



positive.ly

DESIGN BRIEF

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Prototype: <https://invis.io/ZHVIEOO7CAP>

Product Demonstration Video: https://youtu.be/zAcV_szDtds

Executive Summary

Each member of the Positive.ly team has had a family member or friend who has experienced or is currently suffering from depression or other mental illnesses. Using that common thread, we had the idea to create a mood tracking and cognitive behavioral therapy (CBT) program that could help our loved ones. After laying out a development workflow we set about researching the mood disorders, contacting professionals in related fields for advice, and learning about current CBT techniques that we could incorporate into our app. We examined competing apps and found that none had all of the features we envisioned: a mood tracker, a journal, activities to improve mood, gamification elements, and a backend that includes a variety of machine learning algorithms that would do emotional analysis based on passive data, compute results from psychiatric evaluation surveys, voice analysis to detect potentially hidden disorders, and even take into consideration GPS coordinates and the phone's gyroscopes to see if the person was being too much of a homebody and not getting enough exercise. All of this data would be used to create an ever-evolving app that could serve up activities and personalized interactions with the goal to improve the user's mood; we even envisioned a system that could detect at-risk users and prompt them to seek medical assistance.

With all of these ideas in mind, we set about creating wireframes, a user survey and conducting usability testing. The results prompted us to make a number of changes, such as with the icon choices, and reevaluate some of the steps in our journal entry process. We then created a high fidelity prototype and ran another round of usability tests. We were much happier with the results as users seemed to have little difficulty in navigating the app and completing the tasks. The following design brief represents a work in progress that ends with recommendations for design and next steps in the process.

Impetus for Application

According to the National Alliance of Mental Illness, mental illness affects one in five adults in the U.S., but less than half will receive treatment (*Mental Health By the Numbers* | NAMI: National Alliance on Mental Illness, n.d.). Because smartphones are easily accessible, owned by a large majority of the population and are capable of gathering large quantities of data through sensors and interactions they are especially valuable in the field of mental health, as they can be used in the diagnosis, assessment and treatment of mental disorders. Tourous et al. have identified three powerful ways the data from smartphones can be effectively used in the treatment of mental health through data velocity, data volume and data variety (2015). Since smartphones are able to capture data frequently and in real time from both active and passive interactions, this allows medical professionals such as psychiatrists to paint a better picture of a patient's mental state as it fluctuates across temporal dimensions (Tourous et al., 2015). Data collected from passive sources, such as gross motor activity from accelerometers, facial recognition and willingness to reciprocate social engagement provide perhaps the greatest benefit compared to traditional methods of user data collection.

Due in part to their ubiquity, smartphones are an ideal platform to help patients who are currently receiving help from medical professionals, as well as users who are reluctant to, do not wish to see a medical professional, or are unable to due to lack of insurance. Furthermore, community attitudes for the use of mobile phones for monitoring and management of mental disorders has been found to be positive (Proudfoot et al., 2010) and recent research has shown that self help treatments delivered through the internet or smartphone applications offer viable means of helping patients experiencing some form of mental disorder (Ly et al., 2014).

Targeted Use Case

Positive.ly will focus on the 18+, tech savvy demographic with or without clinical diagnosis, with a main goal to provide accurate assessment of mental states and in-time cognitive behavioral therapy to users who are currently receiving clinical treatments and users who just want a little self care. For those who experience symptoms of mental health disorders, this application will be used to store ongoing data that will help the individual improve their mood over time. For those who are receiving clinical treatment, Positive.ly takes it a step further by giving individuals the opportunity to release their data to the medical professional they are seeing to aid in their sessions. This data will include summarized mood graphs charting their patient's entries—not, however, the full journal entries—as well as any tentative diagnoses made by the machine learning algorithms in the backend. This information will help the medical professional in understanding the patient's mood progression over time, learn which activities have seemed to help the patient improve mood, and be able to use the tentative diagnosis as a starting point for additional examinations and treatments.

Product Development Workflow

Our design process was based off of the design thinking methodology and was broken down into a four-stage, six-week design sprint. Each stage was conducted over the course of one to two weeks, ending with a group meeting which was conducted either in-person or via skype. Additional meetings were held during specific stages of the design process as well as constant communication via Discord chat.

Week 1-2: Empathize/Define	Week 2-4: Ideate	Week 4-5: Test and Iterate	Week 5-6: Report
Expert Interview	Design Workshops	Recruitment	Draft Write-up
Competitor Analysis	Low Fidelity Wireframes	Usability Test Plan	High Fidelity Prototype User Testing
Research: Literature Review	Proof of Concept: Guerilla Testing	User Testing/Analysis	Final Edits
Define Problem	Medium Fidelity Prototype	Priority Matrix	Recommendations
Requirements Gathering Workshop		High Fidelity Prototype	

Week 1-2: Empathize/Define

In order to better understand our problem space we conducted expert interviews, a competitor analysis and a review of literature. Two field experts were interviewed to gain insights into feasibility, functional requirements and limitations of mental health applications. Our interviewees credentials are as follows: 1. Dr. Steven Chan, MD MBA, a clinical informaticist and Medical Director for Addiction Consultation & Triage at Palo Alto VA Health, affiliated with Stanford University School of Medicine and co-investigator on clinical research in the areas of tele-health and digital health. 2. Michelle Ghafouri, a masters student in social work who has more than five years experience in the department of Child Protective Services. Insights and notes were gathered and used in later decision making. Once all information had been gathered from expert interviews, competitor analysis, and literature review, the group concluded this stage of the design sprint with a “Defining the Problem Statement and Requirements Gathering” workshop.

Week 2-4: Ideate

In the ideate phase our team focused on rapid design process with a fail fast mentality. The first step involved establishing the information architecture through a site map. Next, over several design workshops, each member of our team designed many low fidelity or paper wireframes which were then presented and discussed. Elements that were agreed upon would be transferred to the next round of iteration. Team members also employed guerilla usability techniques via showing off designs and discussing with friends and family to gain proof of concept. Based on design workshop decisions, a mid fidelity clickable prototype was created using Invision and prepared for user testing.

Week 4-5: Test and Iterate

A total of two formal usability tests were conducted with both the Positive.ly mid fidelity prototype and the Positive.ly high fidelity prototype. Each test included a participant recruitment process and a usability test plan. Qualitative data was analyzed using an affinity mapping diagram and insights were collected by each team member. Quantitative metrics were analyzed statistically following the guidelines of “Quantifying the User Experience” by Jeff Sauro and James R. Lewis (2012).

Week 5-6: Report

Final reporting was conducted over the course of one week and included draft editing and final design updates to the Positive.ly high fidelity prototype. The team concluded our reporting with a “Future Recommendations and Design Retrospective” workshop.

Business Viability/Competitor Analysis

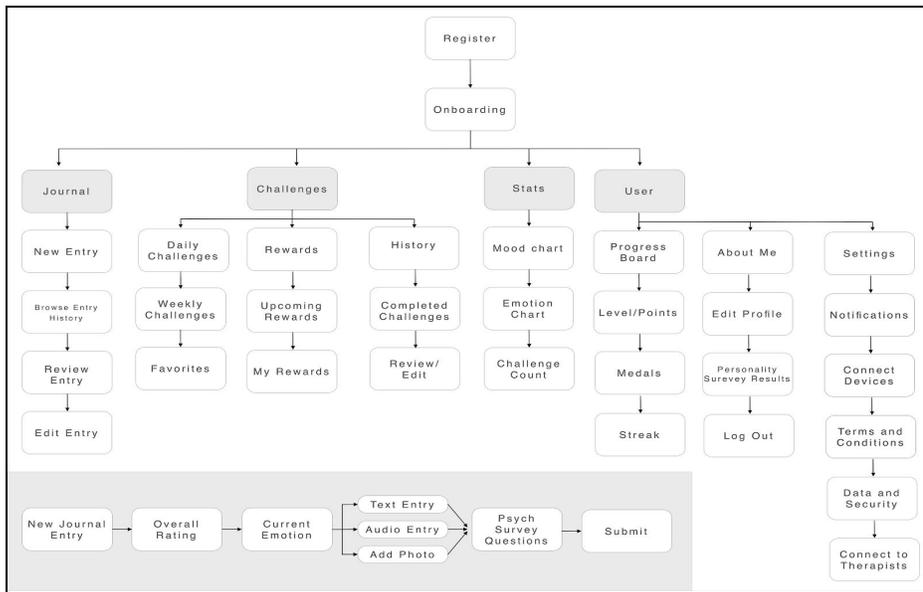
There is no shortage of apps available that track mood; improve mood via activities, exercise, or meditation; and journal thoughts and feelings. To ensure Positive.ly was not a carbon copy of these other apps we did a competitor analysis of apps with similar functionality. Out of the seven apps we looked at—Bliss, Daylio, Happify, Headspace, Moodkit, SamApp, What’s Up—we determined that only Moodkit contained a large number of similar features and goals to Positive.ly.

Moodkit professes that it is built using cognitive behavior therapy techniques and contains a similar feature set: a variety of activities for users to do to improve mood, the ability to journal out thoughts, and a mood rating system with associated tracking chart. This app has also been highly rated by Apple and given glowing reviews in a number of publications. However, Moodkit has a rather bland, basic aesthetic that we could not see users finding at all appealing, particularly younger users. Indeed, some App Store reviewers commented that it was not “‘pretty’ or intuitively constructed;” and “The UI just seems less graphically appealing than more recent apps.” Unlike Positive.ly, Moodkit does not seem to be marketed to the general population but seems to assume its user base has a mental health issue of some kind and interacts with the user accordingly; an App Store reviewer noted “It would be ideal and encouraging if I could record and track positive thoughts and emotions. My thought life is not a constant negative flow[.]” Lastly, Moodkit does not contain any gamification elements. While Moodkit definitely seems like a fully-featured app with the ability to assist people with mood issues, we believe that Positive.ly has the ability to appeal to a broader audience via superior design, an extensive machine learning backend that serves up personalized activities and recommendations, and the envisioned seamless integration to smart devices.

Design & Iteration Approach

The basis for design and features that make up Positive.ly are firmly grounded in the 16 recommendations presented by David Bakker, et al, (2016) in their comprehensive investigation and report on mental health applications, titled “Mental Health Smartphone Apps: Review and Evidence-Based Recommendations for Future Developments.” Particular attention was paid to the following recommendations: 1. Design for use by nonclinical populations, 2. Use automated tailoring, 3. Recommend activities, 4. Behavioral activation, 5. Real time engagement, 6. encourage non technology based activities, 7. Use gamification and intrinsic motivation to engage, 8. Log of past app use, 9. Reminders to engage, and 10. Simple and intuitive interface and interactions.

There were a few other design considerations made early on that affected the entire app’s look and feel. The first was the decision to use a tab bar instead of a hamburger menu—while the initial plan was to use a hamburger menu, a lengthy discussion and some research resulted in the consensus that a tab menu would better communicate the app’s features. This is in large part due to the usability principle of discoverability,



since users could more easily find what they are looking for on the screen. Since our application contained many features, hiding them under a menu would reduce the chances of the user being able to effectively find everything that they needed. Having a tab menu eliminates that problem as it gives the user a clear view of what screens they can switch to and from, and thus the superior design choice (Sebastian 2018).

Another early design decision was to make the app primarily blue, as it was found in one large-scale survey that dark blue is the most relaxing color (Carter, 2019).

The primary accent color chosen was teal, which was found to be the world's "favorite color" via a global survey that included 100 countries (Hooton, 2017).

Lastly, we attempted to make the app as accessible and easy-to-use as possible. Contrast was verified using an online contrast checker to ensure that our text met, at the bare minimum, the Web Content Accessibility Guidelines 2.0. We employed liberal use of the usability principle "recognition rather than recall" by including text along with icons we thought users might be unsure of, such as on the tab menu. We also tried to inform the user of the number of steps in a process, and/or the expected completion time of a task, such as in our journal new entry workflow and in our onboarding survey.

Journaling

As we decided the journaling and associated mood tracking were the most important features of our app, we spent most of our time trying to perfect its design. The first two screens of the "new entry" functionality of the app—the mood reporting—were based on the Brief Mood Introspection Scale (BMIS) and the circumplex model of emotion. The first screen prompts the user "Overall, I would rate my current mood as..." and the user is given the option to choose a value from 0 (very bad) to 10 (very good). We used a modified version of the BMIS question, as their range was -10 (very unpleasant) to 10 (very pleasant) (Mayer & Gaschke, 1988). We believed the changed wording would resonate more with users, and that users would have less difficulty with an all-positive scale. Our next screen asks users to pick the primary emotion that they are currently feeling. The emojis and descriptors we chose were based on the circumplex model of emotion; we also arranged the emojis and descriptors in the arrangement described in Russell's work: larger positive values on the Y axis represent greater levels of arousal and larger negative values represent lower levels of arousal; larger positive values on the X axis represent greater levels of pleasure and larger negative values represent lower levels of pleasure (Russell, 1980). We thought that basing our mood reporting on existing research would allow for a

greater degree of accuracy for our machine learning algorithms to determine a user's true feelings and risk potential for self-harm, etc.

The 3rd step in our journal entry flow allows users to write a journal entry or record their thoughts aloud, which converts to text and saves the audio file. There is an abundance of research that shows that writing feelings helps put people in a better state of mind, and we thought allowing users to speak aloud would be beneficial to users who might have a difficult time typing (Journaling for Mental Health, n.d.). Additionally, recording the user's speech would help us gather data for our algorithms: machine learning models may be able to diagnose depression based on the way people talk, using both tone of voice and word choice; verbal tics may also be used to detect psychosis, depression, and other mental disorders (Matheson & MIT News Office, 2018; Frankel, 2016). Finally, the functionality allowing users to upload a photo with their journal entry allows us to correlate a good mood with imagery and gives us the possibility to serve that photo to the user when they are having a bad day—something that has been shown to improve mood (Rubin, 2013).

Challenges

We viewed the Challenges section as a way to give the user activities to help improve mood, encourage them to continue using the app due to the “fun” factor, and gather data for the algorithms. Activities were researched extensively and evaluated in terms of feasibility to include in our app. These activities include:

- **Meditation.** Meditation is a popular and low effort way for people to improve mood; research has shown that frequent meditation can lower the severity of mood swings and destructive thought processes (Teasdale, 1988).
- **Puzzle Gems.** Casual video gaming has been shown to reduce depression and anxiety as well as improve mood, so we thought including a casual game similar to Bejeweled 2 would be a fun and useful activity (PopCap Games, 2011). Because this option does not have as many verified long-term benefits as the other challenges, we wouldn't expect it to be served up frequently.
- **Outdoor Adventure.** This challenge piggybacks off of the Pokemon Go and Ingress waypoints to encourage users to get exercise. The backend algorithm also does emotion analysis on the selfie users who are prompted to take a selfie upon arriving at the waypoint.
- **Gratitude Journaling.** Instead of making a standard journal entry using the aforementioned journal flow, gratitude journaling prompts users to write (or speak) about someone or something they are grateful to. Expressing gratitude has been shown to increase happiness and healthiness (Harvard Health Publishing, n.d.).
- **Exercising.** Exercise can help improve mental health, even if for a short time (“Exercise for Stress and Anxiety,” n.d.).

Mood Stats

The mood statistics is a feature that we added as a way for users to look upon a summarized version of their mood entries. This would be used by participants to track their overall status on a weekly, monthly and yearly view.

User Profile

The user tab was implemented as a way for users to be able to track their point progress, personal information, quick resources available, and setting options. Our hope is that the user would be motivated by

seeing their current level and the rewards offered by “leveling up” while completing challenges. Diving into the tab options, the “About Me” tab allows the user to change general information such as their name and email address, but also displays their personality survey results from the onboarding. The “Help” tab allows the user to reference quick support resources to aid in an at-the-moment emergency guiding users to a crisis line, and simple exercises that could calm the user’s state from sudden anxiety or panic. Finally the “Settings” tab allows the user to control their notifications but also includes features unique to this application that involve connecting to smart devices and the release of mood statistics to their medical professional.

The ability to connect to smart devices and the notifications are two components that are difficult to show visually in our prototype but are key to the overall user experience. As the app evolves, targeted notifications would be sent to the user to encourage them during positive moments and provide assistance and recommendations during negative moments. Connecting the app to smart devices like a watch allows other data collecting, such as fitness and sleep information, and could allow additional helpful user alerts.

Medium Fidelity User Testing

In order to understand whether our phone application was user-friendly, our team ran two user research studies for the medium-fidelity prototype before deciding to make changes and create our high-fidelity prototype.

Task 1: Usability Testing of Icons

Modeling our study off of the suggestions presented by the Nielsen Norman Group, the goal of our initial testing was to figure out if the icons we originally chose for the menu tabs would effectively communicate what would be shown on the next screen if the user were to tap on the icon. The questions asked were: (1) What does this icon represent to you?, and (2) If you were to see this icon in a phone application, what would you expect to appear on the screen after tapping on it? The idea with these open-ended questions was to allow the user to freely express their opinion on the icon without being limited to multiple choice options. The icons were also displayed in an out-of-context fashion meaning that the user would only be seeing the icon itself paired with the questions without the context of the icon being in the phone application. The survey link was posted with a short description on Craigslist, personal social media sites and the Sammy SJSU phone application to gather survey takers.

With a total of 31 participants (9 males, 22 females) with ages ranging from 19-45+, our leading response for our journal icon indicated that participants thought the icon represented some sort of note taking. Other survey entries described the icon as a potential school or organization related icon that would lead the user to a calendar or a screen to keep contacts. For the challenges icon, most users described it as an icon that represented nature or goals that would lead to an achievement or fitness tracker. Other responses indicated that it looked familiar to a game they played.

From the feedback, our group understood that our chosen icon of a notebook and a pen led participants to the notion that it was mainly for writing purposes. Since the goal was to track down the user’s mood status via a scale, emojis and journal/audio entry we opted for an icon that eliminated the pen and instead featured an open book. With the challenges icon displaying mountains and a flag it was hard to determine what to choose so that participants would not learn towards the notion that the icon dealt with nature or fitness. Since the challenges included outdoor and indoor activities we opted for a star icon. In order to gain a better

understanding of which icons we should use in our phone application future usability testing of icons is suggested in the form of A/B testing where we would have a set of two icons that the users can choose from to represent a category.

Task 2: Usability Testing of Mood Entry Process

One of the main tasks for users to engage in the application involves entering their mood. This is what helps provide relevant daily and weekly challenges for the users to engage in throughout the week. We decided to test this through a step by step verbal guide allowing users to provide feedback on their navigational journey. Participants were recruited through word of mouth requests from among our social circles and sessions were conducted in-person in a private conference room as well as remotely via Google Hangouts.

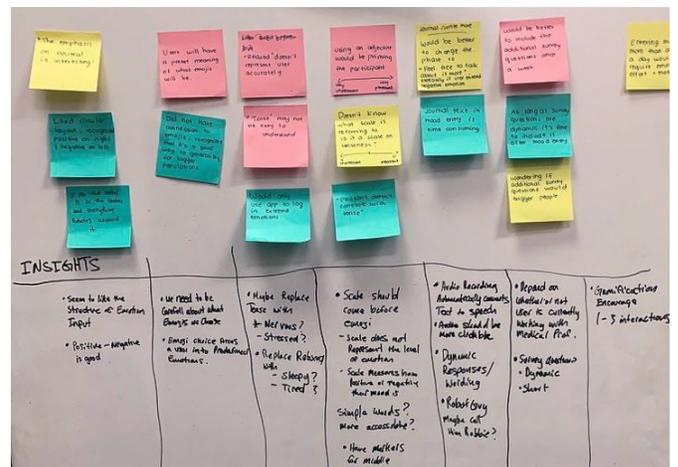


For this task, participants were asked to describe what they saw on the three main screens of the mood entry task. The first screen depicted a series of emojis to choose from and led to another screen depicting a scale for overall mood, and finally ended on the journal entry screen. Participants were also asked to give feedback on additional features that the group was considering to add onto this main task.

Results & Analysis

In order to better assess the feedback, our group decided to create an affinity diagram by listing out quotes from each participant and grouping them based on similarity. We then went through each of the groupings to list out insights that we should consider for future design iterations.

The main insights we gathered from the testing revolved around needing to use relevant and common emojis paired with more familiar everyday terminology, to clarify the usage of the scale and to properly distinguish the difference between the scale and emoji entry.



High Fidelity Usability Test

Overview

Our team conducted a moderated usability test of the high fidelity Positive.ly prototype. Five participants that fit our target demographic were recruited. Of the participants, two participants reported that they are currently seeing a therapist and three reported that they were not/ declined to respond. There were four males and one female, age ranging between 25 and 29. Three participants were tested in-person while two were tested via remote screen sharing software. Our goal was to assess the usability of our primary user journeys, given the aesthetics of the high fidelity design. Four initial tasks were identified as primary user journeys. They are as follows:

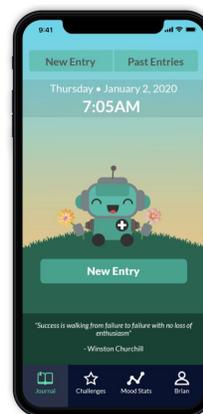
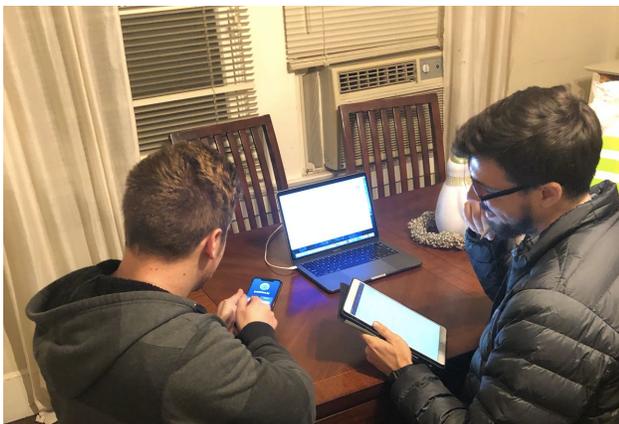
Task 1	Register and complete onboarding steps
Task 2	Mood journal entry
Task 3	Complete a challenge
Task 4	Located mood statistics

Metrics

In addition to qualitative data collected via user comments and discussion, we determined to collect data in the following metrics: 1. Tasks completion rate, 2. Number of errors, 3. Subjective user rating.

Results

The observed task completion rate was 100%. All five participants completed all four tasks with zero errors. Task completion was compared to a benchmark completion rate of 80%. Using the mid-probability binomial distribution, there is an 83.62% probability that the observed completion rate of 100% comes from a population whose true completion rate is greater than 80%. The 95% Adjusted Wald Confidence Interval for task completion is (59.88%, 100%) (Sauro & Lewis, 2012).



On a scale between 1. Completely dissatisfied and 7. Completely satisfied, subjective user ratings scores had a mean of $M = 5.3$ and a standard deviation of $SD = .4$. A confidence interval was constructed using the t-distribution $t(0.05,4)$. Taking into account sample size and variability, we can be 95% confident that the true usability rating score is between 4.8 and 5.8 (Sauro & Lewis, 2012).

Analysis

From our qualitative metric results we determined that our users flow made sense to our users as they had no issues completing tasks, however, the execution would need work. This was evident by the less than perfect subjective user ratings scores. To understand how we could improve we once again created an affinity mapping diagram in order to cluster qualitative user data. Insights were used to perform updates to the current prototype as well as guide our recommendations and next steps discussion.

Next Steps & Future Recommendations

Throughout our group's journey of creating this application and from both the feedback we have received during our usability testing, and our own internal analyses, we realized that there are a number of items we wish to improve upon:

- More cues and/or information given to the user explaining the app so as to remove confusion about the app being more fully-featured than just a diary app.
- Better communication of gamification elements so the user would understand the value of gaining points, medals, and the purpose of a streak.
- Additional visualizations of mood entry information so the user could see their statistics in a variety of ways and choose which best suits their needs, e.g. a calendar view.
- Loading screens that walk the user through the application so they could better understand the context of the application and really drive home what they are gaining from using the app.

Main Takeaways

- Positive.ly is a mental health application that uses mood tracking, advanced AI and data collection techniques to provide a custom tailored mental wellbeing support tool
- We started by understanding our users through research, expert interviews and competitor analysis.
- We discovered valuable ways a smartphone can be used to collect data that can be used in the assessment, diagnosis and treatment of mental disorders.
- A variety of activities such as expressing gratitude, meditation, exercise, and journaling about emotions can have incredible, lasting benefits for mental health.
- We utilized rapid iteration and design workshops to identify the best way to design our app.
- Performing usability tests helped us pinpoint the primary issues with our app as well as spark new ideas when reviewing user feedback.

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