickable options.

The overall feel of the design is clean and timeless. Following the SIU Brand Book, established in 2011, the primary colors used are the SIU Institutional colors of Pantone 209 C (SIU Maroon), Pantone Black (SIU Black), and Pantone Bright White (SIU White). These colors can also overlay to create different opacities like grey or dark maroon. The secondary or supplementary colors include yellow 1 (HEX#fbad18), blue 1 (HEX#

2795ca), green (HEX#7e9520), yellow 2 (HEX#d2a416), blue 2 (HEX#246181), brown (HEX#826947), and tan (HEX#d9d6cb). The primary typeface used in this app is the Univers font family. The secondary typeface that can be used following branding guideline is Perpetua Std. but is only accepted for large headlines or intermediate sized text.

Finally, the overall structure of the app is simple and quick to navigate. The object of the mobile app is to only go three page levels deep from the home screen navigation. This means the first level page is the home screen navigation where the user selects a category button. The screen opens to the second level page which has additional category options. If the user selects one, the app opens the final third level page with additional information. (See Figure 2)

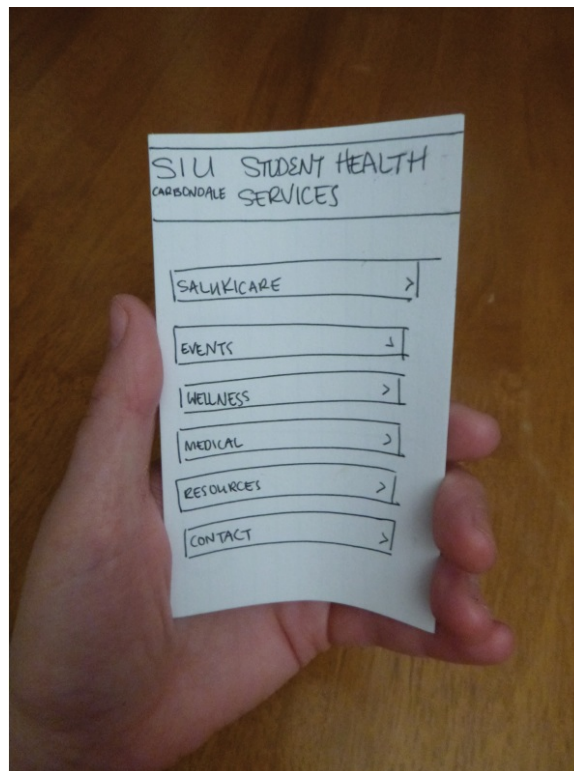


Figure 1. Wireframing

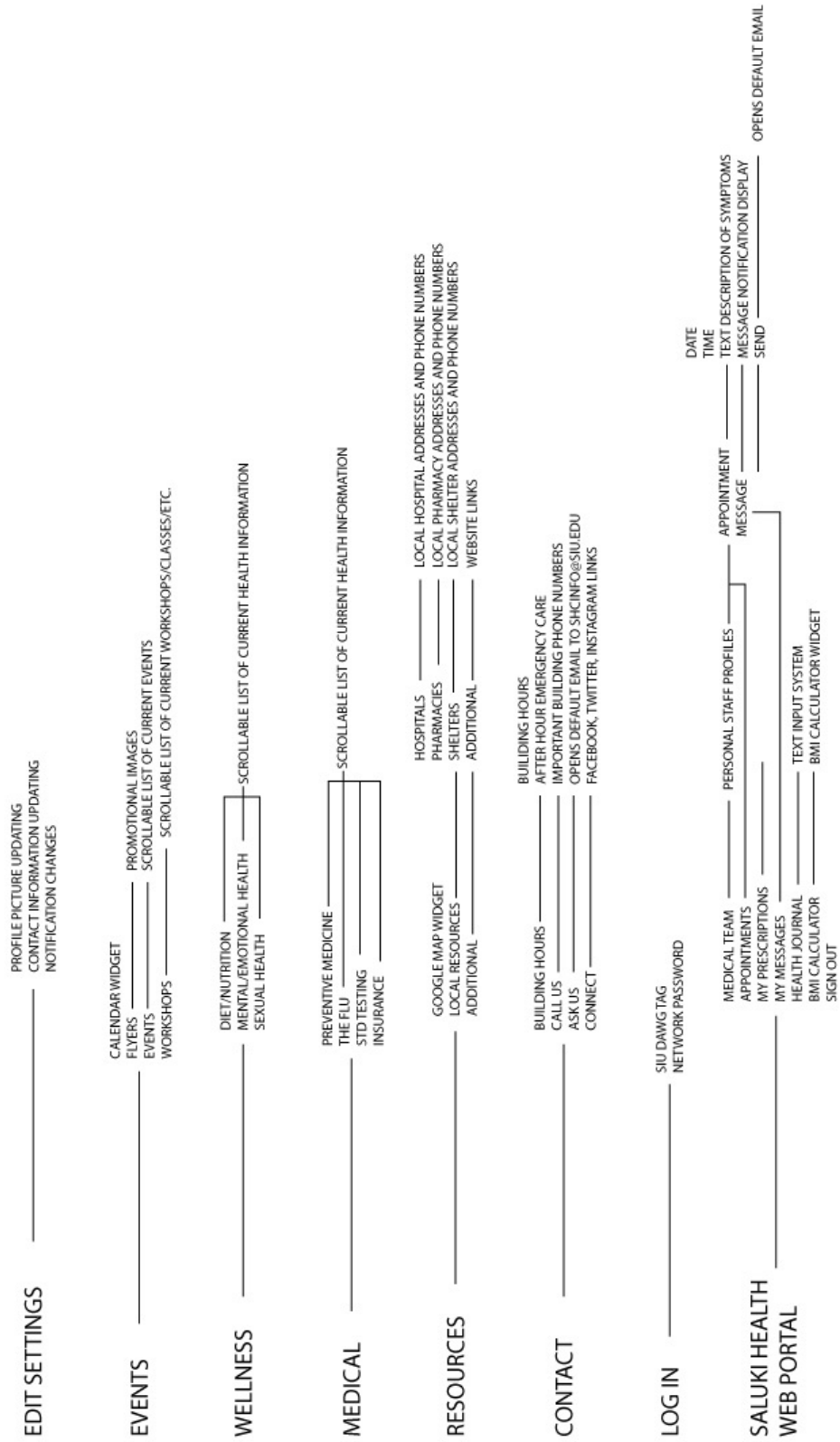


Figure 2. Mobile App Structure/Navigation Map

Navigation and Flow

The current navigation of the health center's website is broken down into Medical Clinic, Immunizations, Insurance, Counseling, Wellness, Psychiatry, Dental, Sports Medicine/Physical Therapy, Pharmacy, Faculty/Staff Convenient Care, and Resources. Once one of these navigational choices is selected there is additional menu options inside it. (See Figure 3) An example of this would be clicking on Medical Clinic and then the viewer can choose from a secondary navigation that includes Appointments, The Flu, STD Testing, Preventive Medicine, and Optical. Currently when students visit the webpage on their default mobile device browser this navigation is too small and the user has trouble using their finger to click the option they desire. Also, if we were to put all these options into the navigation of the mobile app this would create a slower user experience while possibly confusing the user as well.

After careful research and feedback from the survey respondents the main home screen navigation will include an edit settings button, Events, Wellness, Medical, Resources, Contact, and a log in for the Saluki Health Web Portal. (See Figure 4) A secondary navigation will be located in the bottom right corner. This can be pulled up with a simple tap and will include everything you can do through the Saluki Health Web Portal. This does require students to log in because it can contain confidential information about appointments and prescriptions. The log in process will be a simple pop up display that requires users to type in their SIU Dawg Tag and their network password. This secondary navigation includes My Medical Team, Appointments, My Prescriptions, My Messages, My Health Journal, BMI Calculator, and Sign Out. (See Figure 5) The sign out button will once again be the simple pop up display. At any time the user can tap

the back button, located in the bottom left corner, to navigate their way back to the home screen when they feel lost or have found what they needed. To exit out of the app, iOS users simply press the home button located at the bottom of their phones. Other mobile device users can simply navigate back to the home screen and tap the back button to back out of the app.

All navigation flow and interaction uses standard phone techniques that all smartphone users know. Simple finger tapping will select or choose an item and left and right swipe motions will move images or pages from left to right or vice versa. Mainly finger tapping will be used. Users will know when something can be selected by a small right directional arrow after a title. (See Figure 6) Small highlighted dots in the bottom center of the screen will indicate to users when they can swipe left or right to view more options. (See Figure 6)

The screenshot displays the website for the Student Health Services Medical Clinic at Southern Illinois University. The header includes the SIU logo and navigation links like 'Webmail', 'SIU Online', and 'SalukiNet'. A search bar is located in the top right. The main navigation menu on the left lists categories such as 'HOME', 'MEDICAL CLINIC', 'IMMUNIZATIONS', 'INSURANCE', 'COUNSELING', 'WELLNESS', 'PSYCHIATRY', 'DENTAL', 'SPORTS MEDICINE', 'PHARMACY', 'FACULTY/STAFF', and 'RESOURCES'. The main content area features a large photo of the clinic interior, a contact number '(618) 453-3311', and a list of services including 'After Hours Emergency?', 'Schedule Your Appointments On-line', 'Flu Shots', 'Immunization Compliance', and 'Forms'. The footer contains contact details, social media links, and copyright information.

Figure 3. Website Navigation

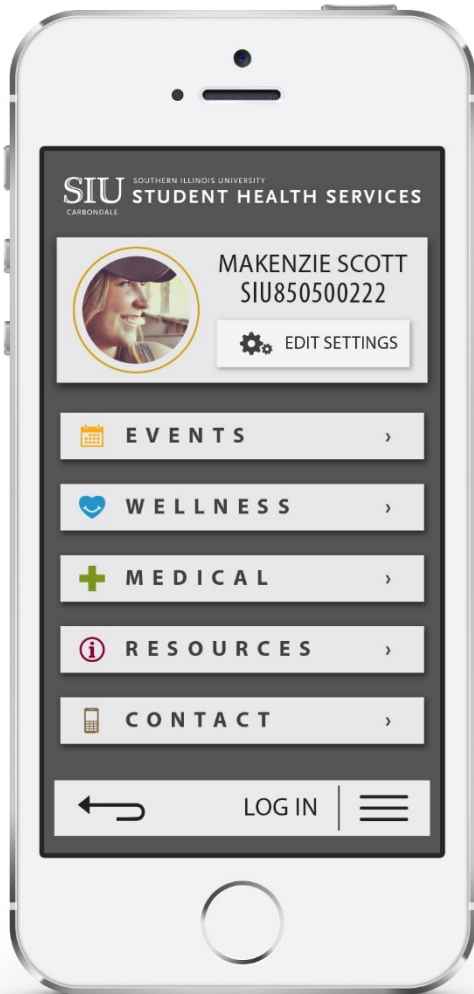


Figure 4. Mobile App Navigation

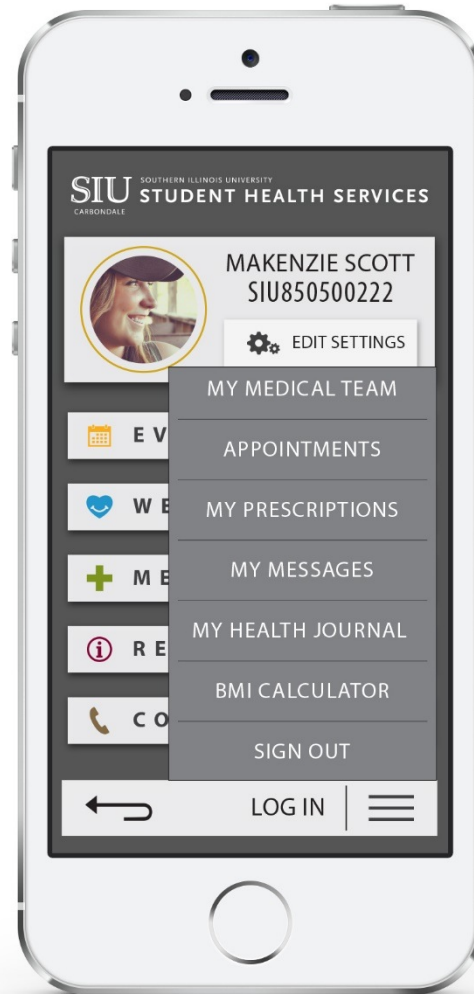


Figure 5. Secondary Mobile App Navigation

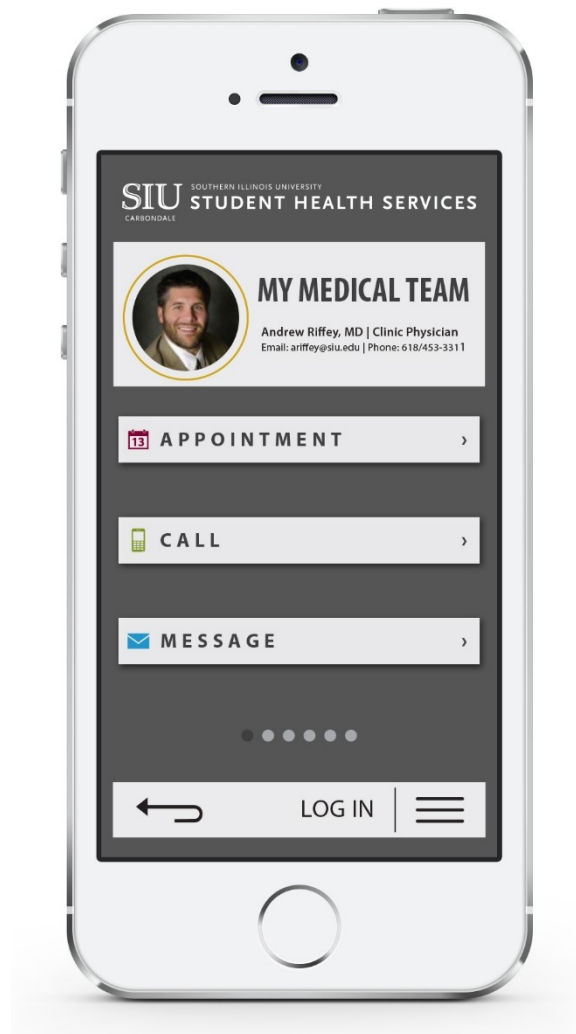


Figure 6. Tap and Swipe Navigation Indicators

Information and Topics

The current health center website is dedicated to giving all general information about the services provided, upcoming events, and additional resources and websites. This structure is successful for a computer based access point because of the larger screens and generally when people use computers they are sitting down and more likely to browse. When people are accessing information through their mobile devices

they are usually doing it with the belief they are going to access it quickly and easily. In regard to the information and content on the mobile device and content on the mobile device, it has been condensed to both what students are searching for and what the health center wants to market. The top 5 topics survey respondents were most interested in included dietary and nutrition, fitness, general health, mental and emotional health, and sexual health.

The Future

With the construction of this mobile device we tackle the issue of students only having access to their healthcare information via a computer access point. This app serves as the mobile access point for students when they don't have access to a computer or choose to access their information from their phone. The app is modern and clean which provides students with the quick and easy access to their information that they need. All the content for the app is condensed information from the website. Photography has also been condensed for specific occurrences. The use of icons with typography in the navigation allows users to search the app quickly and easily. The main navigation on the landing screen is separated into the most important sections of information.

The mobile app is a work in progress and will need to annually be user tested to continue to provide students with the functionality and information they want and need. Also, the health center staff should be surveyed to monitor the information and additional content. As the digital age continues to grow, mobile phones will only continue to be more prevalent in everyday life which means M-Health is going to

become more widely used. This app can easily grow and update to work with the latest trends and technology.

CHAPTER 6

CONCLUSION

In this study, we've discussed the adoption of mobile devices, M-Health, mobile access versus computer access, and application structure and design. This study and research has helped lead to the development of a mobile access point for students to access their university's health center. This application is not designed to replace the computer access point, but to add to the existing technology for better healthcare on campus. The structure, design, and functionalities of the app can adapt and change based on the healthcare the students need and new functionalities that technology presents us in the future. Students are extremely active and are always looking for "on the go" options.

This app provides students with a connection to their primary healthcare provider from anywhere they're at and at any time. This app also provides students with up to date healthcare information about medical education, sexual health, emotional/mental health, nutrition, and drug/alcohol awareness. This app can create an easier way for students to stay on top of their own health and connect with their primary physician. With so many students using smartphones this shows us there is the opportunity for M-Health to be present on university campuses and for telemedicine services to provide the chance for healthier campuses.

Many of the university apps from other Illinois universities aren't even recognizing their health centers inside their mobile apps. They are missing the chance to connect their students with their health. This tells me there is a need to develop a standard

mobile access point for university health centers. The full potential of M-Health and smartphones has yet to be explored. I believe this study and this app will provide the basic fundamentals and blueprints to develop and improve a standard.

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