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# Wearable Lifestyle Tracking Devices: Are They Useful for Teenagers?

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## **Abstract**

Behavioral patterns linked to physical activity and nutrition are established during adolescence and people tend to maintain them throughout their whole lives. Wearable life tracking devices might be a useful tool in order to achieve healthy lifestyles among teens. The objective of this study is to investigate what teens think of current wearable devices for fitness tracking, using the results to provide preliminary suggestions for the design of wearable technology aimed at adolescents. Thirty 14-16 teens (sex balanced) divided into 3 groups were asked to trial use commercially available wearables for one week. Each group took part in two focus group sessions, separated by a week. During the trial users experienced some technical problems while using the devices. Monitoring physical activity seems not to be a priority for adolescents but they recognize the important potential in doing it. Recommendations were suggested for the devices to better meet teenage preferences and needs.

## **Author Keywords**

Teen-agers, wearables, lifestyle tracking devices, focus groups, fitness, physical activity.

## **ACM Classification Keywords**

H.1.2 User/Machine Systems

H.5.2 User Interfaces

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**Figure 1:** First session in a boys group. Image shows while teens were preparing wearables life tracking devices for the test.

## Introduction

Many lifestyle choices are made during adolescence, this makes this period a critical phase of personal development. In particular, behavioral patterns linked to physical activity, sleeping habits and nutrition are established during adolescence and people tend to maintain them throughout their whole lives [1], as such it is important to promote their adoption during adolescence. This would allow having healthier communities, reducing risks linked to cardiovascular diseases, obesity and related comorbidities. The EU-funded PEGASO project (Personalized guidance services for optimizing lifestyle in teen-agers through awareness, motivation and engagement) aims at developing a whole services ecosystem which motivates teenagers to internalize healthy behaviors effortlessly to prevent diseases in adulthood and improve their quality of life. The ICT system is the key resource in the PEGASO ecosystem, providing teenagers with personalized and engaging services, including serious games and gamified apps. An important component of this ICT system is represented by the wearable fitness trackers. Indeed, recently wearable devices for fitness tracking became mainstream and reached a critical mass in the market representing an important revolution for people's engagement with personal health. However, these devices are designed for adults and mainly engage people already motivated in improving their own lifestyles or in using personal informatics to improve their sports performance [2]. The issue of understanding if wearable technology can be relevant for teenagers and if it is possible to sustain their engagement in the long term remains still open.

In this paper, we present a trial of wearable sensing devices with teenagers and the preliminary results of

the investigation to understand what this target user population think about commercial wearable devices for health and to collect design hints that could enable the development of wearable technology conceived to engage adolescents in Catalonia.

## Related Work

It is clear that wearable technology enabled the large adoption of personal informatics as a means to improve personal wellbeing and health. However, this is still a phenomenon is still in its infancy. In particular, wearables conceived for teenagers, and that could create and sustain their engagement with their lifestyle are still missing in the market [3]. Indeed, searching on the Internet it is possible only to find a couple of start-ups featured in technology-related magazines that are dealing with the delicate task of designing wearable technology for teenagers. However, in these examples, the primary focus is on providing teenagers with devices that can pervasively augment their connectivity with their community [4] and, additionally, play games [5]. Nonetheless, these start-ups have yet to hit the market with their products and the outcome is still hardly predictable. Academics investigations of interaction possibilities between teenagers and wearable technology started almost a decade ago. Sessions of participatory design with teenagers stemmed concepts of wearables that could augment adolescents' communication with their peers using fashionable beads for bracelets [6,7]. The first example of wearable technology designed for teenagers, in this case for girls, dates 2006 and presents an interface with some concepts for integrating pedometers in fashionable garments and accessories [8]. A later study conducted explored how the combination of



**Figure 2:** Withings Pulse O2 (upper) and Misfit Shine (lower) wearables devices tested by teens.

pedometers and pervasive games can motivate teenagers to be more physically active [9]. The same researchers conducted another investigation on the effects of social awareness streams designed for the use with fitness tracking devices. This system was conceived [10] for and tested with teenagers, and the results are quite encouraging but it has been emphasized that its success in terms of engagement was mainly due to the school-based approach [11].

### Methods

Three groups of ten 14-16 years old teens from different schools, chosen by convenience, have participated: a) Boys (middle-class) from an urban partially state-funded school in Barcelona (Figure 1), b) mixed group (lower-middle class) from a partially state-funded school located a mid-city in Barcelona suburbs and c) girls (lower-class) from a public-funded school 80km South of Barcelona.

The fieldwork consisted of Focus groups in two stages and a reporting diary. In each case a first Focus Group explored participant knowledge about Smartphones and monitorization plus presenting the wearables life tracking devices. Teens were invited to use one of the devices for one week and registered their impressions and perceptions in a simple grid template. The study concluded with another focus group to share their experiences of using the gadgets. For all focus groups the audio was recorded and transcribed. The source for analysis was the recorded discourse along with the written diaries. Before the analysis process the transcripts were anonymized. Only gender and schools were disclosed in transcripts. The codification of the

transcripts has been assisted by the Atlas.ti qualitative software (version 6). To this end, a guidebook of 97 codes was built in different phases. Verbatims are shown in this paper by "".

### *The tested wearables life-tracking devices*

Two different devices were offered to students: Misfit Shine and Withings Pulse O2 (Figure 2). Withings is more focused on improving overall health by measuring sleep and vital signs, Misfit Shine is more related to sportive activities and goal setting. It also monitors sleep, steps, calories burned, distance made and many other indicators.

### *Research Ethics*

Before the start of the study, information and consent sheets were distributed among parents and adolescents participating in the study, informing about the privacy policies for each provider and requesting consent. Only those giving consent were accepted for the study.

## Results

### *Knowledge about Smartphones and wearables life tracking devices*

All teens are considered digital natives and they are familiar with Smartphones and use apps. Most of them have their own Smartphone (80%). The general purpose of Smartphones is to communicate with others (only boys consider them to play games). The communicative dimension is also translated into their favorite apps: Whatsapp is by far the most popular, followed by Facebook and Twitter (social media). Apps

Activity	%
Eating habits/weight	41,67
Sports practice	20,83
Watching TV	4,17
Schedule control	16,67
Homework	16,67
TOTAL	100

**Table 1:** Monitored activities mentioned by teens in %

for picture edition are also widespread; Apps related to healthy habits promotion are practically inexistent.

Generally speaking, students are unfamiliar with the concept of “personal monitoring”. When asked to provide examples of activities they monitor in their daily life, they tend to suggest examples of time control and quantifiable aspects (Table 1).

In terms of needs by gender, boys are more concerned with their fitness while girls understand healthy and good-looking bodies as a result of being fit and eating well and adequate intake.

PROBLEM	%
Understanding of Instructions	17,5
Synchronization	16,8
Information	15,4
Smartphone brands	9,8
Bluetooth	9,1
Interpretation needed	9,1
Language	8,4
App and mobile	7,7
Battery and power	6,3
TOTAL	100

**Table 2:** Main problems (expressed in %) detected by teen during the testing week

Knowledge and familiarity with life trackers appeared to be limited; consequently, few opinions were given about what the gadgets may be useful for or how teens can benefit from using them. (“What I know is a sort of watch connected to the mobile and when someone calls you see a notification and receive a message and so on.”, “.to count your physical activity, the calories, the amount of homework you have, your sleeping hours...”). Similarly they are not familiar either with the utilities and benefits of life tracker devices.

*Impressions after one-week testing wearables life tracking device*

After testing devices for a week their journey towards using wearables can be summarized in five key moments or milestones: 1) Familiarization, 2) switching on their devices, 3) downloading the apps, 4) synchronizing the life tracker and the mobile phone and 5) using and setting goals

A general trend week long trial included use difficulties and failures. The major failure was produced at the very beginning; around half of participants were unable to either download the app or synchronize it with their Smartphones. As a result, the gadget was turned into a fashion complement or, in the best cases, used as a watch. Table 2 summarizes the main problems and their frequency.

Despite the technical problems, they feel that life trackers are useful (particularly boys). The main uses have been counting calories burned, steps made, and sleeping time. These three functions were of most interesting because they were related to sports and activity contexts which were familiar to the participants and highly associated to goal settings and individual achievement. However, other fitness indicators that may be important and closely related to health status such as blood oxygen seem meaningless to them. The lack of context or references for interpreting the data gathered was mentioned several times. Having a “coach” or a set of personalized tips is something they rated as highly positive. As most of them have their own Smartphone, it is given the impression that there is some overlap with the life tracker, or even is simpler and easier than the mobile phone. Life trackers can be seen as a potential substitute for the Smartphones on occasions when doing physical activity because a Smartphone is less “wearable”. None of the teens mention the differences in accuracy, despite some of them explain cases of wrong monitorisation results, for instance in calories and distance.

In general terms, they have qualified the life tracker as something useful in abstract terms; their speech reveals that the key to consider the need of a gadget

like this is to have a serious goal and strong purposes to achieve it. Thus, they feel that life trackers are not targeting adolescents but other sectors such as frequent sportsmen and sportswomen, older people or patients with heart disease or related health conditions.

In general positive aspects are more than negative issues. Beyond the technical issues the main negative comment is related to control and privacy. They dislike being under control by a machine.

#### *Most important requirements considered by teens*

The design of the gadgets was considered always relevant and recurrent topic by both boys and girls (5% of the quotes over total quotes are dedicated to design and aesthetics), but while for boys design is more important in the first contact with the gadget and after using it they value more its usability and wearability, for girls design issues are persistent and even more prominent after its use.

The most salient aspects that would drive their choice about the potential use of wearables life trackers are a combination of appearance and utility listed below:

- Appealing
- Good design and good looking (regarding color and shape)
- Small size
- Adequate shape to wear it comfortably
- Tactile screen
- Customizable gadget
- Entertaining
- Informative

## **Conclusions**

Although teens are digital natives, the idea of monitorization is still quite abstract and is not as present in their lives as Smartphones. Their main concern with mobiles is to have tactile screens and platforms for using communicative and social media apps. In other words: want to be online and available at any time to be able to chat, speak, gossip and create their identity through interaction among their peers. The quantification of the self is not a central aspect of their lives but they welcome the idea of life trackers. All in all, do life trackers promote healthy habits among adolescents? The association remains unclear at this stage as they are not using any and after the study it seems that setting and accomplishing goals is not as straightforward as could be imagined when using gadgets. Probably some improvements in usability aiming to convert gadgets in more user-friendly devices need to be achieved, while better instructions for use documents should accompany these developments

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