Can User Experience affect buying intention? A case study on the evaluation of exercise equipment

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Abstract

Treadmills are increasingly loaded with digital technology for assisting the individual during the workout sessions by providing information for tracking relevant training parameters. Also, this technology makes exercise more pleasurable by keeping the user connected to her/his digital ecosystem (e.g. social networking, access to multimedia content). Although there is an increasing interest in digital technologies to be used in fitness, a cursory literature search shows that the interest towards gym equipment is currently limited to the hardware component, thus making biomechanics the focus of the investigation. Other types of contributions are very rare and mostly focused on the design of tools for special populations (e.g. elderly, disabilities) as well as for promoting physical activity monitoring (eHealth). In the present study information on the perceived usability of the interface was collected and analysed along with opinions about buying intention and estimated pricing. Twenty-three individuals were tested after using a treadmill (Technogym S.p.A.) equipped with an interface allowing equipment and training management, activity monitoring and user entertainment. Results indicated a significant influence of perceived usability of the interface on the intention of buying the whole system, thus suggesting the existence of a ROI of Human-Centred Design strategies.

Introduction

The growing interest towards Usability and User Experience (UX) is not limited to the goal of devising better design strategies, but it is also related to the increasing awareness about the relation of these aspects with the internal (e.g. staff productivity, software development costs) and external (e.g. conversions, buying intention) Return On Investment (ROI), that is the benefit to an investor (e.g. sales increase, enhanced brand perception) resulting from an investment of some resource (e.g. internal effort, consulting).

Although the commercial impact of usability has been acknowledged since the seventies (Bennet, 1979), and has been elaborated over the years giving rise to the multifaceted UX construct (e.g. Bias & Mayhew, 2005; Graefe, Keenan & Bowen, 2003; Nielsen et al, 2008; Watermark Consulting, 2015), the real understanding of

In D. de Waard, A. Toffetti, R. Wiczorek, A. Sonderegger, S. Röttger, P. Bouchner, T. Franke, S. Fairclough, M. Noordzij, and K. Brookhuis (Eds.) (2017). Proceedings of the Human Factors and Ergonomics Society Europe Chapter 2016 Annual Conference. ISSN 2333-4959 (online). Available from http://hfes-europe.org

the causal (interaction) variables influencing the ROI is still unclear (Rosenberg, 2004; Weinschenk, 2005). Factors influencing this lack of knowledge may be the reluctance of business owners in disclosing the details of their success/failures, as well as the fact that the ROI needs to be related to multiple aspects, such as:

- UX activities frequency and typology;
- type of product;
- specific sector in which interfaces are implemented.

The recent trends (e.g. Internet of Things) have further complicated the scenario considering that nowadays digital interfaces (not necessarily GUIs) are embedded in any kind of product (e.g. cars, home appliances, wearables) and it becomes more and more complicated to understand which part of the product could have an higher impact on ROI (e.g. design, comfort, usability).

The gym is one of those complex UX emerging markets. The so-called "smart gym" is a new paradigm aimed at supporting both users and trainers in keeping track of the work-out activity and tailor it to the real needs and capacity of the individual. Jain (2015) applied this approach to two different equipment pieces (squat machine and leg press machine) matching the work-out activity to the individual profile in order to automatically calibrate and modify the exercise schedule and the workload. The system has been designed to achieve the following three objectives: 1) to provide user with personalized system-generated workout suggestions; 2) to track the user activities and maintain individual history records; 3) adjust the workout regimen according to the available resources. They compared this approach to traditional workout sessions with a personal trainer and found that the adaptive system provided better results in terms of displacement, force and time elapsed. As a matter of fact, gym equipment has been increasingly loaded with digital technology for assisting the individual during the workout sessions, as well as for making the physical activity more pleasurable. In many cases touchscreen displays not only provide information (and require input) that is relevant for the exercise (e.g. providing information about the heart rate) but also for keeping the users connected to their digital ecosystem (e.g. social networking, personalized multimedia content). That makes the usability of these tools particularly interesting to the HF/E community. Unfortunately, although there is an increasing interest towards mobile technologies to be used in fitness, a cursory literature search can easily show that the interest towards gym technology (particularly, treadmills) is currently mainly limited to the hardware component, thus making biomechanics the focus of the ergonomics investigation with some reference to comfort and safety (Biscarini, 2012; Carraro et al., 2014; Reilly & Lees, 1984). Other types of contributions are very rare, and mostly focused on the design of tools for special populations (e.g. elderly, people with disabilities) as well as for promoting physical activity (the so-called “exergames”: see Mueller et al., 2011) and monitoring (the so-called “eHealth”).

Moreover, there is a complete lack of studies trying to investigate the relation between UX and ROI. The case study reported here is a first attempt to deal with this topic in the context of fitness equipment. Particularly, we asked a selected group of individuals to perform a workout session using a treadmill equipped with a companion Graphical User Interface (GUI) and then to evaluate their experience

with the system and their willingness to promote and pay. It is expected to find a link between the experience with the system and the willingness to pay that, in turn, would suggest that investments in UX are as profitable as those in other aspects of both the design and the marketing of a product.

Study

Participants

Twenty-three individuals (12 males, 11 females) volunteered in this study. They belonged to 4 age groups: 25-35 years old (N=8); 35-45 years old (N=8); 45-55 years old (N=4); 55-65 years old (N=3). Structured questionnaires were used to collect information regarding type and intensity of usually practiced physical activity and regarding the familiarity with mobile applications (apps). Generally, the selected user profile included users who often attend the gym and employ the treadmill as the main exercise equipment. Five participants reported to never use mobile apps.

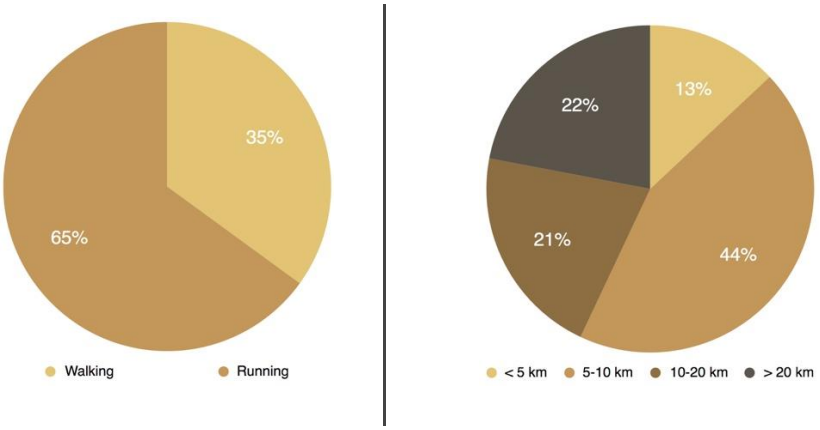

Figure 1. Distribution by favorite workout activity (walking vs. running, left pane) and average km per week (right pane).

Equipment and setup

Product description

A consumer Technogym treadmill (for domestic use only) was used in this study. The treadmill can be used by itself or connected to a native app on a tablet. The treadmill features four indicators (running time, machine inclination, running speed, covered distance) and three physical buttons for starting / stopping the running session and for controlling machine inclination and running speed. Above the machine it is possible to insert a tablet for using the MyRun app (available both for iOS and Android systems) through which the users can create a custom program based on their physical fitness and the frequency of workouts. The app automatically selects music that is matched to users' pace (e.g. through a Spotify account) and compares running sessions on the treadmill with outdoor performance tracked by

compatible apps (e.g. Runkeeper, Mapmyfitness) or specific tracking devices (i.e. Fitbit and Polar).

Figure 2. Technogym treadmill (left pane) equipped with a tablet running the MyRun App (right pane).

Performance metrics

Performance was measured as the proportion of errors made while completing the following tasks (manually recorded by one of the authors):

1. Setting the training goal (i.e. starting a running session of a predetermined duration and keeping a presetted speed).
2. Starting / stopping the training session (either using the app or the physical button placed on the treadmill).

Subjective metrics

Opinions/judgment expressed by users were collected at the end of each session and provided information about three diffecter constructs using the following tools:

- User Experience (UX): participants were asked to answer to four True / False questions (see table 1) related to four dimensions (distractibility, ease of use and pleasantness, functionality).
- Mental Workload: participants rated their experience using the NASA-TLX (Hart & Staveland, 1988).
- Promotion: participants rated their willingness to promote the equipment using the Net Promoter Score® (NPS: Reichheld, 2003), a metric that provides an estimate of the probability with which a person is willing to recommend a particular product to other people on a scale from 0 to 10.
- Willingness to Pay (WTP): participants reported of the maximum price they were willing to pay on the purchase of the same product. They also were requested to provide an estimate (guess) of the actual price of the product.

Additionally, anagraphic data and information on exercise preference (walking vs. running) was collected at the beginning of the session.

Table 1 – UX "quick and dirty" scale. Total score was obtained by summing up all "true" answers after reversing item 1 and 4.

1.	The app distracts me from those aspects I normally pay attention to (e.g. distance travelled, calories burned).	TRUE	FALSE
2.	The app is easy to use.	TRUE	FALSE
3.	The app is pleasant and well finished.	TRUE	FALSE
4.	The app did NOT help me during the workout.	TRUE	FALSE

Procedure

Participants were greeted and introduced to the tasks to carry out using the treadmill. They were asked to sign an informed consent and to fill a personal data form and then to get on the treadmill, set a 10 minutes session and start running and/or walking (depending on their exercise habits) at a speed of 5 km/h at least, while interacting with the MyRun app. During the session they were free to express what they thought about the product, but were not encouraged to do so as in a thinking aloud protocol. The questionnaires described in previous section were administered at the end of the interaction with the product and a debriefing section concluded the session.

Data analysis and results

Answers to the four items of the questionnaire on the quality of interaction with the system were summed up and participants were classified as showing Negative UX (N=8) if their score was below the median. All other participant were classified as showing Positive UX (N=15). The proportion of errors on the number tasks to be accomplished (choose a goal-based workout session, set the time as the goal of the session, set the duration of the session, start the session, stop the session) was used as dependent variable in two ANOVA designs Exercise Preference (Walking vs. Running) x Gender (Males vs. Females) and UX (Positive vs. Negative) x Gender (Males vs. Females), respectively. Results showed no significant differences for both analyses (exercise preference: $F_{1,19}$=1.15, p>.05; gender: $F_{1,19}$=.51, p>.05; interaction: $F_{1,19}$=2.02, p>.05 and UX: $F_{1,19}$=.22, p>.05; gender: $F_{1,19}$=.04, p>.05; interacton: $F_{1,19}$=.09, p>.05, respectively).

NASA-TLX score was used as dependent variable in two ANOVA designs Exercise Preference (Walking vs. Running) x Gender (Males vs. Females) and UX (Positive vs. Negative) x Gender (Males vs. Females), respectively. Results of the first analysis showed no significant effects (exercise preference: $F_{1,19}$=1.16, p>.05; gender: $F_{1,19}$=.06, p>.05; interaction: $F_{1,19}$=1,67, p>.05).

A significant main effect of UX ($F_{1,19}$=4.30, p=.05) was found in the second analysis: users who reported a positive UX also reported lower mental workload. Neither a significant effect of gender ($F_{1,19}$=3.08, p>.05) nor a UX by gender interaction ($F_{1,19}$=.75, p>.05) was found.

Net Promoter Score (NPS raw score) was used as dependent variable in an ANOVA design Gender (Males vs. Females) x UX (Positive vs. Negative). Results showed a significant main effect of UX ($F_{1,19}$=11.59, p>.01): users who reported a positive UX

also reported higher NPS values. Neither a significant effect of gender ($F_{1,19}$=.15, p>.05) nor a UX by gender interaction ($F_{1,19}$=.06, p>.05) was found.

Willingness to Pay (WTP), that is the maximum price at or below which a consumer will definitely buy one unit of the product, was used as dependent variable in an ANCOVA design using UX (Positive vs. Negative) as factor and Estimated Price as covariate, which was found to be positively correlated to WTP (r=.49; p<.05). The covariate was introduced for subtracting the weight of the estimated (guessed) value of the product. Results showed a significant effect of the covariate ($F_{1,20}$=6.57, p<.05) and a tendency toward statistical significance of UX (F1,20=3.92, p=.06): users who reported a positive UX also reported higher WTP close to the real price of the product.

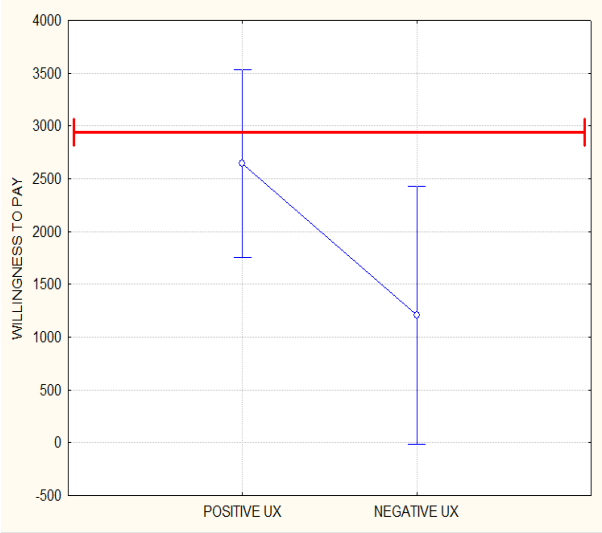

Figure 3. Willingness To Pay (WTP) in Euros by User Experience. Vertical bars denote .95 confidence intervals and the red line indicates the actual price of the equipment tested. Notably, the mean WTP for the Positive UX sub-group Approached the actual price of the equipment.

Discussion and conclusion

This case study showed that UX with the MyRun app influenced the attitude towards the entire product. All participants showed homogeneous performance in terms of number of tasks correctly accomplished during the experimental workout session, but users whose experience with the treadmill was positive reported lower mental workload compared to those who experienced a negative interaction with the system. The relation between usability and workload is often overlooked. Nevertheless, problems related to usability may lead to a loss of control, orientation and frustration from the user (e.g. Faliagka, Rigou & Sirmakessis, 2015) and -as reported by Longo (2015)- “mental workload is gaining momentum as an important

design concept in human–computer interaction and is important in considering the interaction of people with computers and other technological devices" (p. 758).

Satisfied users reported higher NPS values, therefore indicating them as advocates and promoters of the product, and also reported higher willingness to pay for the equipment a price that is close to the actual value of the good. In other fields, such as e-commerce, the influence of usability on buyers' intention has been already reported (Konradt et al., 2003), and this result is aligned with that literature.

Interestingly, even if the estimated price resulted to be positively correlated to the willingness to pay, the effect was obtained also after subtracting the influence of the estimated price: no matter what is the imagined monetary value of the product, individuals who experience a better interaction with the system are willing to pay for it and, very surprisingly, they are willing to pay its actual price (even if they has no information about the actual price).

So far, the influence of UX on promotion was reported only for web sites in correlational studies (Sauro, 2012). The present case study is the first to take into account this relation for physical products and confirms what has been found elsewhere: the usability of a system is a strong determinant of success for a product / service. The ROI of UX research and consultancy is a fact and should be taken into consideration by any organisation / company.

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