

Side Effects and ‘Gateway’ Tools: Advocating a Broader Look at Evaluating Persuasive Systems

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ABSTRACT

This paper argues for evaluating the impact of persuasive systems on users beyond metrics that focus on system usage, based on an interview study of 16 Wii Fit users. While exploring their experiences and reasons for abandoning the system, two main themes emerged: the tension between Wii Fit as a fitness tool and a game, and ways participants reacted to the system’s feedback about their weight and performance. Some participants used Wii Fit as a ‘gateway fitness’ tool, moving beyond it to other fitness routines. Additionally, some users had significant emotional reactions to the Wii Fit’s feedback. We argue that these ‘side effects’ are crucial considerations for the design and long-term evaluation of persuasive technologies.

Author Keywords

Wii Fit, e-health interventions, persuasive technologies.

ACM Classification Keywords

H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms

Experimentation.

INTRODUCTION

Nintendo’s fitness system Wii Fit has sold over 22.5 million copies worldwide, making it the third best-selling non-bundled console video game ever¹. Its combination of fitness, fun, and affordability has led to its use as a fitness tool in a wide range of contexts, including physical education courses and nursing homes. Wii Fit is a commercially successful example of the growing class of persuasive technologies that aim to change specific health behaviors (e.g., [3]).

There is less data on whether Wii Fit has been effective as a tool for actually encouraging fitness, and in fact many technologies and resolutions are abandoned shortly after their adoption. Based on an interview study of 16 adults who played Wii Fit for at least two weeks, we found that all of our participants had either stopped or dramatically

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decreased their use of Wii Fit. Below, we explore why this is so. We first briefly introduce Wii Fit’s main features and our participants’ background. We then describe their reactions to Wii Fit as a game and a fitness tool and to its feedback about their performance and body weight. We next discuss reasons they stopped using Wii Fit, including boredom, changes in the gaming environment, and a move to more challenging fitness routines. Based on these data, we argue that effective persuasive technologies must look beyond system usage, and instead should consider how the design may affect people’s self image and scaffold behaviors that go beyond what the design itself can support.

A BRIEF INTRODUCTION TO WII FIT

Wii Fit is a fitness system in which the user performs specific movements while standing on a balance board (see Figure 1). The balance board has pressure sensors which determine a user’s center of balance and weight.

When a player first uses the system, he or she is prompted to create or select a Mii (an avatar representing the user) and then is asked to take a body test—which the user has the option of repeating at any time. The test asks for the user’s age and height, and uses the balance board to record his or her weight. Following the weigh-in, the system displays the users’ *body mass index* (BMI), which is computed based on weight and height, and a BMI “label” (e.g., underweight, obese) (see Figure 2). The user then completes a short series of balance tasks which are used to compute and display a *Wii Fit Age*, which often differs

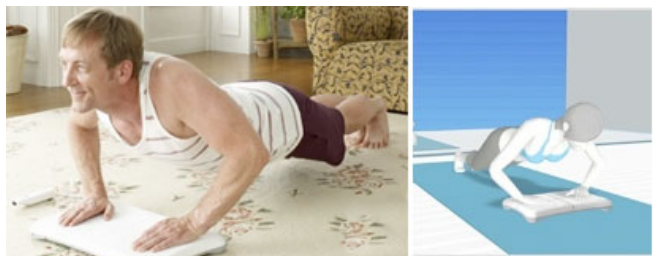


Figure 1. This user is using the balance board for push-ups, one of the strength-training activities. There is a screen shot of the Wii Fit game display on the right.

¹ <http://www.nintendo.co.jp/ir/pdf/2010/100507e.pdf#page=6>

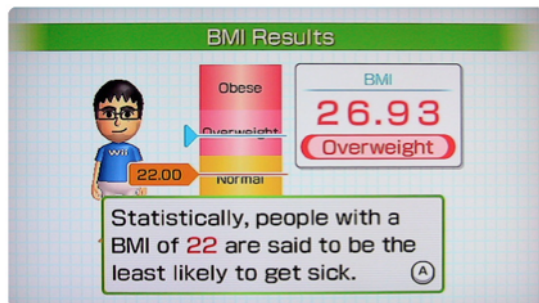


Figure 2. After being weighed by the system, the user sees the following screen including their Mii, BMI and weight label.

from his or her actual age. At this point, the user may also set a weight goal, which is tracked by the system over time.

People spend most of their time on Wii Fit participating in five types of activities: *Yoga*, *Strength Training*, *Aerobics*, *Balance Games*, and *Training Plus*. After completing an activity, the user receives feedback about his or her performance, including a score, a rating out of five stars, and a ranking on a leaderboard relative to other users using the same copy of Wii Fit. New activities are “unlocked” by reaching score or time thresholds.

Wii Fit uses characters such as an animated balance board to provide information, such as the relationship between balance and fitness, and positive and negative feedback, such as congratulating users on unlocking new levels and scolding them if they fail to use the system regularly.

METHODS

We conducted semi-structured interviews of 16 participants (eight female; ages 18–54; median age 24). Ten participants were students (seven undergraduate, three graduate); the remaining six were occupied in a variety of fields, ranging from the service sector to professional work. Interviews lasted approximately 20 minutes. We conducted 12 in person and four via phone or Skype. Fourteen were audio recorded, while detailed notes were taken during the other two. Undergraduate participants were compensated by either course credit or by entrance into a lottery for one of eight twenty-dollar gift cards, and other participants were compensated by the latter.

We began by asking for participants’ “overall impressions of Wii Fit” and asked them to “describe a typical game session.” Based on their responses, we asked about specific features of the system (e.g., “what about the balance games did you like?”). We asked about the body test and “how [they] feel about the game’s representation of [themselves].” and why they started and stopped using the system. Finally, we asked if they “ever used any other systems or tools for fitness, weight loss, or nutrition.”

We analyzed the interviews using inductive qualitative methods drawn from grounded theory [7]. First, three of the authors reviewed each interview and independently took notes about key ideas. We then used affinity diagrams to organize these ideas into the themes we discuss below.

RESULTS

A Wide Variety of Users and Uses

Participants came to Wii Fit with a variety of video game and fitness experience. Two participants called gaming “a passion” but most had little to moderate experience with video games. Similarly, our participants varied in how much they exercised when they started using Wii Fit, ranging from very little physical activity to regular fitness routines. Their use of Wii Fit itself spanned a wide range in terms of overall use (from “a couple of times” to four years), frequency (from “off and on” to daily), and session length (from 20 minutes to three hours). Their initial reasons for trying Wii Fit also varied. Six participants did so because their family or friends owned the system and/or they thought it was novel and interesting. Eleven purchased the system to use as a fitness tool.

Fitness Tool versus Game

This variety of motivations and experience led to a tension between perceiving the system as a fitness tool or a game.

Nine participants viewed Wii Fit primarily as a fitness tool. These users focused on “serious” and “non-game” activities that they considered more “exercise-y” such as Strength Training or Yoga, using activities that they saw as games for a “break.” Six participants saw the system as primarily a game, and treated it as such. The game-like ability to unlock new content was motivating to 10 participants, but those participants who saw Wii Fit as a game mentioned getting bored after all the content was unlocked.

At times, Wii Fit awkwardly straddled the line between fitness and fun, as a “gimmick” to combine games and fitness. Eight participants who exercised outside of Wii Fit stated that the system would not replace their current workout routine or that they could get a “better” workout in other ways, while seven thought it could be marginally beneficial because it was “better than nothing” or “I was doing *something*.” Four participants described Wii Fit as not as entertaining as other games; if they wanted to play a game, they would play something like Wii Sports instead of Wii Fit: “I don’t want to run...it’s not what video games are for.” These participants felt that the Wii Fit was not serious enough of a fitness tool to be useful in that respect, but it also wasn’t fun enough to be played regularly as a game.

Social aspects of playing Wii Fit highlighted this tension between fun and exercise. Many of our participants enjoyed playful teasing and friendly competition during group use, sharing in the success of others by providing support and encouragement. Others, however, would save the “serious fitness stuff” for solo play, because trying hard on certain activities makes “you look kind of ridiculous.” Some used Wii Fit because they felt embarrassed about going to the gym, making social use unappealing and counterproductive.

Reactions to Motivational Feedback

People also had mixed reactions to the feedback Wii Fit provides, with some finding it motivational and others finding it hard to interpret and sometimes hurtful.

This feedback includes metrics of performance such as activity scores, changes in the user's Mii, and coaching, and metrics of fitness such as Wii Fit Age, BMI and BMI label. Three participants had positive emotional reactions to this feedback. They noted that it felt "good" when their Wii Fit Age was lower than their actual age and appreciated the positive feedback on their performance. They also appreciated some of the harsher features and liked that the system "scolded" them when they had not played recently.

Four of our participants, however, reported negative emotional reactions. They felt "bad" when they were given feedback such as their Wii Fit Age being higher than their actual age. There were also negative reactions to how the Mii changed shape according to their weight. One participant was nervous about being weighed because "[she] didn't want to have a pudgy little Mii." Another participant said, "it's one thing to see your [weight], it's another thing to see yourself—your Mii—as a Stay-Puft Marshmallow man." Although some participants found negative feedback motivating, these participants did not:

"The little guy yells at you...some people might be motivated by that, but not me."

"The little machine lecture[d] me."

"It can be a little harsh."

Seven participants were skeptical about these features on an intellectual level. Some questioned the use of BMI as a representation of their fitness; one called it a "garbage number." Others were skeptical of or confused about the system's metrics and accuracy:

"I didn't understand how they calculated things and how they knew when I was fit."

"How the hell do they determine that?"

"Maybe my floor is off, or [Wii Fit] has really high standards."

Reasons for Leaving Wii Fit

All of our participants had either stopped or dramatically decreased their use of Wii Fit at the time of the interview, citing a wide variety of reasons. Nine participants identified prosaic, circumstantial events that contributed to reduced use: hot weather or changes in the gaming environment such as moving the system to the basement or buying a set of peripherals for another game. Seven participants said that other activities took priority, while five mentioned being bored with the repetitiveness of the Wii Fit's activities.

Of our 16 participants, six approached Wii Fit with serious fitness goals. In addition to the above reasons, two additional reasons emerged in this group. Three participants stopped using the system because it did not live up to their expectations as a serious fitness tool. The remaining three changed to another fitness routine, such as running or working out at a gym. These participants purchased Wii Fit as a first step towards getting fit, and as they came to prefer

more strenuous exercise in place of using of the system, their use of Wii Fit decreased.

DISCUSSION

Some of the reasons for leaving Wii Fit, such as circumstantial change or boredom, indicate that it was not an effective motivator for everyone. But others reported stopping because their use of Wii Fit was *successful*: it led to their adopting other fitness activities they came to prefer. Wii Fit may have played a key role in scaffolding these activities. Cognitive dissonance theory [5] predicts that freely adopting goal-oriented behaviors, even if they are temporary and are replaced by others, may help people maintain or strengthen those goals and related attitudes. In the fitness domain, [2] reports that participants who freely chose to engage in exercise activities reported more positive attitudes about exercise and greater intention to exercise than those who were pressured or required to.

This is in line with our current findings, and shows the potential for Wii Fit usage to have a lasting influence on users, perhaps serving as a 'gateway fitness' activity. We therefore argue that when evaluating electronic health behavior interventions and other systems with persuasive elements, it is critical to consider attitude and behavior change, not just system utilization. Evaluation of e-health interventions often focuses on how, and how much, people use the system itself [10]. While this is a natural and readily available metric, it is only part of the story. Törning & Oinas-Kukkonen highlight the importance of approaching persuasion with the goal of changing attitudes, not just behaviors, and point out that many efforts in the area of persuasive systems design focus on behavior only [12]. We take our findings as a warning against being too system-focused in evaluation.

The idea that abandonment can be a marker of success also implies that persuasive systems can be explicitly *designed* for this 'gateway' effect, planning for the day when the system will no longer be needed to support new behaviors. Instead of seeing persuasive tools as persistent, permanent companions, persuasive systems designers should consider whether the systems might play a critical but temporary role in a gradual change, much as nicotine patches are not designed for indefinite use. For example, Wii Fit might start new users with more game-like activities, but over time the balance of game and fitness could shift until use of the system simulates a trip to the gym. It might even suggest more intense fitness activities outside of the system. Other persuasive tools, such as home energy monitors that are often used to encourage sustainable behavior [4], may also benefit from careful consideration of their role in the larger picture of how attitudes and practices around sustainability evolve. Once people learn how they use energy in their homes, what then for the monitor?

Another design implication comes from the tension that participants felt between the fitness and fun aspects of Wii Fit, often seeing it as purely a fun activity, or one that was

too game-like to support serious fitness needs. We see clear parallels between educational games and games to increase physical activity: both take an activity that can be seen as unattractive and attempt to engage users in it by making it more fun. It follows that design suggestions from educational games research could be adapted to tools like Wii Fit. Isbister et al.'s idea of "Deep content," for instance, argues for educational material being tightly integrated into games and not "bolted on" [8]. Users viewed certain Wii Fit activities as fitness and others as games, but rarely both; it might be effective to incorporate core fitness moves into the game-like activities, creating experiences that support both fun and fitness.

Finally, we return to the potential 'side effects' of persuasive technologies on people's emotions, especially in domains such as health and fitness where issues of self-image are salient [1] and can lead to dire consequences such as the eating disorders that affect between 6 and 11 million people in the United States [11]. A quarter of our participants experienced negative emotions related to feedback based on BMI or fitness performance. While they did not explicitly cite these feelings as reasons for abandoning Wii Fit, negative feedback was largely viewed by these participants as unproductive, and sometimes unwarranted, as expressed by one participant's frustration with the system's blindness to positive or neutral reasons for weight gains such as increases in muscle mass or a female's monthly cycle.

Such experiences raise the question of how (or whether) systems that use health and biometric data can make useful, appropriate, and sensitive interpretations that "negotiate the relationship between objective signals and subjective experiences" [9]. Persuasive technologies often privilege certain values or attitudes, which can stifle rather than encourage reflection on the topics of interest. Fogg's original captology work explicitly points to ethical considerations [6], but in practice ethics is rarely considered in persuasive technology literature [12]. Our work calls out the need for designers of persuasive health technologies to consider the potential negative consequences of their use.

Limitations and Future Work

Our participants stopped using Wii Fit several months to two years prior to the interview date. We are therefore limited by the specific experiences they remembered and reported, which likely do not represent their entire experience with the system. We are following up on this work by running a month-long in-home study of new Wii Fit users. With this work we hope to better understand users' experiences with the system over time without relying on the self-reflection method used here. We also hope to shed light on what kinds of early experiences might predict whether the system will ultimately be abandoned in frustration or in triumph.

CONCLUSION

Our interviews revealed two key themes in users' experiences with Wii Fit: the tension between the system as

a fitness tool or a game and the sometimes negative emotional and intellectual reactions to feedback. They also gave us insight into the reasons why users abandon the system. These themes lead us to highlight considerations for the design and evaluation of persuasive technologies. First, it is important to consider attitude change, not just behavior change, when evaluating the effectiveness of these systems. Sometimes abandonment of the system is not evidence of failure, but of successful attitude change, and designers should often explicitly aim for this kind of scaffolding. Second, attitude and behavior change are not the only outcomes to consider around persuasive systems. Emotional impacts on their users may pose risks greater than the benefits to be gained, and designers have the responsibility to take these risks into account.

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