



# Lighten Up. lower your risk<sup>1</sup>.

Prediabetes Intervention Mobile Application

**HCDE 518i -- Autumn 2016**

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**TEAM LESS IS MORE.**

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# 1. PROJECT OVERVIEW

## Context and background

A person with prediabetes has a blood sugar level higher than normal, but not high enough for a diagnosis of diabetes. He or she is at higher risk for developing type 2 diabetes and other serious health problems, including heart disease and stroke as well as increasing risk of developing several types of cancer. One in three Americans—about 86 million people—has prediabetes, and only 10% of people with prediabetes know their status: 90% do not. If left untreated, 15-30% of people with prediabetes will develop type 2 diabetes within 5 years. The group at highest risk for prediabetes comprises adults aged 45-64 who are in an at-risk weight category **and/or** get little or no exercise. (Source: US Centers for Disease Control and Prevention, <http://www.cdc.gov/diabetes/prevention>.)

To reduce risk, the CDC, other public health agencies, and clinicians recommend 150 minutes of physical activity per week. However, **any increase in activity for a sedentary or at-risk individual can start the habits of good health** that reduce risk.

## Design problem

*How can a mobile health application (mHealth app) support physical activity in sedentary or overweight adults, aged 45-64, to help reduce their risk of developing prediabetes?*

## Audience for this document

This document serves as a resource for the developers of the Lighten Up! mobile app for iOS devices.

## 2. PROJECT SCOPE

### In scope

This mHealth app is intended to:

- Leverage the Apple iPhone platform
- Provide simple sign-in on-boarding with minimal data collection
- Promote incremental increases in physical activity by offering “tiered” activity levels
- Offer customizable daily activity goals
- Accommodate user-chosen motivational materials

### Out of scope

This mHealth app was not designed for these end users:

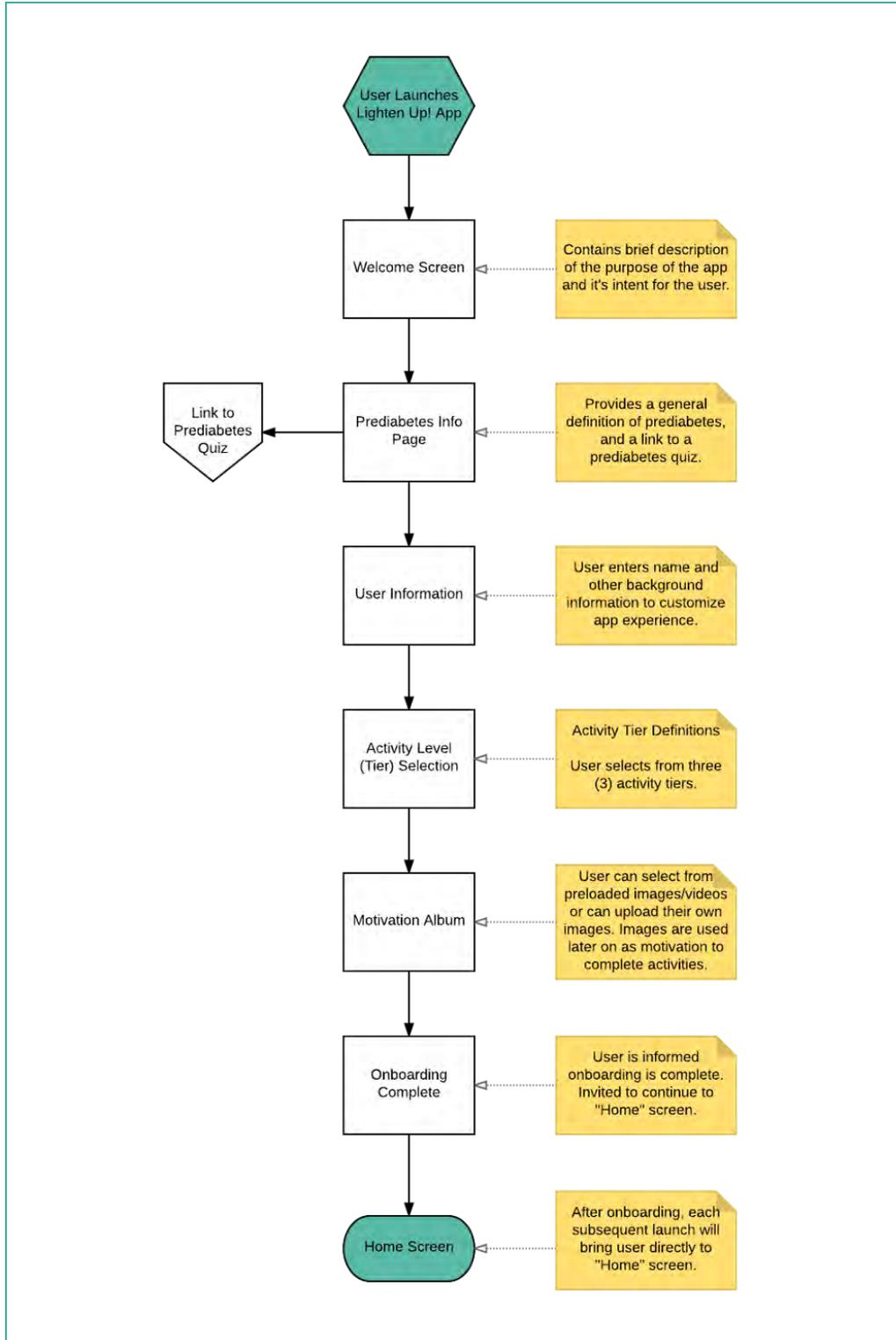
- Power users who already engage in regular exercise routines, meeting or exceeding the CDC recommendations
- Those younger than age 44 (as recommended by the CDC)
- Those 65 or older, as they usually are under the supervision of a primary care provider and are more likely to know their prediabetes status
- See Appendix A’s negative user persona

This mHealth app currently is not intended to provide this functionality:

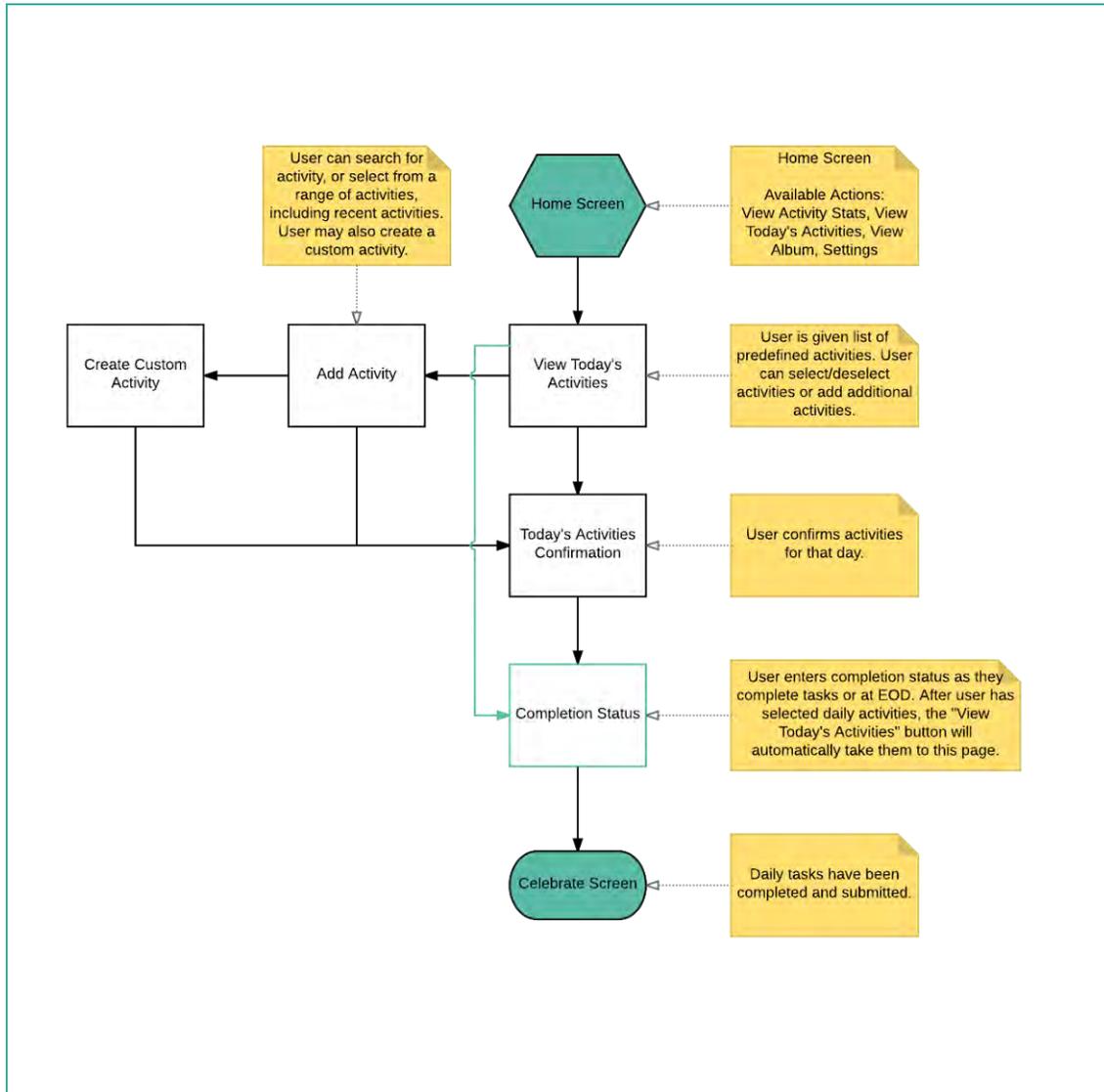
- Detailed statistics tracking
- Weight tracking
- Interfacing with wearable technology

### 3. PROCESS FLOWS

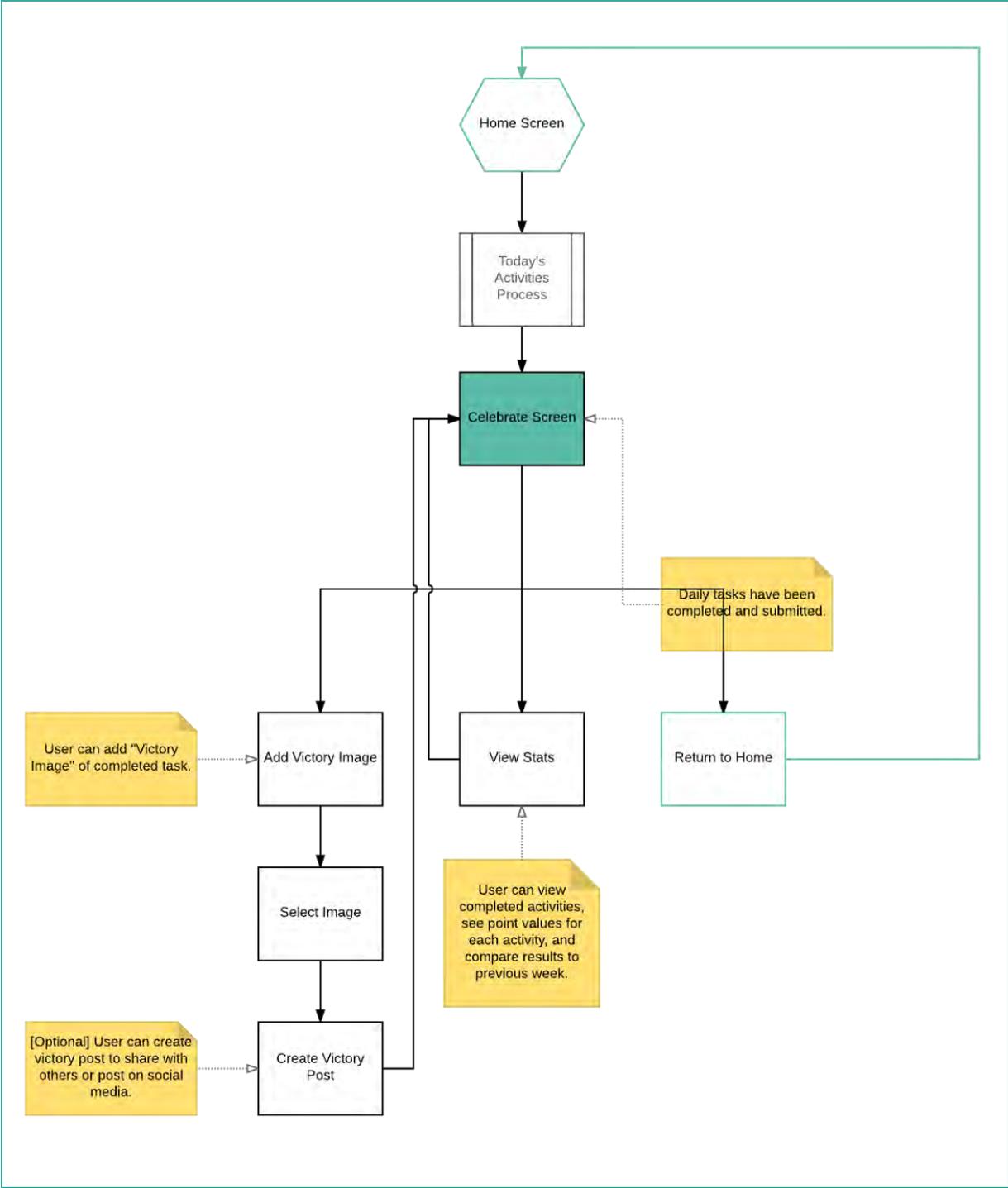
#### Sign-up and onboarding



## Daily activity customization and logging



# Viewing achievement statistics and visual album



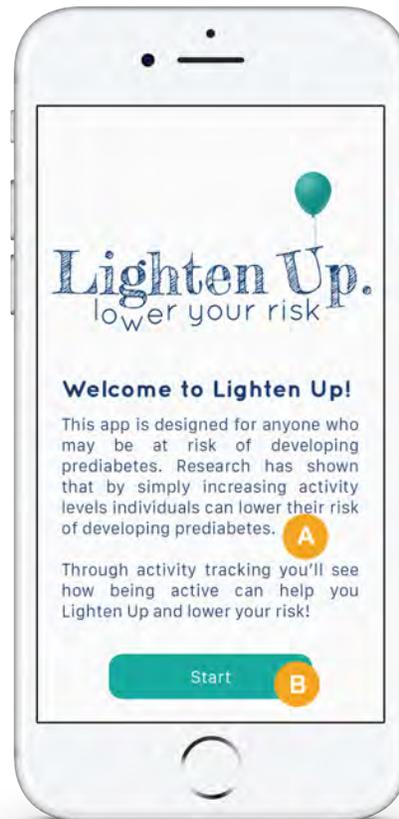
## 4. DESIGN REQUIREMENTS

### Choice of platform

We chose iOS system as our platform. And our user interface is designed according to the iOS design guidelines.

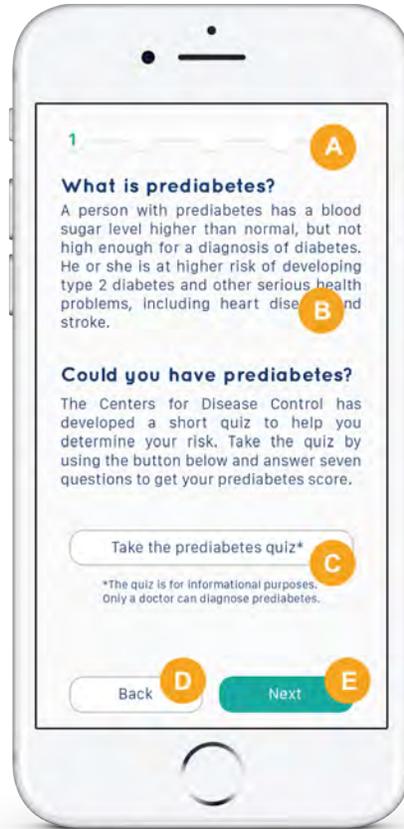
### Annotation for screens and interactions

#### Sign up and on-boarding



Welcome page

Ref.	Element	Description	Interaction
A	introductory text	introduction to Lighten Up	N/A
B	start button	start the signup	when clicked, transition to prediabetes page



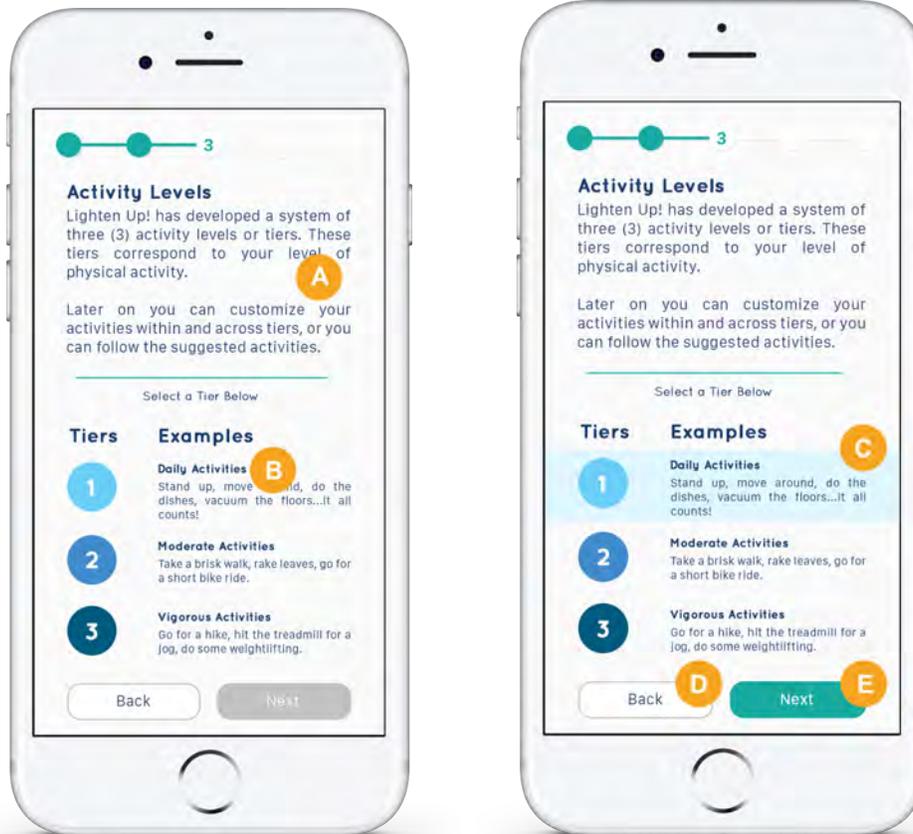
Prediabetes page

Ref.	Element	Description	Interaction
A	status bar	indicates which step user is at during the registration	N/A
B	introductory text	introduces prediabetes	N/A
C	quiz button	take the prediabetes risk quiz	when clicked, transition to an online CDC prediabetes risk quiz
D	back button	N/A	when clicked, back to the welcome page
E	next button	N/A	when clicked, forward to personal info page



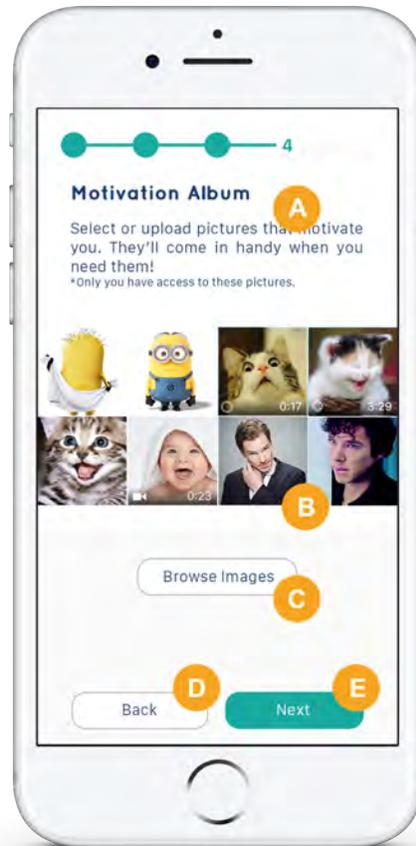
Personal info page

Ref.	Element	Description	Interaction
A	personal info	personal info including name, gender, age, weight	input box
B	back button	N/A	when clicked, back to prediabetes page
C	next button	N/A	when clicked, forward to activity level page



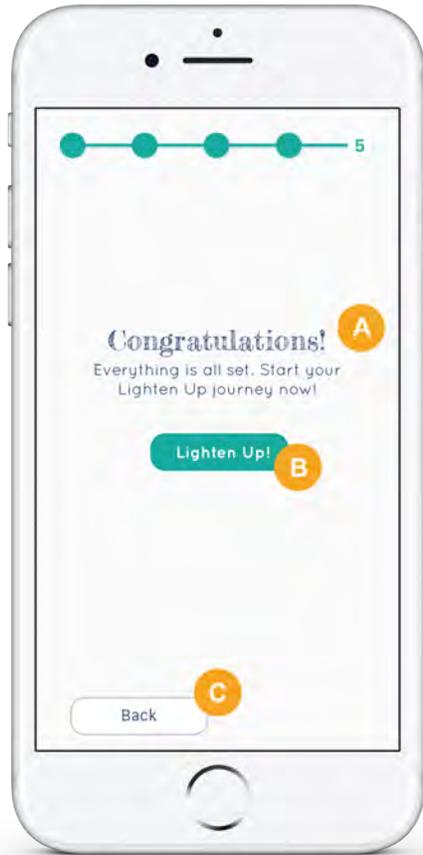
Activity level page

Ref.	Element	Description	Interaction
A	introductory text	introduction of the activity levels	N/A
B	Tiers	examples of the activities for each tier	when clicked, becomes the state of “selected”
C	Tiers	examples of the activities for each tier (selected)	when clicked, becomes “unselected”, and the “next” button is activated
D	back button	N/A	when clicked, back to personal info page
E	next button	N/A	when clicked, forward to motivation album page



Motivation album page

Ref.	Element	Description	Interaction
A	introductory text	introduction of motivation album	N/A
B	pictures	examples of motivation pictures	each image becomes selected with a check icon when clicked
C	browse images button	users can add images from their own camera rolls	when clicked, jump to the system's photo galleries
D	back button	N/A	when clicked, back to activity level page
E	next button	N/A	when clicked, forward to signup completion page



Signup completion page

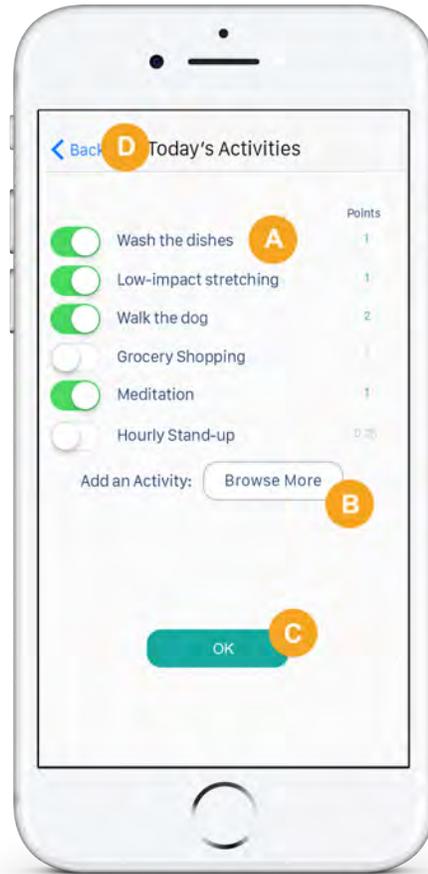
Ref.	Element	Description	Interaction
A	congratulation text	indicates the registration is complete	N/A
B	lighten up button	start using the main functions of the app	when clicked, transition to home page
C	back button	N/A	when clicked, back to motivation album page

## Daily activity customization and logging



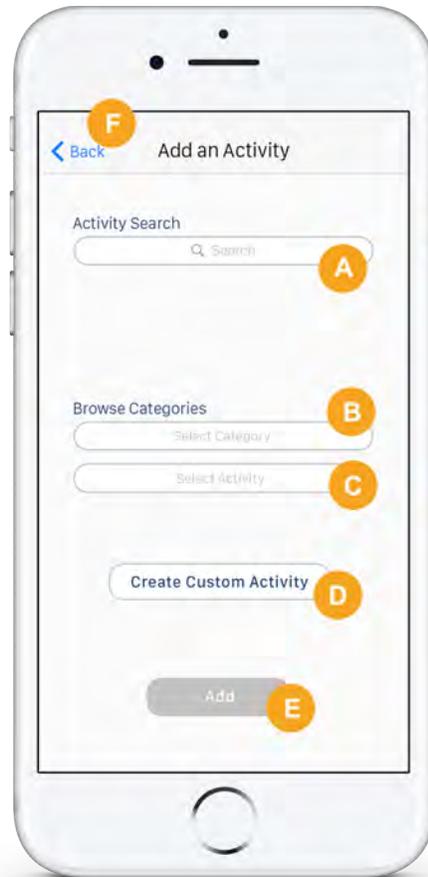
Home page

Ref.	Element	Description	Interaction
A	view stats	user can view the scores he/she has gained for today's activities	when clicked, transition to stats page
B	view today's activities button	user can view today's recommended activity list and customize it	when clicked, transition to today's activities page
C	view album button	users can view motivation/victory albums	when clicked, transition to victory album page
D	customize settings button	user can customize profile settings	when clicked, transition to settings page (not available now)



Today's activities page

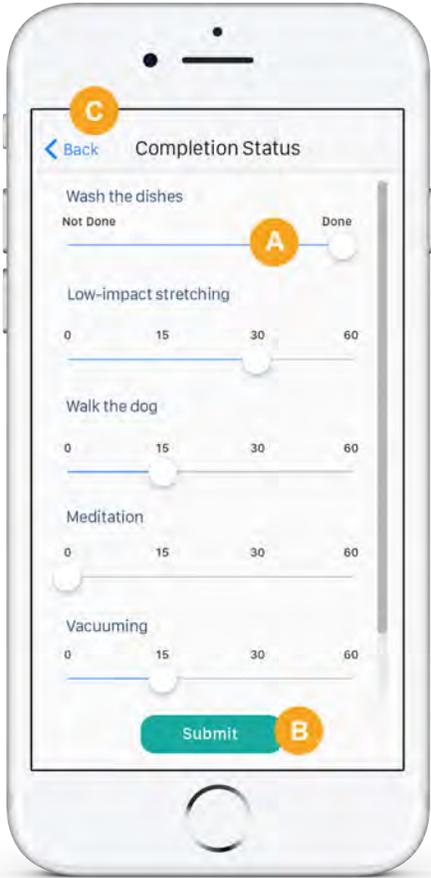
Ref.	Element	Description	Interaction
A	activity list	activity list which contains both recommended and customized activities	user can slide the slider to choose whether or not to keep the activity (default: chosen state)
B	browse more button	add more activities	when clicked, transition to add an activity page
C	OK button	indicates user is satisfied with the list	when clicked, transition to completion status page
D	back	N/A	back to home page



Add an activity page

Ref.	Element	Description	Interaction
A	search box	search activities through typing	user can type in the search box and get a result list that matches the letters entered
B	category selection box	select a category of activities	when clicked, a list drops down showing available categories
C	activity selection box	select an activity from the chosen category	when clicked, a list drops down showing available activities
D	create customised activity button	create an activity that's not offered in the list	when clicked, a typing box shows up in a new page and user can enter the

			name of the activity
E	add button	add the chosen activities to today's activities list	when clicked, return to today's activities page with the updated activities
F	back	N/A	return to today's activities page

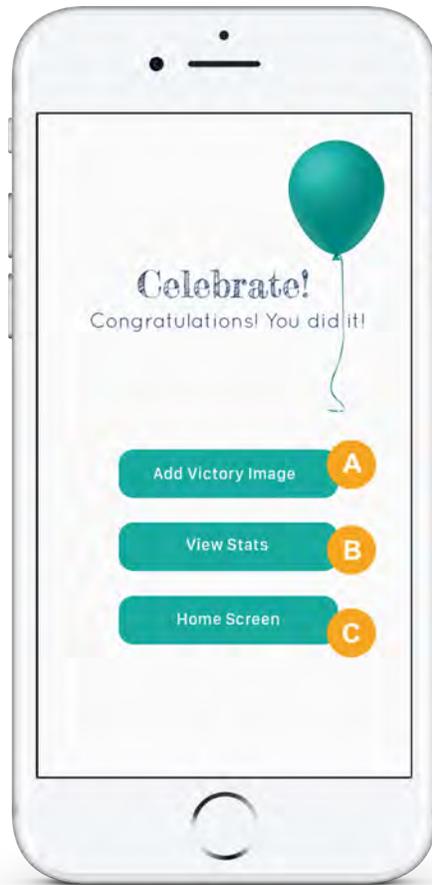


Completion status page

Ref.	Element	Description	Interaction
A	activity completion status	introduction to Lighten Up	the slider can go between not done/done or among different time periods
B	submit button	submit the completion	when clicked, transition to

		status	celebrate page
C	back	N/A	return to today's activities page

### Viewing achievements statistics and visual album



Celebrate page

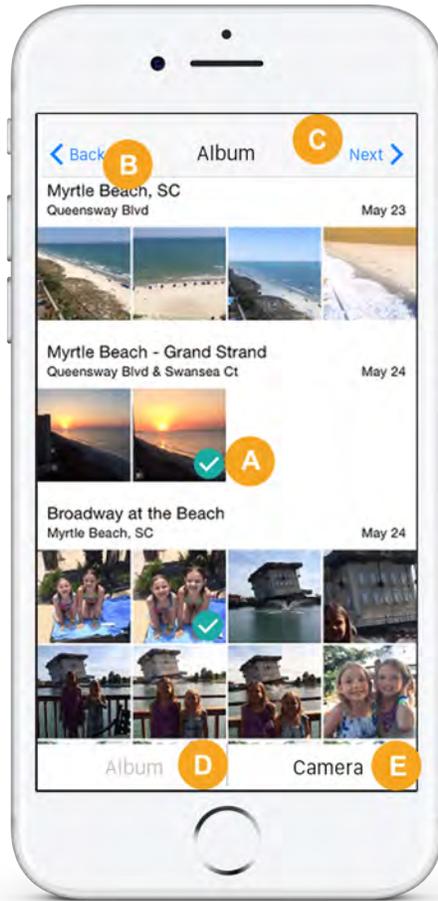
Ref.	Element	Description	Interaction
A	add victory image button	introduction to Lighten Up	when clicked, transition to Victory album -- add pictures page
B	view stats button	view status	when clicked, transition to stats page

C	home screen button	back to home screen	when clicked, transition to home page
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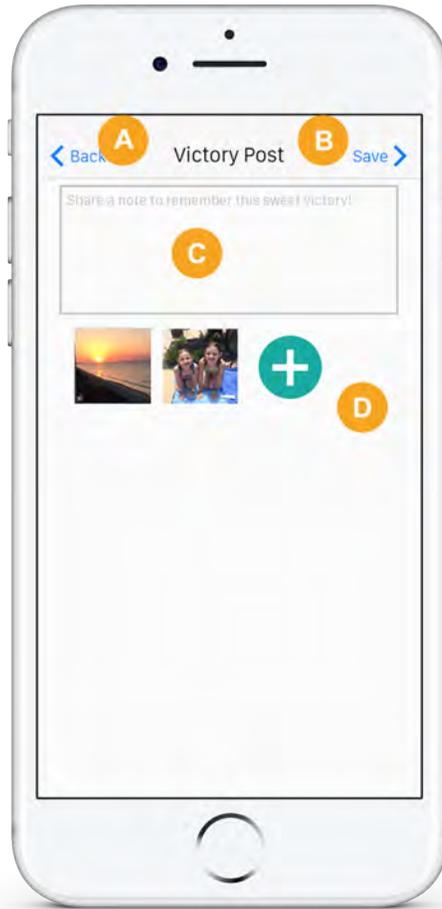
Stats page

Ref.	Element	Description	Interaction
A	today's stats	today's total score and scores from each activity	N/A
B	weekly stats	current and previous weeks' stats	N/A
C	back	N/A	return to celebrate page/home page depending on how user lands here



Victory album -- add pictures page

Ref.	Element	Description	Interaction
A	photos	photo gallery in the system	when clicked, the photo is selected with a check icon
B	back	N/A	return to celebrate page
C	next	N/A	forward to victory post page
D	album tab	choose photos from the gallery	when clicked, goes to the camera gallery
E	camera tab	take photos	when clicked, goes to camera



Victory post page

Ref.	Element	Description	Interaction
A	back	N/A	back to victory album -- add pictures page
B	save	save the image to the victory album	go to victory album page
C	input box	enter the description of the picture	when clicked, the input box is activated
D	add button	add more pictures from the photo gallery	when clicked, transition to the photo gallery



Victory album page

Ref.	Element	Description	Interaction
A	victory album tab	N/A	when clicked, go to victory album
B	motivation album tab	N/A	when clicked, go to motivation album
C	album	weekly album which contains all pictures taken in that period	when clicked, go to a new page where the album can be played as a video
D	back	N/A	back to celebrate page/home page depending on how user lands here

## 5. DESIGN RATIONALE

Interaction with users informed our design decisions throughout the development process. Below we describe four major research findings and how they influenced design choices.

### Identifying target user group

#### Research findings

We administered the CDC prediabetes quiz as a paper survey to 9 participants (4 over the age of 45 and 5 participants younger than 45). Data confirmed two key findings: that 45- to 64-year-olds tended to be in the high risk group and that people under the age of 45 were less likely to be in the high risk group. People over the age of 65, who are eligible for Medicare in the US, would probably already be under a physician’s supervision. The biomedical informatics literature also suggests that there is a “digital divide” and that, until a majority of Baby Boomers reach retirement, older adults are unlikely to engage in using mHealth apps.

**CDC Prediabetes Screening Test**

**COULD YOU HAVE PREDIABETES?**  
Prediabetes means your blood glucose (sugar) is higher than normal, but not yet diabetes. Diabetes is a serious disease that can cause heart attack, stroke, blindness, kidney failure, or loss of feet or legs. Type 2 diabetes can be delayed or prevented in people with prediabetes through effective lifestyle programs. Take the first step. Find out your risk for prediabetes.

**TAKE THE TEST—KNOW YOUR SCORE!**  
Answer these seven simple questions. For each “Yes” answer, add the number of points listed. All “No” answers are 0 points.

Yes	No
1 <input type="checkbox"/>	0 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>
1 <input type="checkbox"/>	0 <input type="checkbox"/>
5 <input type="checkbox"/>	0 <input type="checkbox"/>
5 <input type="checkbox"/>	0 <input type="checkbox"/>
5 <input type="checkbox"/>	0 <input type="checkbox"/>
9 <input type="checkbox"/>	0 <input type="checkbox"/>

Are you a woman who has had a baby weighing more than 9 pounds at birth?  
Do you have a sister or brother with diabetes?  
Do you have a parent with diabetes?  
Find your height on the chart. Do you weigh as much as or more than the weight listed for your height?  
Are you younger than 65 years of age and get little or no exercise in a typical day?  
Are you between 45 and 64 years of age?  
Are you 65 years of age or older?

**AT-RISK WEIGHT CHART**

Height	Weight Pounds	Height	Weight Pounds
4'10"	129	5'7"	172
4'11"	133	5'8"	177
5'0"	138	5'9"	182
5'1"	143	5'10"	188
5'2"	147	5'11"	193
5'3"	152	6'0"	199
5'4"	157	6'1"	204
5'5"	162	6'2"	210
5'6"	167	6'3"	216
		6'4"	221

**IF YOUR SCORE IS 3 TO 8 POINTS**  
This means your risk is probably low for having prediabetes now. Keep your risk low. If you're overweight, lose weight. Be active most days, and don't use tobacco. Eat low-fat meals with fruits, vegetables, and whole-grain foods. If you have high cholesterol or high blood pressure, talk to your health care provider about your risk for type 2 diabetes.

**IF YOUR SCORE IS 9 OR MORE POINTS**  
This means your risk is high for having prediabetes now. Please make an appointment with your health care provider soon.

**HOW CAN I GET TESTED FOR PREDIABETES?**  
**Individual or group health insurance:** See your health care provider. If you don't have a provider, ask your insurance company about providers who take your insurance. Deductibles and copays may apply.  
**Medicaid:** See your health care provider. If you don't have a provider, contact a state Medicaid office or contact your local health department.  
**Medicare:** See your health care provider. Medicare will pay the cost of testing if the provider has a reason for testing. If you don't have a provider, contact your local health department.  
**No insurance:** Contact your local health department for more information about where you could be tested or call your local health clinic.

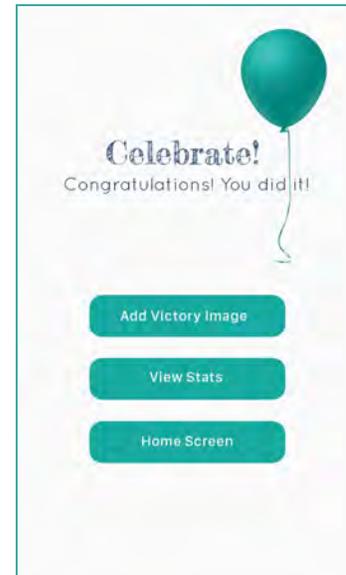
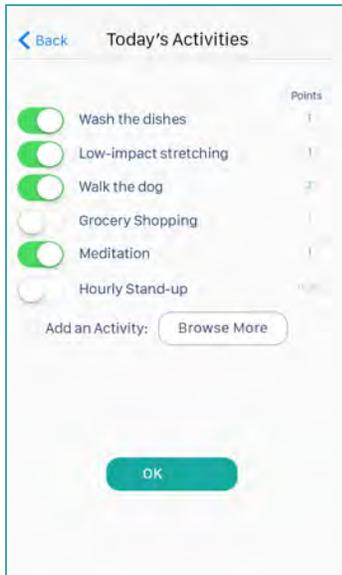
National Center for Chronic Disease Prevention and Health Promotion  
Division of Diabetes Translation

[www.cdc.gov/diabetes](http://www.cdc.gov/diabetes)

CDC Prediabetes Quiz: <https://www.cdc.gov/diabetes/prevention/pdf/prediabetestest.pdf>

## Design decisions

The overall approach to the app design was constantly informed by the fact that target users were not “power users” but those already at high risk for a serious health condition. The design team’s focus shifted from an app that would provide everything that has been shown to play major roles in reducing prediabetes risk (i.e., physical activity support, meal tracking and diet advice, and mood improvement elements) to an app that prioritized low-hanging fruit: getting sedentary adults moving.



## **Enhancing user acceptability by (re)defining physical activity**

### Research findings

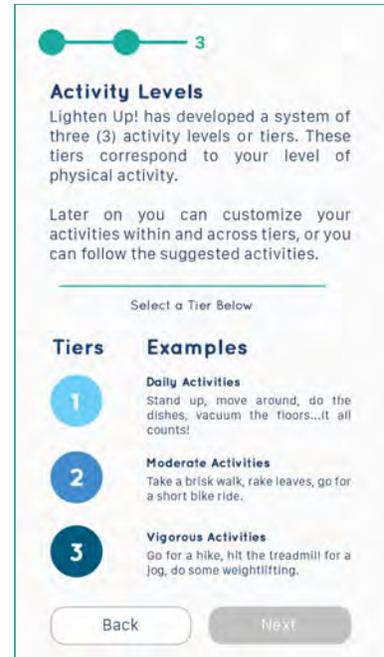
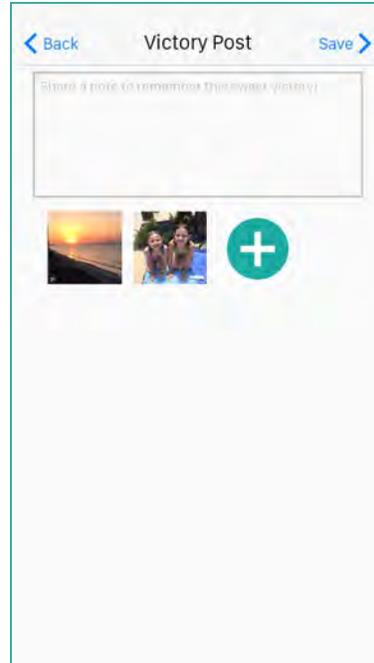
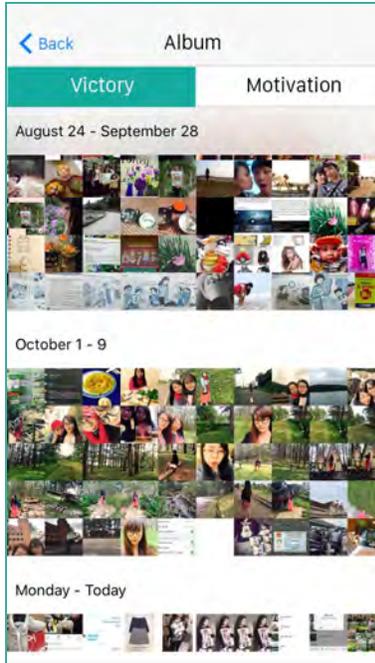
Our formative user research indicated that users defined wellness more holistically, beyond exercise and eating right, to include social interaction, appreciating nature, and enjoying music and art. Interestingly, users also defined exercise as encompassing everyday activities, such as yard work, housework, and running errands.



## **Design decisions**

The social aspect informed the content of our motivational elements, which would allow the user to record “victories”—when daily activity goals were met—via photos or videos. The collections would comprise weekly albums that documented progress in a shareable form and could be reviewed as achievements to support motivation.

As a result of user insights into what constituted exercise, the design team moved almost completely away from a FitBit-type approach to physical activity definitions. The team decided that the physical activity support element should group activities into three tiers. Tier 1 focused on familiar and achievable everyday activities (e.g., vacuuming, weeding the garden); Tier 2 on moderate activities (e.g., taking the dog on a brisk walk, raking leaves); and Tier 3 on more intense activities (e.g., more traditional cardiopulmonary exercise, such as jogging, elliptical, etc.). The rationale was twofold: 1. to accommodate users capable of vastly different activity levels and interests and 2. to create a sense of progress as users moved to more active tiers.



## Offering activity customization

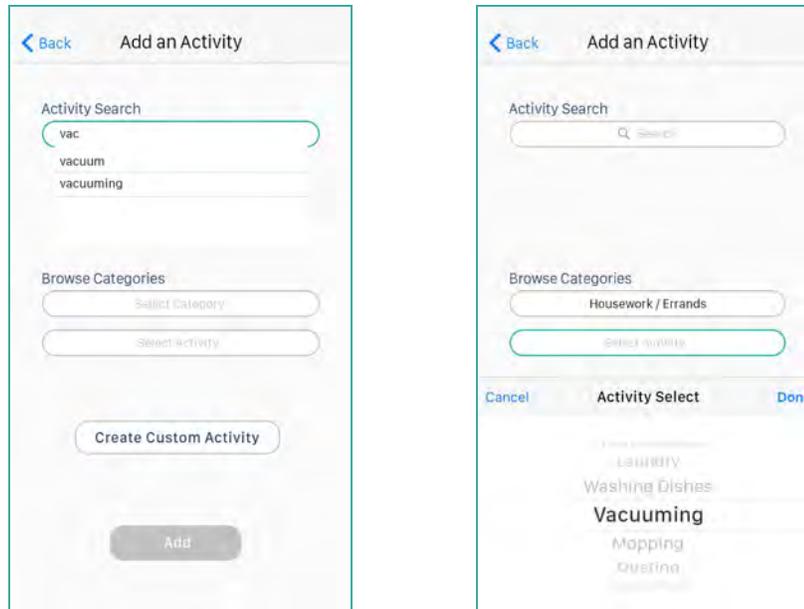
### Research findings

Formative research at the paper prototyping stage indicated that users (and reviewers) supported user customization of activities but thought the onboarding process was too complex because it offered this customization at the wrong points in the process. Feedback suggested that users merely select a tier during onboarding rather than laboriously tailor their activities at that time.



## Design decisions

The design team had several activity customization screens available during onboarding; these were now discarded. Instead the app offered brief descriptions of tiers on a single screen during onboarding and users simply chose a tier. Customization was then offered to users when the app generated their suggested list of daily activities. The team also fine-tuned two ways to browse: via auto-complete searching of the activities database and using categories that grouped similar activities together (e.g., stretching, walking, household chores, etc.) as well as a “recent” category that would be updated with app use.



## **Supporting diverse user motivations**

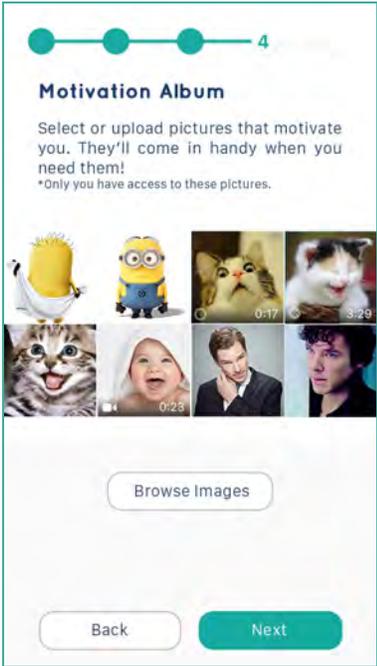
### Research findings

Results from testing with the paper prototype indicated that not all users are motivated by recording achievements or sharing them with friends and family. Reviewers commented that there were limited inspirational elements for those without friends or family or for those who preferred not sharing these sorts of activities. When tested using the interactive prototype, the redesign of customization resonated with users, who particularly appreciated the opportunity to “shop” (using the browse feature) for activities that they may already do, think they can do, or want to do—but may not have thought of. **Users found the browse feature not just functional but also motivating.** Both findings indicated that the design team’s definition of motivating elements had to be set aside to accommodate a broader understanding of what might inspire users to increase physical activity.

### Design decisions

To support diverse sources of user inspiration, the design team expanded the motivational elements to include more comprehensive statistics (i.e., activity

completion) tracking and trending and preloaded content of pictures and videos from which users could choose material they found inspirational. The team also discussed adding achievement badges or trophies, but this element is not reflected in the current interactive prototype.



## APPENDIX A: PERSONAS

PRIMARY USER: SUSTAINED GUIDANCE REQUIRED



# Susan Jones

"I know I should exercise more. I just wouldn't know where to start...or how to keep it up once I started."

**Age :** 57  
**Gender Identity :** Female  
**Occupation :** Human Resources Coordinator  
**Income :** \$68,000/yr  
**Education :** B.A. in Sociology  
**Technology Level :** Uses a desktop computer regularly and owns a smartphone and a tablet.  
**Support Network :** Friends and co-workers  
**Favorite Foods :** Fettucini alfredo, Pad Thai, pizza, brownies, coffee  
**Favorite Activities :** Going to the movies, cooking, reading

**Biography :** Susan has worked for the same company for eighteen years and likes the stability that her choices have afforded her. She is a people person, and she wears her heart on her sleeve. Susan freely admits that she is an emotional eater and after a tough day she just wants to sprawl on the couch with a good movie and some delivery or takeout. She knows that she shouldn't do it and she knows that she should be exercising more often. She's tried making changes in the past, but found it was so different from her normal routine that eventually she just went back to how things were before.

**Goals for the system :** Sustained guidance and suggestions for increasing physical activity, goal tracking, and a greater sense of well-being that she can celebrate or share with others.



## Bob Campbell

“My wife and kids are always telling me to lose weight. I’ve tried diets and always feel awful when I fail. Besides, who wants to go through life depriving themselves all the time? Why do something that makes you feel bad?”

**Age :** 48  
**Gender Identity :** Male  
**Occupation :** Facility Manager  
**Income :** \$59,900/yr  
**Education :** Associates Degree  
**Technology Level :** Occasional computer use. Owns a smartphone.  
**Support Network :** Wife, close-knit family, friends, co-workers  
**Favorite Foods:** Chips, french fries, tacos, fried chicken, pastries, nachos, pickles, beer  
**Favorite Activities :** Avid football fan, gardening, tinkering on home projects

**Biography :** Bob has worked his way up from a maintenance worker to the facilities manager of an entire government facility. His problems with weight began soon after he moved from the field to behind a desk. He was not as active as he used to be, and the responsibilities of running a large team often have him eating at odd hours or making poor meal choices. Both of Bob’s parent’s have developed type 2 diabetes, which is a legacy that Bob hopes to avoid. He has tried to start an exercise regimen in the past, but has a hard time maintaining his commitment. Each time he fails, he feels that he is less likely to try again in the future.

**Goals for the system :** Live both healthily and happily, have clear goal and path, be motivated



# Blake Sommers

"For me, fitness is a part of who I am. I want to feel good as much as I want to look good. Not only do you have to eat healthy and work out everyday, but you have to enjoy being who you are."

- Age :** 27
- Gender Identity :** Male
- Occupation :** Bartender / Fitness Instructor
- Income :** \$48,000/yr
- Education :** High School Diploma
- Technology Level :** Heavy smartphone user.
- Support Network :** Friends, social media network, parents & close family
- Favorite Foods :** Seafood, hummus, sushi, bahn mi, ice cream, espresso
- Favorite Activities :** Running, going out with friends, geo caching, foraging, discovering new music

**Biography :** Blake is both a part-time fitness instructor and bartender. He has never been one to settle for the status-quo and is always actively seeking new experiences. While Blake has many friends, he is fiercely independent, and a master planner. He has competed in six triathalons. His short-term goal is to backpack across Europe to compete in several marathons scross the continent. His main goal in life is to open is own independent fitness studio.

**Goals for the system :** None.

## **APPENDIX B: LINK TO PROTOTYPE**

Our prototype was wireframed using Balsamiq, then reworked in Adobe Photoshop and Illustrator and imported into InVision for final development. The hi-fidelity interactive prototype can be accessed via an iOS device or through a web browser.

**(Recommended) To access the prototype via a web browser, follow these steps:**

Click this link: <https://invis.io/HZ9IEOZ8G>

If the link does not open, copy and paste the URL above into your web browser.

**To access the iPhone prototype, follow these steps:**

Open this link on your iOS device: <https://invis.io/HZ9IEOZ8G>

----- OR -----

Follow this link: <https://invis.io/HZ9IEOZ8G> . After the project loads, click on the small grey cell phone icon in the bottom right of the screen. Enter your mobile number and click send. An SMS message will be sent to your iOS device with a link to the project.

## **APPENDIX C: USER TEST CASES**

Users were asked to perform the following tasks to test the hi-fidelity interactive prototype:

### **Task 1**

You've just downloaded a new app, Lighten Up!, which is supposed to help you increase your physical activity levels without making you feel like you're preparing for a triathlon.

Complete the onboarding (sign-up) process for the new app. Please walk us through what you are doing aloud and share what you are thinking as you make your selections. We need to know what makes sense as well as what does not.

### **Task 2**

Once you've completed the sign-up process, launch the app to get started with your recommended activities. Once you're happy with the activities you want to complete, pretend that you've completed them.

### **Task 3**

If you wish, at the end of the day's activities, celebrate by viewing statistics or viewing or uploading pictures or videos.