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Personalizing Narratives to Support Motivation for Physical Activity

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Abstract

Technology supporting motivation for physical activity has been a common theme for researchers and companies during the last decade. Mobile devices and applications with diverse features provide novel and personalized ways to motivate users for healthier lifestyles. Features like goal orientation and self-monitoring are common for activity and emotion tracking applications, and lately there has been interest also in the use of narratives. Consequently, in this study we evaluate through a qualitative study how narratives are used to motivate physical activity. We analyze both user and system-specific characteristics using nexus analysis and conclude with three techniques for personalizing narratives.

Keywords: Personalization, Narratives, Motivation, Physical Activity, User Experience, Nexus Analysis

1 Introduction

Being physically active is not only beneficial for an individual, but also for the society (Kranz et al., 2013). Modern world health problems like obesity have become common (Campbell, Ngo and Fogarty, 2008; Consolvo et al., 2006) and people are facing difficulties in maintaining physical activity in their everyday lives (Consolvo et al., 2006) which emphasizes the possibility of encouraging more active lifestyles by changing individual exercise habits. Thus, it is evident that people should be encouraged and motivated to maintain their mobility behavior. In recent

years, a number of mobile devices and applications that aim at supporting people in their athletic endeavors and other physical activities have emerged and these applications, with various tracking features, encourage people to exercise more (Ahtinen et al., 2008). These exercise applications provide opportunities for personalized health services, which make use of digital data in proactive and personalized ways (Häkkilä et al., 2015).

In this study, we examine the use of narratives in motivating users to engage in physical activity. We collected data using participatory observation, a focus-group, and semi-structured interviews, after which we analyzed users' reasons and motivations for exercising and use of the exercising application applying a nexus analysis (Scollon, 2004) approach. With nexus analysis, the aim is to deepen the understanding of the qualitative data collected (Molin-Juustila et al., 2015). The concept of user experience is widely applied in the fields of human-computer interaction (HCI) and interaction design and it is used for collecting subjective experiences, comprising the interaction between people and products (Forlizzi and Battarbee, 2004). By analyzing these experiences, we search for techniques for personalizing narratives. Our research increases the understanding of narratives as a motivational strategy and their impact on individuals' motivation.

2 Related Work

As modern life has increasingly been intertwined with digital technology, leisure activities are an important arena that have seen a lot of digitalization (Eklund, 2015). In recent years, for example, sports and overall wellbeing are topics receiving increased interest from research as well as from industry (Buttussi, Chittaro and Nadalutti, 2006). For this reason, both software developers and the general audience should be aware of the various ways of and the approaches to how people may be, are being, and will be influenced through the design of computer systems (Oinas-Kukkonen, 2013).

The HCI community has strived to promote wellbeing by developing applications and technologies that monitor and track users' activities. This has mainly been through use of theoretical frameworks derived from persuasion and social psychological theories, which make use of behavioral components like regular feedback and reminders to users in their physical activities (Maitland and Siek, 2009).

A related concept, gamification, the application of game design elements in non-game contexts (Deterding et al., 2011) has also become prevalent. Gamification can have a positive impact in health and wellbeing (Johnson, et al., 2016) and there have been increasing interests in using game principles in non-game contexts to make a challenging activity, such as exercising, more enjoyable and integrated into the users daily lives (Goh and Razikin, 2015).

One basic element in gaming are narratives. In gaming, narratives are used to structure games into logical series'. Unlike traditional narratives in movies, for example, which are linear and fixed, in games, players interact with the narratives, and the structure of the narratives is typically nonlinear (Qin, Patrick Rau and Salvendy, 2009).

Among the motivations for exercise is usually a discrepancy between the desired and actual lifestyle, and technology is used to support people towards a lifestyle they would like to lead

(Consolvo, McDonald and Landay, 2009). Motivation is an essential feature in exercising as it highlights individual differences in behaviors when engaging in exercise (Patel and O'Kane, 2015). Using exercise applications is a complex mix of motivation towards exercising, satisfaction towards the application, external pressure, and actual effect of the usage of the application (Ahtinen et al., 2009).

In this study, we consider both intrinsic and extrinsic motivation (Vallerand and Losier, 1999). Intrinsic motivation refers to exercising for internal reasons like fun and pleasure. Extrinsic motivation emphasizes the role of external factors in motivating behavior. For example, exercising because of the expectation of a reward (Vallerand and Losier, 1999). Recently, motivational factors for exercising have been studied, for example, in the context of young adults doing physical activity (Capel et al., 2015). Capel et al. (2015), found that goal achievement, staying healthy, and social aspects were the key motivational factors for adolescents. More sustainable motivational factors have been studied by Fritz et al. (2014) where the authors interviewed users that had been using persuasive technology devices constantly for at least three months. The authors found that, routinized usage, integration to daily life, numerical feedback, and awareness of the value provided were the key factors that motivated users towards a more sustainable use of technology (Fritz et al., 2014).

3 Research Methodology

The research method applied in this study is nexus analysis (Scollon, 2004), a research strategy that uses discourse analysis and other methods well-suited for studying complex social action. In nexus analysis, each social action is thought to be mediated by the *interaction order* (relationships and power structures) among participants in a particular environment; the *historical body*–previous knowledge, experience, attitudes, and assumptions that the participants bring into the action; and, the *discourses in place*, that is, the discourses that are associated with or embedded in the scene of the action (Scollon, 2004). In this study, the concepts of historical body and interaction order are used in our analysis.

3.1 Study Context

The artefact under examination is *Zombies, Run!*[1] *Zombies Run*! is an exercise application that is available for mobile devices through Google Play and Apple's App store. It is a running game with zombies as a survival story, is meant to be an immersive adventure, and "*the game takes the player into a post-zombie-apocalypse world*" (Southerton, 2013). The idea is to be outdoors as the application is story-based and at certain intervals, during the story, one is instructed to do certain things. Users can pick a mission before they start their run or follow a predefined series of missions culminating in an entire season.

The unique characteristics related to apocalyptic narratives make the game as a good example of a gamification-based application (Helf and Hlavacs, 2016). The application includes gamification elements such as, rewards, distance challenges, points, as well as supplies to be collected during the runs. Runs can be synced online and progress can be shared in various social

1 https://zombiesrungame.com/

media outlets like Facebook. *Zombies Run*! initially started as a premium service, but recently (in 2015) launched a freemium version–the basic application is free, but additional services and storylines that can improve the user experience come at a fee.

3.2 Data Collection and Analysis

Six participants were recruited for this study. All participants were female postgraduate students. We were interested in studying the users' motivational factors for exercising, usage of the application, and to examine the role of narratives in motivating exercise. According to their level of familiarity with the application, participants were categorized into two groups: Experienced and Inexperienced (Table 1) and were assigned aliases that will be used henceforth to represent them. Inexperienced users had minimal or no prior experience with the application, whereas experienced users had been using the application for at least 2 months.

Multiple qualitative data collection methods were used for achieving methodological triangulation. Data was collected using three different methods: 1) a focus group which was video recorded, 2) semi-structured interviews, and 3) participant observations, where participants were asked to think aloud and also video recorded during exercise. Data collection occurred between September and November 2015 and recruitment was mainly done using snowball sampling (Patton, 2005).

Participant	Experience level	Data collection
1. Abbey	Inexperienced	Participant observation and focus group
2. Becky	Experienced	Focus group
3. Carla	Experienced	Focus group
4. Debbie	Inexperienced	Participant observation and semi-structured interview
5. Ellen	Inexperienced	Semi-structured interview
6. Felicia	Experienced	Semi-structured interview

Table 1: Categorization of Participants and Data Collection

The focus group had 3 participants. One inexperienced user, Abbey and two experienced users, Becky and Carla. The focus group consisted of open-ended questions, starting from basic questions related to participants' motivations for exercise and covering exercising habits, role of technology in exercising, hindrances towards exercise and their experiences of *Zombies Run!* Following the focus group, participant observation (video recorded) while using the application and three semi-structured interviews, each lasting 40-60 minutes, were conducted. Interviews consisted of similar questions to those in the focus group, and the aim of recording was to capture users' authentic feelings and user experiences when using the application.

Interviews were transcribed and the data was analyzed using NVivo11 software. Data analysis process was twofold: first we identified, and categorized general discourses regarding motivations for exercising, and the role of narratives (and other application features) in exercising. Second, the concepts of interaction order and historical body (Scollon, 2004) were applied, in order to understand the motivations and the role of narratives more clearly.

4 Results

Generally, all participants had positive thoughts about exercising, but some of them pointed out the need for extra motivation, which could be provided, for example, by exercise applications.

4.1 Historical Body

Historical body refers to an individuals' background, experiences, beliefs and practices, which may influence their view of and interactions with different media (Scollon, 2004). Abbey, Debbie and Ellen (inexperienced users) had not used the application prior to the study, whereas Becky, Carla and Felicia (experienced users) had. Two of three experienced users participated in the focus group and one in a semi-structured interview.

Abbey regularly went to the gym, went jogging, and also walked. Due to her already active lifestyle, she felt that she did not need any extra motivation to exercise (or to use the application). As she had used other activity tracking applications, she was clear on what she expected from such applications. Narratives were not, for her, a compelling reason to use the application. ***Debbie*** was video recorded while jogging and participated in a semi-structured interview. She stated that she was physically active and exercised regularly, but at times finding time to exercise was a problem. Debbie also occasionally used activity tracking applications. ***Ellen*** participated in a semi-structured interview. She used to exercise in various (playing floorball, participating in group exercises, jogging) ways but the frequency had been decreasing due to tight time schedules and difficulties in starting to exercise again.

Becky participated in a focus group. She had been using the application for about half a year and prior to that she hardly exercised. The main reason for using the application was because it was different and she needed something interesting to get her to exercise regularly. The role of narratives was very important in her decision to purchase the application, as can be seen in the following quote:

"*I bought it (the application) because it is geeky and fun, and it sounded more interesting than other running apps*" (Becky).

Carla had been using the application for a longer period of time. She enjoyed the zombie genre and liked listening to the narratives. Prior to using the application, she was not very active and she stated that the application helped her to improve her exercise habits. The narratives and pre-set goals motivated her to exercise more because she saw pre-set goals as challenges that had to be completed, which she was incrementally able to do as illustrated by the comments below:

"*The 5k which I tried first is perfect for anyone who has not been running, but wants to start. You start with really small steps and in the first parts you just run for 30 seconds or something*" (Carla).

"*It really improved my running a lot. I would say, within six months. In the beginning I would run for five kilometers, and after six months I could run twenty, so there is a big difference*" (Carla).

Felicia participated in a semi-structured interview. She stated that she was physically active but finds it difficult to be consistent. Her motivation to exercise was related to wellbeing as

exercising made her feel more energetic. Felicia mostly exercised alone because she wanted to focus on only that when doing it. The quote below illustrates this:

"I like exercising alone. For example, if I go to gym, I try to go there as late or as early as I can, so that there is no one else. Also when running, I prefer to run alone" (Felicia).

4.2 Interaction Order

Interaction order is about how relationships and technical affordances (if within a technical environment) affect people's interaction. The interaction order entails studying how mediated actions occur: whether alone, in groups, the time, what precedes or triggers an activity and so on (Scollon, 2004). The different kinds of (social) interactions that can take place are supported or encouraged by different design/feature implementations and these in turn control or limit users' actions.

Other than supporting the primary intent, which is jogging, in *Zombies Run*!, there are game-like features where users collect various supplies that help protect from a zombie attack and can be used to rebuild one's virtual town. Users can also share information about their exercises via social media channels or via Runkeeper[2] that offers more social features[3] than *Zombies Run!*

Abbey felt that the narratives in the missions were a distraction and they could be shorter. Although the narrative and game-like features are what initially attracted her to the application, **Becky** felt that they were not an integral part of the running experience. After using the application for a while, **Carla** and **Felicia** also stated that the narratives could be improved on by making them shorter or by reducing the time in between stories. There are long pauses in the stories when running that make it difficult to continually concentrate on a mission because one's focus is, every now and then, shifted away from a particular mission. Carla needed a distraction from the narratives because of the long pauses, and according to Abbey, the option of listening to music during the breaks in the mission was even more of a distraction as one had to switch between "*two states of mind"*– the joy provided by the music and the concentration needed in the mission. Abbey and Carla also felt that social features were not important for enhancing their experience of or engagement with the application. Becky, on the other hand, felt that social elements were important and a key feature needed to give her that extra motivation to exercise. For **Ellen**, a lack of actual interactivity in the stories negatively affected her experience with the application. All the participants felt that the virtual rewards did not add any value or interactivity to a mission and the running experience would have been the same with or without them. **Debbie,** and Ellen felt that it would have been much better if collecting or winning something in the mission would have been linked to a physical activity. For example, in order to win a first-aid-kit, one had to either increase their speed or do jumping jacks that were directly linked to the item collected.

2 https://runkeeper.com/

3 Not necessarily for interaction with other users, but to, for example, be able to see what others are doing or have done, their achievements, awards, to cooperate, to compete etc.

5 Personalization of Narratives

Nexus analytic concepts of historical body (life histories and experiences of the participants), and interaction order (relationships between participants engaged in social action) (Scollon, 2004; Molin-Juustila et al., 2015) enabled us to study narratives as a motivational feature. Instead of a generic narrative, narrative adaptation is one method for personalized gaming (Bakkes, Tan and Pisan, 2012). Personalized narratives are related to interactive storytelling, where the game content is personalized according to user preferences (Bostan and Marsh, 2010). We thus agree with Göbel et al (2010) that it is not feasible to create a narrative for each individual user. Therefore, based on our analysis, we propose three different narrative personalization techniques in the form of use cases.

5.1 Personalizing Narratives for Goal Achievement

This technique proposes that narratives are personalized based on users' goals. Once the user sets a personal goal, narratives are personalized to support the achievement of that goal. By monitoring users, the system identifies that achieving a personal goal requires a longer run, for example, and by personalizing the narrative, the system systematically persuades users to achieve their goals. The following quotes present some of the user goals:

"*You have a certain goal for every exercise you do, and that gives structure to your exercise. I think that is one of the most motivating things for me. To have a certain specific goal*" (Ellen).

"*As for me, I think what I find motivating about running is the improving, getting faster, going further*" (Becky).

"*That is one motivation. Losing a little weight*" (Felicia).

"…*I have run for twenty-five minutes this week even though last week I could only run for fifteen minutes. The number of kilometers I have been running is more related to personal goals. Not that much of the goals set by the system*" (Felicia).

Personal goals between users vary; some try to lose weight, whereas some want to improve in running. The following use case illustrates this narrative personalization technique:

> A while back, Ellen was an active young woman but recently she has been demotivated and her husband constantly reminds her about her New Year's promise to exercise more. Previous sports applications supported her goal settings, but this application also provides narratives tailored to her goals.
>
> Her goal is to lose weight and increase the distance she can run. After one month has passed, Ellen is not likely to achieve her goals. Therefore, the application adjusts the narratives to last for 60 instead of 40 minutes (length of basic episode). Goal setting is supported on many sports applications, but personalizing narratives to certain goals set by users is not that common. Once users set their goals, the system personalizes a narrative by either lengthening or shortening an episode to support the achievement of those goals.

5.2 Personalizing Gamification level of Narratives

This technique proposes that gamification level is personalized. Some users preferred to passively listen to the narratives without game elements, whereas others would have liked more "playful" elements in the narratives, whether it was related to goal achievement, building a virtual base, or the integration of narratives into their surroundings:

"*Application did not succeed in motivating me because it was not actually interactive at all. I was expecting some interactivity related to achieving my goals*" (Ellen).

"*In the game, base can be improved, but improving that base has no effect on the missions or how the story goes on*" (Felicia).

"*Because I wanted to experience something I started to 'play the storyline', like when I heard that bandages or whatever were picked, I started to pick some leaves fallen from the trees*" (Debbie).

By personalizing gamification level, system could provide more (or less) gamification elements, tasks for users to complete for building the base, or provide "sub" missions that are integrated to certain locations and surroundings of the user. The following use case illustrates this technique:

> Debbie has heard about *Zombies, Run!* from her friend Carla. Carla persuades her to try the applications and upon installing it, she is asked to set her location (Springfield) and level of gamification (high or low).
>
> After a while, zombies are chasing her as she collects virtual bandages. Concurrently, in the narrative, there are facts integrated to Springfield, where zombies have captured the town hall. To rescue the town hall, she has to run intensively to the hall in order to expel the zombies. Debbie does this and the she is rewarded by getting an extra town hall badge that can be used in her virtual base also.

5.3 Personalizing Genre or Intensity of Narratives

This technique proposes that the narrative genre is personalized based on users' preferences. Some users were willing to have more intense storylines, whereas others preferred milder ones. The following quotes present the ideas of genre based personalization:

"*You should have different storylines for other people as well, I could never imagine my mom going running with the zombies*" (Abbey).

"*There could be some adjusting in the storylines. You could for instance exclude the zombies or choose a different kind of narrative*" (Carla).

As zombies are 'the selling point' in the application, excluding the theme fully may not be appropriate. However, letting users personalize the intensity/genre of a storyline, from scary to

light, could attract a wider audience to the narratives. The following use case illustrates this technique:

> Felicia, is a true zombie freak who has been organizing annual zombie parades in her local area. She was an early adopter of the application and now she is listening to the narratives again, but with a new scary-mode on. As she jogs, the zombies are ultra-aggressive, and she loves it. This is something she wants to show to her sister.
>
> As her sister Abbey tries the scary-mode, she does not like it and quits right away. She blames Felicia for even suggesting her to try that. Felicia calms her sister down and lets her know that the intensity can be adjusted. Switching it from 'scary' to 'light' she persuades Abbey to try the application again. Abbey decides to go for a jog and instead of an avalanche of zombies, just a few zombies appear and, some of them are even having a "vegetarian picnic" in the park. She enjoys the mode and agrees that it provides a joyful experience.

Personalizing narratives for different genres can consist of different levels of storylines. Some can be scary and involve personalization based on the difficulty level (Bakkes et al., 2012), where the run could end up with 'game over', if ultra-aggressive zombies catch the user. Vice versa, on the lighter storylines zombies are not aggressive at all.

6 Concluding Remarks

Technology plays an important role in motivating people to exercise (Capel et al., 2015) and pervasive devices like smartphones can provide an accessible and personalized platform for applications supporting regular physical exercises (Kranz et al., 2013). In this study, the focus was on investigating the use of narratives as a motivational feature. Findings related to motivations and the role of technology are first discussed, and this is then followed by the use of narratives.

All participants exercised (some more than others) and had positive thoughts towards exercising. Although, their intentions to use exercise applications varied. Ahtinen et al. (2009) found that motivation to use exercise applications required both simultaneously enjoying to exercise and satisfaction with the application. In our study, not all participants were satisfied with the application's features and its technical stability which negatively influenced their intentions to use the application in future.

Staying healthy, socializing, and achieving certain goals are key factors that motivate young adults to be active (Capel et al., 2015). Social sharing was found not to be a key motivator, which is consistent with findings in Ahtinen et al. (2008), as most of the participants did not want to/feel the need to share their exercise logs with other people or on online social platforms. The participants were primarily motivated to exercise for health reasons and even though some did not exercise consistently, they considered exercise to be an important part of their overall wellbeing. All participants found goal setting and data tracking as good motivators for exercise. Some users preferred setting goals themselves, and others used the system-set goals. The

system-set goals were considered by some to be challenging, whereas others felt that these goals did not match their own personal goals.

Gamification improves attitudes and enhances exercise (Goh and Razikin, 2015), and the gamification elements supporting goal setting and monitoring were appreciated by all participants. A recurring observation was that the gamified elements should better support the monitoring of pre-set or personalized goals, i.e. to better merge narrative elements of the application with individual's goals and their tracking.

Combining personalization strategies with persuasive systems rather than offering generic solutions has potential for better outcomes and can enhance users' experiences and achievement of their goals (Berkovsky, Freyne and Oinas-Kukkonen, 2012). However, support for personalization is still at a low level within these systems (Helf and Hlavacs, 2016). Personalizing narratives for each user may not be technically feasible (Göbel et al., 2010), but as users' motivations vary, personalization should be supported. In our study, three narrative personalization techniques were proposed to support users' motivation for physical activity.

The present study had a limited number of participants with relatively homogenous backgrounds. User experiences were collected using a focus group, participatory observation and semi-structured interviews. Our intention was not to focus on women only, but with snowball sampling, we ended up with such a homogenous user group. Furthermore, at the time we conducted the study, women were the most willing participants and not all of them were available to participate in all the data collection phases. Nevertheless, this provided us an opportunity to combine several qualitative data collection methods, and get detailed qualitative data, but sets limitations for the generalizability of the results as it was limited to a small group of Finnish users. Gender, age and cultural differences were also not considered in this study and therefore the findings cannot be assumed to be widely applicable to different contexts. With different application and users, results may differ. Nonetheless, the study highlights the importance of tailoring and personalization and presents ideas on how this can be done for different user groups.

In summary, technology for supporting motivation towards healthier lifestyles has remained a key topic in the fields of HCI and computer science. Development and evaluation of exercise applications with various features have been studied comprehensively. This study qualitatively analyzed the role of narratives to motivate people to exercise by using a nexus analytic approach. The focus was on user experiences related to an exercise application that utilized narratives to motivate users. Our study revealed that features like tracking and goal orientation did motivate users to exercise and so did narratives, however, their usage in wellbeing technology is still in its infancy. Personalization techniques have been used for setting personalized goals, or objectives, but in narratives, these techniques, are not widely studied. In this study, we have proposed three techniques (based on goals, gamification, and genre) for personalizing narratives.

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