

# The Impact of Gamified Social-Media Mobile Challenges on Mental Well-being

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## Abstract

Mental well-being is an intangible, subjective perception of our own emotions and cognitive capabilities. With the rise of social networks, connectivity and media consumption have seen dramatic changes, and serious games have been applied in many different ways as an effective approach for improving mental well-being. In this work, we focus on understanding how mental well-being relates to people's routines, what dangers and recommendations we should be aware of, and what opportunities exist to leverage current technologies in order to improve people's lives. In this paper we present Spark, a mobile application where everyone in the world participates in a single challenge every 25 hours. Each challenge asks the user to perform an activity, capturing that moment with a photo, and then sharing it. As the user participates in different challenges over time, a record of the activities is always accessible. This encourages the user to relive positive past experiences, and take note of his accomplishments. We evaluated the tool during a six-month long study where participants ranked their weekly levels of mental well-being. The results suggest there is a positive impact of the gamified challenges in the overall perception of mental well-being.

**Keywords:** Serious Games; Social Media; Mental Well-being; Mobile Media; Online Communities; Qualitative Methods.

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## 1. Introduction

Mental well-being is an intangible, subjective perception of our own emotions and cognitive capabilities. It is described by the World Health Organization as “the state in which the individual realizes his or her own abilities, can cope with normal stresses of life, can work productively, and is able to make a contribution to his or her community”. With the rise of social networks, connectivity and media consumption have seen dramatic changes.

The everyday struggle, or the positive affect towards life are the main objective and intention of our concept, targeted at the everyday user. With this concept in mind, we pursue research within the following areas: (i) Gamified social networks as a serious game-tool to share emotions

and experiences; and (ii) Advice and suggestions to promote healthy habits. An important focus of our study was to understand what kinds of activities have an overall positive impact in helping people feel happier and more satisfied. The result was a collection of gamified activities that have the most potential for being suggested and promoted to users. These activities were then gamified and incorporated into a mobile social-media network called Spark, a mobile application where everyone in the world participates in a single challenge every 25 hours. These challenges were specifically designed in order to improve mental well-being levels of the users.

In this paper, we start out by describing the research insights which informed the design of both the gamified challenges and the social network itself. We then illustrate some of the uses of Spark, and present for the first time the

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results of a six-month long study that assessed the impact of the challenges on the participant's mental well-being. Finally, we discuss the results and outline some of the potential future work.

## 2. Gamifying Mobile Media for Mental Well-being

When reading about the factors that influence people's well-being, there are two recommended habits that can help in a positive way. The first is to take notice, to be aware and to process what happens around you. Being aware and knowing how to deal with situations, helps build good practices that will help people overcome more sensitive situations. The other is to keep learning, to absorb and integrate new things, and to keep being active [1].

A serious amount of research has been dedicated to improving mental well-being through mobile technology. Lathia et al. defend that it is possible to make inferences about use contexts, physical activities, and mental states (including emotions and stress) using data from smartphone sensors [1]. These are also privileged devices to provide tailored advice, support goal setting, help users plan and chart their progress, and send personalized emails or SMS reminders. The paper tests a system (called EmotionSense) that automatically recognizes who's speaking and what the speaker is feeling, using classifiers that run locally on phones. They had good results in predicting emotions from speech and believe this solution obviates the need for self-input. It still needs work and a perfection of technology, however, to be fully reliable. The paper also tests another application called SocioSense, that applies a gamification method to the social communications of the user [1].

Social networks, essentially Facebook, have also been studied from the perspective of emotion-sharing. Buechel and Berger [2] set out to accomplish two goals: to understand if "emotionally unstable" people post personal stories on Facebook more than others, and to know what types of sharing possibilities have a bigger positive impact on the user's well-being. Essential findings showed that users were classified as Emotionally *Stable* and *Unstable* based on a well-documented survey/scale called Big Five Personality Inventory [3].

Journaling is a means of emotion expression. It prevents the inhibition of emotion which is harmful as a chronic stressor [4]. Expressing Trauma-Related emotions in a safe environment enhances feelings of control and mastery over traumatic events [4]. Journaling also allows for cognitive processing of critical life situations where subjective meanings of the world have been questioned. An experiment compared the effects of writing about emotions, facts or both and realized that the combination of both presents the best result. Researchers tried to compare emotional disclosure (journaling) versus cognitive disclosure and both. They also compared differences in the content of the writing and their outcomes. The group that wrote about both emotions and facts

increasingly wrote about cognitive processing topics (understanding the problems, rather than stressing on the emotions) [4].

Ma and colleagues [5] propose a novel framework called MoodMiner for assessing and analyzing mood in daily life. MoodMiner uses mobile phone data – mobile phone sensor data and communication data (including acceleration, light, ambient sound, location, call log, etc.) - to extract human behavior pattern and assess daily mood. Experimental results on 15 users for a month showed an effective assessment of the system to decipher daily moods objectively with minimal user intervention. The several sensor types used to model the system application include: accelerometer - used to detect the user's physical environment; sound sensor - used to sense background sound and the user's voice that can both discern the mood state of the user; location - used to provide context information for user behavior. The application was designed to have a defined set of daily behavior features extracted from mobile sensor data and communication data. Because of the subjective nature of mood, sensor data, communication data and the failure to reflect mood swings through historical mood data - the analyzed mood may be incorrect. Further, users show a significant difference in daily behavior style and phone usage pattern. The model discussed by Ma et al. has the potential to be successful, however it would involve the dedicate use of mobile phones to keep it from failing [5].

## 3. Concept Probe

We started this work by designing a research method that combines the longitudinal property of a diary study, with the inspirational potential of a cultural probe and the honesty of storytelling methods. 20 participants, from a variety of countries, ages and backgrounds were selected to participate in our study, which was divided in two main parts: activity participation and in-depth interviews.

Spark sends daily challenges that were designed to stimulate participants to undergo meaningful tasks, while simultaneously be fun and engaging. We took advantage of our previous research insights to select 3 main groups of activities. By performing these activities, we hoped participants would feel compelled to do something novel everyday, leading them to break from their established routines.

### 3.1. Social Interaction

Interacting with other people is an essential element in promoting mental well-being. Therefore, a number of our challenges were focused on promoting social interactions which users might not have planned for that day, by requiring the participant to ask for the help of a friend (or a group) in order to successfully complete the challenge. The following are a few of the challenges applied to this group: *Surprise someone with their favorite coffee or snack and*

*share their reaction; Record the chorus of a song you like with a friend; Have someone record you while you hold a “free hugs” sign you should at least get two hugs!*

### 3.2. Outdoor Activities

Connecting with the surrounding environment and establishing a contact with nature was another activity we found to be beneficial for mental well-being. Some of our challenges were chosen because they had the potential to inspire the participant to go outside and draw inspiration and material from the environment. The following challenges applied to this group: *Capture video or picture of something that smells good; Find a pebble that you find interesting and take a picture of it; Go for a 10-minute walk and share (write, take a picture or video) something interesting you see / hear / feel.*

### 3.3 Creativity or Introspective Activities

By promoting creativity, we are prompting the participants to seek inspiration, to pause and to reflect. Introspective activities allow the use to think back on his experience, organize his thoughts and learn on his own. The following challenges applied to this group: *Sketch something on a napkin and take a picture; Write 3 things you want to remember from yesterday; Have you ever captured a picture and later found a stranger in the background? Share the picture and make up a story about the person.*

## 4. Interviews

After the terminus of this concept probe, we conducted semi-structured hour-long interviews with each participant. In these interviews, we went through each challenge from start to finish, and asked participants to tell us the story of their daily experience participating in this event, how it fit within each person’s routine, and what impact it had on their day.

We took advantage of the words selected by our participants to trigger conversation and get to know more about them. We also collected suggestions, ideas and tried to gauge the variety of personal preferences.

After finishing our interview process, we transcribed and coded each interview into notes which were printed, cut and joined together.

We clustered all the notes into meaningful groups by affinity, constructing a large affinity diagram representing the positive effects, the fears and difficulties as experienced by our participants. These groups were rearranged and joined together to form concrete insights. We also collected the daily words that were chosen by our participants, sorted them by frequency and built a word cloud as a representation of how our participants moods varied over the course of the study. The results were clustered into four

topics: daily routines, social interaction, creativity and gamification.

### 4.1. Daily routines

From our interviews with the participants we found that in general, having daily goals added a positive value to the person’s established working routine. We were also told that they want to take breaks from their routines, and prefer doing so with fun activities. We found that although people enjoy taking part in challenges and completing activities, some said they were only receptive about adding an activity to their routines if they feel it can be accommodated for within their time and energy constraint.

### 4.2. Social Interaction

We saw that activities which involved social interaction, like “*sing a chorus of a song with your friend*”, were mentioned as having the highest positive impact on the person’s day. People enjoyed participating with others, and their friends also got invested and wanted to participate more. We also found that people were more motivated when the challenges involved other people, and especially their friends. There was a mix of people who enjoyed seeing the participations of other people around the world, but then they also preferred and felt more comfortable in sharing their participations with close friends. They also indicated that they would like to be able to comment on other people’s participations.

### 4.3. Creativity

Based on the feedback we got of what the participants thought of the challenges themselves, it was indicated that having creative or social goals was more impactful on the person’s life. They also revealed that they preferred the creative and social goal oriented challenges instead of the stricter, more specific goals we gave them. Thus, although people liked being given a challenge directive for the day, they also enjoyed having a certain freedom as to what the participation could be. It was also indicated that they preferred challenges where the participations were done via photo or video rather than simply writing.

### 4.4. Gamification

We also found that people wanted to be able to interact with other people’s participations. They wanted to be able to “Like” or Up Vote the participations they liked more, and to be able to see the best participations for that day’s challenge. They also indicated that they would like to have a goal or reward in the case their participation was one of the most voted out of all the people, and that they would enjoy competing with others. Overall, they would

appreciate a game like element to the challenges, which could make interactions more engaging.

#### 4.5. Design Implications

With the goal of discovering more about mental wellbeing in its holistic view we approached a number of experts in the area. Our experts deal with people on a daily basis and have in-depth knowledge of the literature on psychology and psychiatry about the subject.

The interview insights proved extremely useful to the design of the challenges. Participating in outdoor activities and exercise increases self-confidence. Exploring the outdoor brings people a sense of connection to the environment and a feeling of belonging. The exterior is also a source of stimuli, bombarding the person through different senses which triggers curiosity and resolve. Exercising contributes to feelings of self-worth and confidence.

Reinforcing social interactions with others brings a range of positive elements from the intimacy of a conversation, to the joy of a group exchange or the ease of a digital interaction. To our experts this is the most fundamental activity for people undergoing an emotional struggle. Exploring creative and inspiring activities gives perspective. Individual Activities such as Reading, Meditating, but also Shopping or playing games were mentioned as allowing the individual to organize his thoughts and gain perspective.

Some of our experts encourage people to use tools to record emotions and experiences daily and were able to discuss some of the benefits and problems of the technique. Recording experiences helps people learn coping strategies. By writing about positive and negative experiences, people are able to look back and learn behavior patterns. Recording an experience improves people's commitment to their future goals. Simplifying feelings to single words or images leads to a disconnection to person's real emotions.

People do not feel comfortable framing the complexity of their feelings in words or images (smileys). Labelled emotions are disconnected from the reality of the person. Experts encourage the usage of metaphors, video, or writings to allow full expression.

#### 5. The Gamified Mobile App

Spark, our mobile social network, is the materialization of the research insights and visions obtained throughout a previous (almost) one-year study on how people's routines and social network behaviors relate to their emotional states. Spark is a mobile application where everyone in the world participates in a single challenge every 25 hours. Each challenge asks the user to perform an activity, capturing that moment with a photo, and then sharing it. Figure 1 shows an example. Each challenge comes from a database of well-defined and well-thought challenges that

were used and improved in the concept probe. As the user participates in different challenges over time, a record of his activities is always accessible. This encourages the user to relive positive past experiences, and take note of his accomplishments. This also provides us, researchers, with an interesting set of data regarding the activities which were sparked by the use of the tool.

There are essentially two main activity tabs in Spark's app: browsing past history of accomplished challenges, and browsing by location to check out what other users posted and created, as answers to previous challenges (see Figure 2). In order to account for individual differences regarding the way emotions are perceived and spread, we used the emotional contagion scale [6]. To assess the actual perception of emotional state, we asked participants to elicit emotions according to the semantic space for emotions [7]. Spanning the semantic space means choosing which words (adjectives) better describe how a given product is perceived. Preliminary results on a pilot study showed that there was a steady increase and uphold of positive emotions during the 18-day period of this pilot study. This encouraged us to move forward with the gamified challenges and investigate their impact on the users' mental well-being. This is described in the next section.

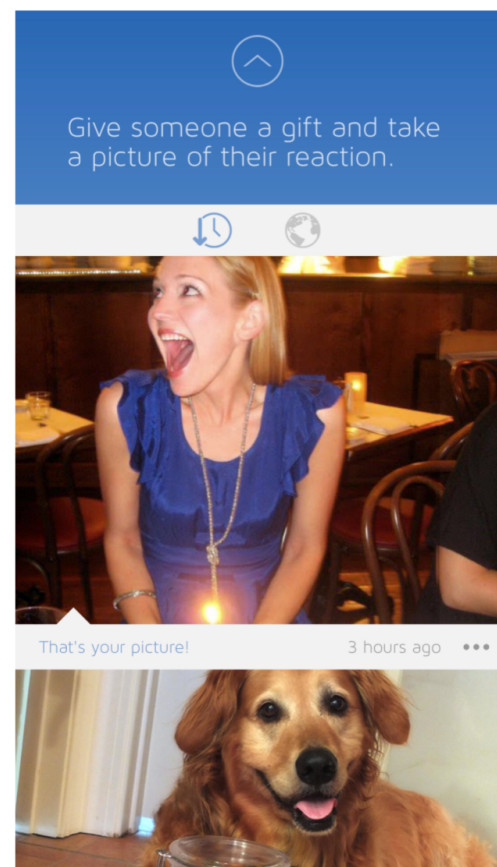


Figure 1. A screenshot from Spark showing one particular challenge.



## 6. Results

It was important to actually obtain results in a longer study, since the novelty factor of the gamified challenges could be biasing the assessment of the challenges' impact on the users' mental well-being levels.

We evaluated the tool during a six-month long study where participants ranked their weekly levels of mental well-being. The results suggest there is a positive impact of the gamified challenges in the overall perception of mental well-being.

The process of emotional contagion (EC) [6], is a phenomenon in which a person or a group influences the emotions and affective behavior of another person or group through the conscious or unconscious induction of emotions.

The Emotional Contagion Scale is one of the measures used in this research. It is a 15-item index designed to measure an individual's susceptibility to "catching" the emotions of others. It examines a person's tendency to mimic five basic emotions: sadness, fear, anger, happiness, and love [6]. Considering the gamified daily challenges were also shared on the mobile app (Figure 2), this makes the EC scale an appropriate measurement instrument for the assessment regarding the impact of these challenges on the user's mental well-being.

### 6.1. Participants

We recruited participants online ( $N=62$ , average age=27.2, min age=18, max age=48, 32 were male and 30 were female), contacting them through our own networks of friends via social media, through the university and research institute, and through the users downloading the app themselves. Since our team is multinational, this helped ensure a user sample very diverse from eight different countries.

### 6.2. Procedure

Participants were offered a 15€ gift voucher they could use online, as a reward for fully participating in the study. We required them to use the tool everyday, which meant trying to accomplish the daily challenges and sharing them on a daily basis. This usually took about 5 minutes of their day. We also asked participants to rank their emotional state using the EC scale every week. Since the scale is composed of 15-items, this actually meant that we gathered data for 62 participants during six months (182 days), gathering 1488 affective reactions (one measure every week, on a total of 24 weeks). These results were, in the end, analyzed together with post-experiment interviews conducted via skype and face-to-face with a subset of the participants (28).

### 6.3. Results

Table 1 shows a small summary of the EC scale results, for Month 0 (pre-experiment), Month 2 and Month 6 (end of the study). We used the following key on the 1 to 5 scale [6]:

5. *Always* = Always true for me.
4. *Often* = Often true for me.
3. *Usually* = Usually true for me.
2. *Rarely* = Rarely true for me.
1. *Never* = Never true for me.

We can observe the positive evolution of the positive emotions (Love, Happiness) and the diminishing values reported for the negative emotions (Fear, Anger, Sadness and Happiness). T-tests for assessing the differences found between pre- and post-experiment (Month 0 versus Month 6) showed a significant effect ( $p<0.01$ ) when considering the average scale values reported for *Love* and for *Sadness*.

Table 1. Sample of the results from the EC scale measures.

EC basic emotion:	Average value reported		
	Month 0	Month 2	Month 6
LOVE	3.8 ( $\pm 0.2$ )	4.1 ( $\pm 0.5$ )	4.8 ( $\pm 0.1$ )
HAPPINESS	3.4 ( $\pm 0.4$ )	3.5 ( $\pm 0.6$ )	3.4 ( $\pm 0.2$ )
FEAR	3.1 ( $\pm 0.3$ )	3.2 ( $\pm 0.5$ )	3.2 ( $\pm 0.4$ )
ANGER	2.8 ( $\pm 0.6$ )	2.4 ( $\pm 0.9$ )	2.2 ( $\pm 0.8$ )
SADNESS	3.2 ( $\pm 0.8$ )	3.0 ( $\pm 0.7$ )	1.6 ( $\pm 0.2$ )

Qualitative results from the post-experiment interviews corroborated the indication from the EC scale in which the gamified daily challenges were positively correlated to the users' mental well-being. Some participants mentioned they really enjoyed "*breaking away from the routine within a social sharing environment*" [P8], and also that "*Interacting within a close group of friends had a highly positive impact*" [P14]. In particular, "*Reading and viewing funny and entertaining content was a very positive activity*" [P12]. Clustering the interviews' data, we could observe that participants found most positive: (i) inspiration from people's participation; (ii) surprise elements in the routine; (iii) engagement in creative activities; (iv) connection with the exterior, i.e. outside activities.

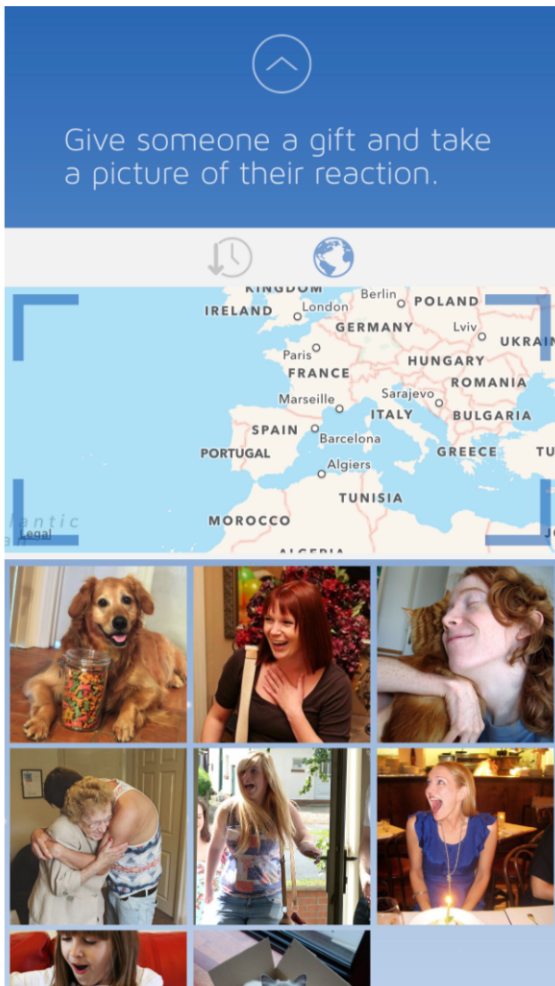
## 7. Conclusions

Mental well-being is an intangible, subjective perception of our own emotions and cognitive capabilities. With the rise of social networks, connectivity and media consumption have seen dramatic changes, and serious games have been applied in many different ways as an effective approach for improving mental well-being.

When designing this tool, we combined the longitudinal property of a diary study, with the inspirational potential of

a cultural probe and the honesty of storytelling methods. Expert interviews and surveys also helped us get a sound understanding of how mental well-being relates to people's routines, what dangers and recommendations we should be aware of, and what opportunities there are to leverage current technologies in order to improve people's lives. The resulting prototype gamifies the way people create and share experiences in mobile media, and it was clear that both aspects (creating and sharing) contributed to improving the users' levels of mental well-being.

This work also points out that routine breaks triggered by social media can be an effective means to improve people's mental well-being. Additionally, encouraging the user to relive positive past experiences, taking note of accomplishments, is also a key factor to a better mental well-being. These insights, organized in terms of daily routines, social interaction, creativity and gamification, can inform the design of future technologies aimed at improving mental well-being.



**Figure 2.** A screenshot from Spark showing how users can geographically browse through the media created by users regarding a particular daily challenge.

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