Gamification through Fitbit

Playing to exercise or playing to win?

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Abstract

Smartphone applications have altered the ways we carry out previously mundane activities, including how we manage our well-being. With the aid of digitalization many health monitoring practices became automated and initiated by individuals themselves, who want to have detailed, thus quantified overview of their health. Fitbit as a fitness app is one of the platforms that facilitates having such an overview. Therefore, this research aims to critically analyse Fitbit, its functions, especially the gamification features, and its technological affordances that taken together, nudge users towards specific behaviours. Using the walkthrough method, a framework to study apps, the analysis outlines different self-tracking modes that are reflected in the app, with private-self tracking as the dominant mode. It further argues that the purpose behind some gamification features, such as bonuses, is not predominantly to nudge users to exercise, but rather to maintain their activity in the app itself. This is the reason why users should take a more critical stance towards the apps they are using, as their intended purpose may be different to what they are advertised as, so that the developer takes advantage of the user, but the user does not benefit from the app in the ways outlined by the developer. In the case of Fitbit, the analysis shows that gamification elements encourage winning the game and staying in the app but not always encourage physical activity, which is what the app presents as its intended purpose.

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1. Introduction

Smartphone applications have revolutionized the way we carry out many day-to-day activities. They have permeated into all spheres of life, including education, work, health, media, art, entertainment, and even religion. Previously mundane and time-consuming chores can now be conducted online from the comfort of our homes or anywhere else in the world. Transferring money, doing groceries, booking tickets and attending a doctor's appointment are available at our fingertips, all due to technological advancements of the past decades. Many of those services are facilitated via apps, making the whole process easier, faster and more accessible for most people. Apps' predominantly organisational purpose at first, quickly extended into the entertainment realm, later combining many functions to achieve specific goals. The Fitbit application is an example of merging of such purposes, bringing health, a serious domain, and fun together.

Fitbit Inc., formerly known as Healthy Metrics Research Inc., is an American company established in 2007 by James Park (current CEO), and Eric Friedman (current CTO), that specializes in the production of wearable technology devices, such as activity trackers, wristbands, and smartwatches. They measure an array of health parameters including the amount of steps walked, calories burned, heart rate, sleep quality etc. Fitbit's current product line consists of several smartwatches like Fitbit Versa Lite, Versa 2 and Ionic; trackers, such as Fitbit Ace 2 (for children), Charge 3, Charge 4, Inspire, Inspire HR; weighing scales, such as Fitbit Aria Air; accessories, like replaceable wrist bands, charging cables and syncing devices; apparel; and services, including Fitbit Premium and Fitbit Coach. The International Data Corporation (IDC) report published in March 2020, ranked Fitbit the fifth biggest wearable company after Apple, Xiaomi, Samsung and Huawei with 15.9 million devices shipped in 2019 (IDC, 2020).

Since its launch, Fitbit acquired many fitness related start-ups in an effort to monopolize the wearables market. This included a fitness coaching app Fitstar[1], key assets from Pebble[2], Vector Watch SRL start-up[3], Twine Health's software and employees[4], and a smart credit card

[1] https://www.mobihealthnews.com/41063/fitbit-confirms-it-is-acquiring-coaching-app-fitstar
[2] https://investor.fitbit.com/press/press-releases/press-release-details/2016/Fitbit-Inc-Acquires-Assets-from-Pebble/default.aspx
[3] https://consent.yahoo.com/v2/collectConsent?sessionId=3_cc-session_120d6996-6a58-4555-9c5c-27e01744e12a
[4] https://www.theverge.com/2018/2/13/17008620/fitbit-twine-health-cloud-health-care-software-company-health-wellness

company called Coin[5]. They have entered the New York Stock Exchange in May 2015, but after an initial success[6], their shares fell by more than a half in 2016. This prompted a change of Fitbit's mission from *'consumer electronics company'* to a *'digital healthcare company'* (Stevenson, 2016). Apple's, Samsung's and Xiaomi's domination on the market does not allow Fitbit alone to compete against them. Thus, in November 2019, Google announced that it will acquire Fitbit for $2.1 billion[7]. Both companies' missions align, in that they want to understand and improve the health of millions of people around the world by advancing in hardware, software and the AI[8]. The acquisition raised many privacy concerns among 28 million Fitbit users, but as of June 2020, the deal is still pending an approval from the US Department of Justice (Langley, 2020).

To delve into the app analysis, it is important to consider its environment of expected use, which consists of the app's vision, operating model and the mode of governance. Establishing such environment helps "researchers to understand how an app's designers, developers, publishers and owners expect users to receive and integrate it into their technology usage practices." (Light, Burgess, & Duguay, 2016, p.889). Fitbit's vision consists of its purpose and the target user base. It outlines what the app is supposed to do, how it can be used and by whom. As stated in the Google[9] and the Apple App Store[10], Fitbit's aim is to track basic stats and keep their users motivated on their fitness journey, so that they can live healthier, more active lives, and get a complete picture of their health. Furthermore, they can get inspired and motivated by Fitbit community, challenge their friends and family, set fitness goals, get guidance and keep track of their nutrition, hydration and weight. Fitbit is advertised as *'The fitness app for everyone.'* Its scenarios of use depict everyday situations, where users wear trackers and smartwatches while exercising, wandering in nature or having a morning coffee[11]. The app is supposed to track all-day activity, workouts, sleep quality, heart rate, hydration, nutrition and more, using various trackers such as MobileRun and MobileTrack, PurePulse for heart rate,

[5] https://eu.usatoday.com/story/tech/news/2016/05/19/fitbit-buys-coins-wearable-payment-platform/84582962/
[6] https://money.cnn.com/2015/06/18/investing/fitbit-ipo-stock-bounce/
[7] https://blog.google/products/hardware/agreement-with-fitbit?utm_source=tw&utm_medium=social&utm_campaign=og
[8] https://investor.fitbit.com/press/press-releases/press-release-details/2019/Fitbit-to-Be-Acquired-by-Google/default.aspx
[9] https://play.google.com/store/apps/details?id=com.fitbit.FitbitMobile&hl=en
[10] https://apps.apple.com/us/app/fitbit-health-fitness/id462638897
[11] https://www.fitbit.com/ie/app

barcode scanner and calorie estimator for food, notifications and pop-ups for reaching goals etc.

A company's operating model outlines its business strategy and revenue sources that indicate their political and economic interests (Light, Burgess, & Duguay, 2016). Although the app is free to download, there are in-app products and services available for purchase, such as the aforementioned trackers, accessories and Premium subscriptions. Van Dijck (2013), points out that many users pay with personal data to access apps' services. This happens already at the registration stage, where one is required to provide their name, e-mail address, password, date of birth, gender, height, weight etc. Such information can later be sold to advertisers and data miners, proving that "revenue generation may not involve monetary exchange" (Light, Burgess, & Duguay, 2016, p. 890). As outlined in their Privacy Policy[12], a collection of information, such as access to one's location, is used to improve other Fitbit services.

The mode of governance "involves how the app provider seeks to manage and regulate user activity to sustain their operating model and fulfil their vision. Governance is reflected in the app's rules and guidelines, which place boundaries around the types of activity that users are able to conduct, and even the types of users allowed on an app." (Light, Burgess, & Duguay, 2016, p.890). In short, the mode of governance is outlined in the app's Terms of Service[13]. It will not be discussed in detail, as it is beyond the scope of this research.

The majority of Fitbit studies takes a quantitative approach, examining the numerical validity and reliability of Fitbit trackers against clinically tested apparatus like the ActiGraph[14], a wristband used by researchers and physicians to record movement, rotation, and body position, or diagnostics measuring multiple parameters like polysomnography to monitor physical activity and sleep. This included Fitbit One (Takacs et al., 2014), Fitbit Zip (Tully, McBride, Heron, & Hunter, 2014), and Fitbit Charge 2 (Zambotti, Goldstone, Claudatos, Colrain, & Baker, 2017), some of which are no longer available on the market[15]. Similarly, a number of studies tested the accuracy of Fitbit trackers with a specific focus on either predicting the overall energy expenditure with or without classifying the activity one is performing (Dannecker, Petro, Melanson, & Browning, 2011; Sasaki et al., 2015), comparing the results of various Fitbit wristbands based on the same activity (Feehan et al., 2018), or comparing the

[12] https://www.fitbit.com/legal/privacy-policy
[13] https://www.fitbit.com/us/legal/terms-of-service
[14] https://www.actigraphcorp.com/actigraph-link/
[15] https://www.self.com/story/fitbit-inspire-changes-to-product-lineup

results of different commercial tracking devices, also while assessing the same activity (Düking et al., 2020; Kooiman et al., 2015).

In addition, there are a number of qualitative studies, which examined concepts related to digital health that were focal to this research. This included a critical commentary about digitized health promotion practices, the reasons and actors behind implementing such practices and their socio-political ramifications (Lupton, 2014a). Moreover, the influence of so-called M-health (mobile health) in promoting healthy behaviour was examined against concepts of embodiment, selfhood and social relationships, arguing that such technologies produce digital cyborg bodies, both objects and responsible citizens under constant surveillance (Lupton, 2012). But such surveillance can be met with resistance, especially among teenagers. A study that examined the use of Fitbit in a school setting among one hundred 13- to 14-year-olds in the United Kingdom, revealed that while many were encouraged to reach the 10,000 daily step goal due to self-surveillance, they resisted the practice only after a few weeks, because the device did not measure the activity accurately, and as such it promoted negative feelings among young people (Goodyear, Kerner, & Quennerstedt, 2017). In addition, several studies examined the extent to which users can get addicted to Fitbit and its health monitoring abilities (Baalbaki, Hoffman, & Gilliard, 2017), and analysed the meaning of step-counting in the health society and the era of Fitbit (Adams, 2018).

All in all, there has been an extensive amount of research, both quantitative and qualitative, conducted about various aspects of Fitbit. While the methodologies differed across the disciplines, none of the studies adopted the walkthrough method developed by Light, Burgess and Duguay (2016), to critically examine a fitness app, not to mention Fitbit, which I will do in this research. In addition, the work by the interdisciplinary scholar Deborah Lupton will lay a foundation upon which I will assess the workings of the Fitbit app and its cultural and behavioural implications. I will further discuss the relationship between governance, self-surveillance and gamification, as evident in the Fitbit app, based on the inquiry of philosopher Michael Foucault.

2. Theoretical Framework

2.1 Applications

Software applications, also called mobile apps, or just apps, are computer programs found on mobile devices, like smartphones, tablets or watches. They are focused on solving particular, singular needs, such as organization, communication, media display, entertainment etc. (Pressman, 2005). It is problematic to determine one person or event responsible for the emergence of apps, because their origin can be traced back to several technological developments that happened in a relatively short time span.

The Psion Organiser[16] released in the mid-1980s was regarded as a predecessor to a mobile computer. It was one of the first personal digital assistants (PDA) which could perform simple operations, such as editing text, calculating, making notes, setting agenda, writing a diary and running a contact database (Richmond, 2019). Although, the Psion Organisers could not make phone calls, they paved the way for future mobile apps, which at first, fulfilled predominantly business needs (Pressman, 2005).

A decade later, in 1993, Apple released a PDA called Newton, which could connect to PC's, Macs and Wi-Fi networks. Apart from pre-installed data organization software, users could download third-party apps like Pocket Quicken, a program which helps to arrange finances, an email and a web browser. Furthermore, Newton could recognize hand-written notes, which is a feature promoted on newest smartphones, such as on Samsung Galaxy Note10[17]. Yet, the popularity of Newton did not last very long as it was replaced by a more straightforward and intuitive PalmPilot[18], a PDA which supported a software development kit, allowing an average user to create an app that could cooperate with that PDA's interface (Richmond, 2019). This reflects the way programs are created nowadays, with third-party app developers providing software to a range of mobile devices.

Further inventions which paved the way to modern day apps include the introduction of the game Snake on Nokia 6110 in 1997, which initiated the era of entertainment on mobile phones. In the meantime, PC's were gaining popularity and users wanted to avail of similar functions on their handheld devices. This resulted in the emergence of the Wireless Application Protocol

[16] https://stevelitchfield.com/historyofpsion.htm
[17] Official video advertisement https://www.youtube.com/watch?v=4_Y995u6HFw
[18] Genesis of Palm products https://www.technobuffalo.com/palm-the-rise-and-fall-of-a-legend

(WAP) that allowed browsing through simpler versions of websites, which were previously supported by the Hypertext Transfer Protocol (HTTP).

The last crucial moment which contributed to the form of modern-day apps, was the release of Apple's iOS and the first iPhone in June 2007, with a digital keyboard and a touch screen. Shortly afterwards, in June 2008, its App Store was launched (Light, Burgess, & Duguay, 2016), with over 500 apps available to download.

This brief etymology of smartphone applications shows how the development of hardware enabled more complex affordances of the software, where functions of apps changed over time. The aforementioned review is significant in terms of this research, because further evolution and blurring of organizational, communication and entertainment purposes will be more apparent in forthcoming sections, as the use of gamification features will be implemented to encourage users of a fitness app to engage in physical activity.

2.2 Governance, Surveillance and the Care of the Self

Exploring the relationship between governance, surveillance and the care of the self, will aid in understanding the position of gamification in the health discourse that is central to this research.

According to Rose (1999), the government ought to be understood as a code of conduct, as an entity that shapes, guides and directs such conduct of people inhibiting a particular territory, regardless of their position in the society. It also takes into account individual's passions, instincts and ways in which people govern themselves. The actors involved are the governors, that is, state institutions, schools, employers etc., and the governed that is, citizens. Rose (1999), argues that governance is a productive process, which requires knowledge of peoples' motivations to act in a certain way, and then using this knowledge to mold their actions and outcomes to fulfil one's goals. Therefore, in order for governance to be more productive, nudging is better than forcing, because the governed participate willingly.

Governance takes places in a particular space that depends on surveillance. This notion has been discussed at length by Foucault in his work *Discipline and Punish* (1977), where he discussed the history of governance since the 18th century, particularly focusing on prisons. He claims that in order for society to be organized (disciplinary society), one must see its people as individuals, recognize their needs, and only later compare them to each other. This can be

achieved through surveillance. An example of exerting such disciplinary power is the panopticon, and an example of the original panopticon design is the circular prison building with a tower in the middle, structured in such a way that it allows the guard to observe all the inmates, but the inmates cannot see each other, and cannot know whether the guard tower is occupied or not. Even the smallest possibility of prisoners being observed by the guard prompts them to behave in a certain way, as to obey the rules. Thus, the power of the panopticon, which was later adapted in hospitals, schools and the military service, causes individuals to conform to the socially accepted norms. In modern times, the impact of conformity and normalization is reflected in grades, ranks, scores, and even Body Mass Index (BMI) ratios (Whitson, 2015).

In light of neoliberalism, the aforementioned civil society, guided by common goals, beliefs and values, was replaced by consumer society, where ideas roam freely and the way in which citizens identify and respond to social conformity changed. "In a consumer society, surveillance shifts from tracking individuals to monitoring behaviour and consumption patterns. Populations are constituted as consumers to be seduced into the market economy." (Whitson, 2015, p. 343) (control society). Individuals are no longer seen as beings with unique personalities, but as bits and bytes of information stripped of value judgements that exist in the digital era, also known as *dividuals* (Deleuze, 1992), and *data doubles* (Haggerty & Ericson, 2000). On the one hand, they are created by algorithms, which is outside of scope of their control, but on the other, they willingly disclose private information, in order to personalize online services. Here is where gamification (see section 2.4) and governance come together, where "we broadcast our personal data as the price of participation" (Whitson, 2015, p. 344). Yet, apart from personalization, there are also other consequences of gamification as governance, including the notion of the care of the self, which nowadays is channelled via technology.

2.3 Self-Tracking

Self-tracking, also labelled as life-logging, personal analytics and personal informatics, refers to a regular and voluntary extraction and accumulation of data about oneself in order to improve one's well-being. This can include various parameters related to *health*, such as weight, blood pressure, heart rate, nutrition, medication, sleep; *environment*, such as the impact of exposure to pollutants or amount of toxic substances in the air; and *behaviour*, for example, productivity and habits (Swan, 2009). Once the figures are collected, they are organized,

analysed, interpreted and represented via graphs, statistics, and other forms of data visualization, so as to offer valuable insights about oneself.

The idea of monitoring oneself was discussed at length by philosopher Michel Foucault (2003) in the mid-1970s at the Collège de France. In a series of lectures, he closely examined the notions of 'normality' and 'abnormality' which constituted the prerequisites of power in the 19th century. Furthermore, Foucault outlined how one should strive to be a good citizen, one who obeys the rules, causes no harm, and takes care of his or her physical, mental and spiritual health, so as not to become a 'monster,' an outcast in society who needs to be cured with the help of a system, such as a family, a mental institution or a prison. He also argued that self-optimization is necessary, because today's notions of selfhood and citizenship are closely linked with moral obligations and ethical incompleteness, with the latter constituting a starting point of improving oneself (Foucault, 1988). One should reflect and strive towards conforming to certain societal norms to become better and normal, as opposed to abnormal. Hence, through modifying one's behaviour we can take control of our destiny.

Yet, while the behaviour change of the 21st century often takes place with the help of technology-aided self-tracking devices, and not explicit systems of control, the focus largely remains the same, where "self-tracking may be theorized as a practice of selfhood that conforms to cultural expectations concerning the importance of self-awareness, reflection and taking responsibility for managing, governing oneself and improving one's life chances." (Lupton, 2014b). Furthermore, Lupton (2014b) characterized five self-tracking modes, which are particularly common today. They are private, pushed, communal, imposed and exploited self-tracking. Even though, some of their traits overlap, they are still noticeably distinct from each other, especially with regard to the voluntary aspect of self-tracking and uses of the generated data. While they are all worth investigating, in light of this research, I will mostly focus on the first three, namely, the private, pushed and the communal modes. Together with examples from the Fitbit app, they will be further discussed in the analysis section to avoid repetition.

2.4 Gamification and Ludification

While ludification and gamification often occur in a similar context and are used interchangeably, it is important to differentiate between the two. According to Lupton and Thomas (2015), ludification is a more extensive concept than gamification. Within the academic discourse, it is utilized in the context of gaming, also referred to as 'ludology.' It

encompasses game elements applied in other domains of life, not only those limited to leisure. In today's economy, playfulness has permeated into once serious activities, such as work (which now ought to be fun), education (serious gaming), politics (ludic campaigns), and warfare (video games simulating war) (Frissen et al., 2015). Jeremy Rifkin (2000, p.263), an American economist and social theorist, emphasizes that "play is becoming as important in the cultural economy as work was in the industrial economy."

Gamification, on the other hand, is "the use of game design elements in non-game contexts" (Deterding, Dixon, Khaled & Nacke, 2011, p.9). The concept emerged in the online media sphere to represent the inclusion of game features into digital technologies, such as points, badges, levels, rewards and leader boards that were not initially designed as games per se, but which were entertaining, motivated users to use them, and hence, increased their activity and retention (Deterding et al., 2011). Gamification is apparent in the literature on marketing strategies, behaviour modification and persuasive computing (Lupton & Thomas, 2015). It is a vital element of 'nudging,' a practice promoting behaviour change, which emphasizes persuasion, rather than coercion (Jones, Pykett & Whitehead, 2010).

In an attempt to understand the changes brought by nudging, Jones et al. (2010), examined the transition of British government's attitudes towards their health policy. Previous national health campaigns "reinforced a perception among the public that everyone is consuming vast quantities of alcohol" (Jones et al., 2010, p.85). Instead, Andrew Lansley, who at that time was the Secretary of State for Health, proposed that the Department of Health campaigns should "focus on the moderate levels of alcohol consumed by the majority of individuals in the UK" (Jones et al., 2010, p.85). Therefore, instead of imposing on, and 'preaching' to its citizens about the suitable amount of alcohol that can be consumed, the Department of Health ought to empower people, so that they make the right choices about their health. It should 'nudge' them in the right direction and promote positive options, as opposed to moralizing them. This way of nudging reflects libertarian paternalism, which is an idea that "politics [is] defined by the promotion of welfare (paternalism) at the same time as ensuring freedom of choice (libertarianism)" (Jones et al., 2010, p.85).

All in all, Lupton and Thomas (2015) best summarize the difference between gamification and ludification, stating that "the former involves applying ludic principles for reasons other than the pleasures of enjoying the game for their own sake, often to achieve objectives set by actors and agencies other than the gamer." Thus, in exploring how Fitbit nudges its users to exercise, the gamification concept is a more suitable fit as the aforementioned features such as

points, badges, levels, leader boards etc., ought to motivate millions of people to keep moving and reach their fitness goals. Yet, Fitbit's objectives are not only limited to improving the health of the masses. Given their commercial foundations, they primarily want to capitalize on the sale of fitness trackers, data aggregation and mining. While this last point is a complex and fascinating area to delve into, it falls outside the scope of this research.

3. Research Questions

The following are the research questions derived from the theoretical framework:

RQ 1: How are different self-tracking modes evident in the Fitbit app?

RQ 2: How is the care of the self materialized in the Fitbit app via gamification?

RQ 3: How are users nudged to engage in physical activity, and how are gamification features used for that purpose?

4. Methodology

The overall aim of this research was to investigate how Fitbit users are nudged to engage in physical activity. An important strategy the app uses in its nudging pertains to gamification. Therefore, in order to gain an in-depth understanding of the gamification features and the behaviour they elicit in users, a qualitative approach was used.

This approach required a partial adaptation of the walkthrough method, which is "a way of engaging directly with an app's interface to examine its technological mechanisms and embedded cultural references to understand how it guides users and shapes their experiences" (Light, Burgess, & Duguay, 2016, p.882). It involves outlining the app's environment of expected use and the walkthrough technique that consists of three steps, namely registration and entry; everyday use; and app suspension, closure and leaving. The last step of the walkthrough technique was omitted, as it explores the consequences of either permanently or temporarily leaving the app, and the ways the developers can obtain value from users after they opt-out. This was not relevant to my research, as I focused on the features that were available to users upon downloading the Fitbit app, and not what they face after leaving it.

The central part of the walkthrough method "involves the step-by-step observation and documentation of an app's screens, features and flows of activity – slowing down the mundane actions and interactions that form part of normal app use in order to make them salient and therefore available for critical analysis." (Light, Burgess, & Duguay, 2016, p.882). In essence, apps' widespread presence in the digital media today shapes our everyday practices, therefore, it is useful to study their features, which "are the site of significant sociocultural and economic transformations across many domains, from health and relationships to entertainment and everyday finance." (Light, Burgess, & Duguay, 2016, p.881).

To analyse the Fitbit app, I have established its environment of expected use, consisting of its vision, operating model and the forms of governance (see section 1) to prepare for the step-by-step technical walkthrough. This could also have been done while advancing through the walkthrough process itself, helping to decode the purpose of specific features and their functions (Light, Burgess, & Duguay, 2016).

Second, I have adopted part of the walkthrough technique to collect data, which involved moving through the stages of app registration and entry, and everyday use. I have downloaded the Fitbit app from the Google Play store on my smartphone and set up an account. Next, I have browsed through the app to record and discover its functions, features and affordances. This

included taking part in the *Habits for Restful Sleep* guided program; *Weekend Warrior* challenge; *Vernal Falls* solo adventure; *Valley Loop* adventure race; trying out several of the video workouts; monitoring my health and fitness stats, such as steps, exercise, and water intake; reading through the feed; and setting up my own interest group. While a lot of options were only available to the Fitbit Premium users, the basic walkthrough showed me what activities were there, what they allowed users to do, and also how users were guided and to what degree they were limited by specific features. Given this, I did not proceed with the last step of the technical walkthrough that consisted of the discontinuation of use, as it was not relevant to my analysis.

Third, to gain a better understanding of the features offered and how to avail of them fully, I have consulted the Fitbit website, in particular its community section, where moderators and other users discuss technical affordances of activity trackers, talk about various settings, share video tutorials etc. Furthermore, I have read press releases and blog entries written by Fitbit employees. According to Light, Burgess and Duguay (2016, p.889), "these often establish an app's discursive and symbolic representation (e.g. logos, colour schemes, images), which is carried through to its technical interface."

The walkthrough method as a way to study apps foregrounds many similarities with digital ethnography, an approach used to study online practices and communications, and offline practices that are moulded by digitalization (Varis, 2016). For both, the data collection process is conducted online, a method I have used for the purpose of this research. A significant part of my data consisted of notes and screenshots. A combination of the walkthrough method and digital ethnography facilitated the process of analysing data, especially finding connections between affordances of the apps' features and their intended impact on Fitbit users' offline.

5. Analysis

5.1 Self-Tracking Modes and the Care of the Self in the Fitbit App

In this section I will closely analyse Fitbit's three most prominent self-tracking modes as described by Lupton (2014b), in particular, private, pushed and communal modes. I will provide examples of each to illustrate their differences and their impact on the Fitbit users. Moreover, I will briefly discuss how the care of the self resonates with gamification features present in the Fitbit app.

5.1.1 Private Self-Tracking

The primary goal for many individuals who participate in self-tracking techniques is to improve their lives through self-awareness. The quantitative and qualitative data gathered on a range of health aspects contains valuable knowledge which ought to improve overall well-being, achieve higher quality sleep, have greater control over mood swings, monitor aspects of chronic illnesses, for example blood glucose level and blood pressure, decrease stress levels, increase productivity and improve relationships with others etc. (Lupton, 2014b). Private self-tracking is often self-initiated and voluntary, and the journey to self-optimization is described by individuals as enjoyable and playful.

As the name indicates, private self-tracking is carried out for individual purposes, and the accumulated data is either only available to the users themselves or it might be shared with carefully selected others, such as members of the Quantified Self (QS) movement. The term 'quantified self' was coined in 2007 by Gary Wolf and Kevin Kelly, editors of the *Wired* magazine. Together, they set up the QS website[19], a platform that brings together users and developers of self-tracking devices who can interact on discussion forums, read blog posts and guides on how to start tracking one's health. *'Self-knowledge through data'* is the motto of the QS community, whose members share their findings, talk about burning issues and learn from each other about many health aspects, data visualization techniques and so on. Furthermore, they organize regional meetups, events and international conferences. A study conducted in 2014 (Choe, Lee, Lee, Pratt & Kientz) analysed 52 videos from the QS website. Its aim was to detect how what the researchers conceived as 'extreme users' avail of self-tracking techniques

[19] https://quantifiedself.com/

and whether they encounter any difficulties along the way. The researchers found out that while presenting their findings, members strive to answer three questions, namely: *What I did?; How I did it?;* and *What I learned?* The obstacles to monitor one's activity included lack of time and motivation, and difficulties in interpreting the data.

Self-tracking, as portrayed in the media, is often a reflection of the private self-tracking mode. People who engage in such health monitoring practices are often regarded as narcissists (Lupton, 2014b), and geeks (Li, Dey & Forlizzi, 2010). The main drives that initiate self-tracking include interest in the tools for self-tracking, such as wearable devices and apps, being encouraged by friends and acquaintances, and wanting to eliminate a specific problem, such as to lose weight, improve productivity or regulate sleeping pattern (Lupton, 2014b).

5.1.2 Pushed Self-Tracking

Pushed self-tracking differs from the private self-tracking in terms of motivation to undertake health monitoring practices. The reasons to do so come from external actor or agency. While still taken up privately and spontaneously, pushed self-tracking is encouraged in response to the outside stimuli (Lupton, 2014b).

Self-tracking is widely regarded as a tool to accomplish behavioural change in target groups, where people are nudged to alter their actions in order to improve their well-being and achieve other outcomes. 'Persuasive computing' (Purpura, Schwanda, Williams, Stubler, & Sengers, 2011), and 'lived informatics' (Rooksby, Rost, Morrison, & Chalmers, 2014), are some of the terms used to describe this field of research. Lupton (2014b) outlines that pushed self-tracking is most commonly applied in patient self-care, preventive medicine and health endorsement, where bodily aspects such as diet, weight, fitness level, and chronic illness indicators like blood glucose level and blood pressure are being monitored (see, for example, Ayobi, Marshall, Cox, & Chen, 2017; Chiauzzi, Rodarte, & Dasmahapatra, 2015; Swan, 2009).

There are multiple ways in which the data gathered through this mode of self-tracking is used. In research, it is portrayed as pedagogical and motivational, promoting balanced lifestyle and inviting others to self-reflect upon their health, especially patients with chronic illnesses, who can lower the number of visits to their doctor by becoming 'digitally engaged' (Lupton, 2013b). Moreover, it elicits emotional reactions such as guilt, fear or shame, which in turn, leads to change in behaviour (Lupton 2012, 2013c).

Pushed self-tracking is prominent in the workplace, where employees are encouraged to participate in 'wellness programs' to improve productivity. An argument in favour of this scheme claims that a healthy workforce is more efficient, which in turn reduces healthcare expenditures (Baicker, Cutler & Song, 2010; Chung, Gorm, Shklovski, & Munson, 2017). In return, employees may enhance the 'team spirit' and may be financially rewarded by employers who offer a discount on health insurance premiums or award them with virtual points, which can be exchanged for gifts, airline miles, hotel vouchers etc. (Chung et al., 2017). Therefore, "it is (…) in their financial interest to promote good health among their workers" (Lupton, 2014b, p.7). Furthermore, there are more health apps and software programs on the market, which encourage workers, especially the sedentary group, to take active rest and walk every break to lower stress levels (Bloom, et al., 2017), and decrease the risk of weight gain (Heuvel, Looze, Hildebrandt, & Thé, 2003).

"Wearable technology manufacturers such as Fitbit are brokering deals with employers and insurance companies to sell their fitness and activity trackers and data analytics software as part of these wellness programs" (Olson & Tilley[20], 2014 , as cited in Lupton 2014b, p.7). Some of the corporate wellness providers and health systems that currently collaborate with Fitbit include limeade[21], Castlight[22] and Cigna[23], whereas BP, IBM, Kimberly-Clark, Bank of America and Target constitute more widely recognized corporate clientele. Overall, there is a growing trend for insurance providers, especially in the United States, to combine self-tracking data as part of assessment of risks and premiums for customers (Lupton, 2014b).

One of such companies is Johnson & Johnson, whose health insurance partner Wellness & Prevention developed an app exclusively available to its customers. "Track Your Health can incorporate data from a number of third party health trackers and sensors, allowing users to track and aggregate data, set goals, and visualize their weight, movement and nutrition progress in the form of charts. Additionally, it will send anonymized data back to the health plan that users belong to." (Comstock, 2014).

[20] https://www.forbes.com/sites/parmyolson/2014/04/17/the-quantified-other-nest-and-fitbit-chase-a-lucrative-side-business/#d79ccf42c8ad
[21] https://www.limeade.com/wp-content/uploads/2016/05/Limeade-How-to-solve-the-wellness-program-participation-problemFINAL.pdf
[22] https://www.castlighthealth.com/resources/thought-leadership/employee-health-incentives-5-lessons/
[23] https://www.cigna.com/employers-brokers/plans-services/cigna-health-and-wellness-programs

Another example of a mobile application includes *Fitbit Plus – Health Coaching*, formerly known as Twine Health. As stated by the developer[24], this mobile app is part of Fitbit's wider health coaching platform, which is utilized in employer health and wellness programs. It is aimed at improving one's well-being, while at the same time staying in touch with one's care team comprised of coaches, clinicians, friends, and family. The central features of Fitbit Plus – Health Coaching include creating an individualized health plan and setting health goals with one's coach, selecting adequate measures for one's action plan, setting reminders, monitoring progress, confidentially contacting with one's health coach, sharing one's journey with the care team and syncing data from Fitbit trackers and other third party apps, such as Apple Health app[25] (see Figure 1).

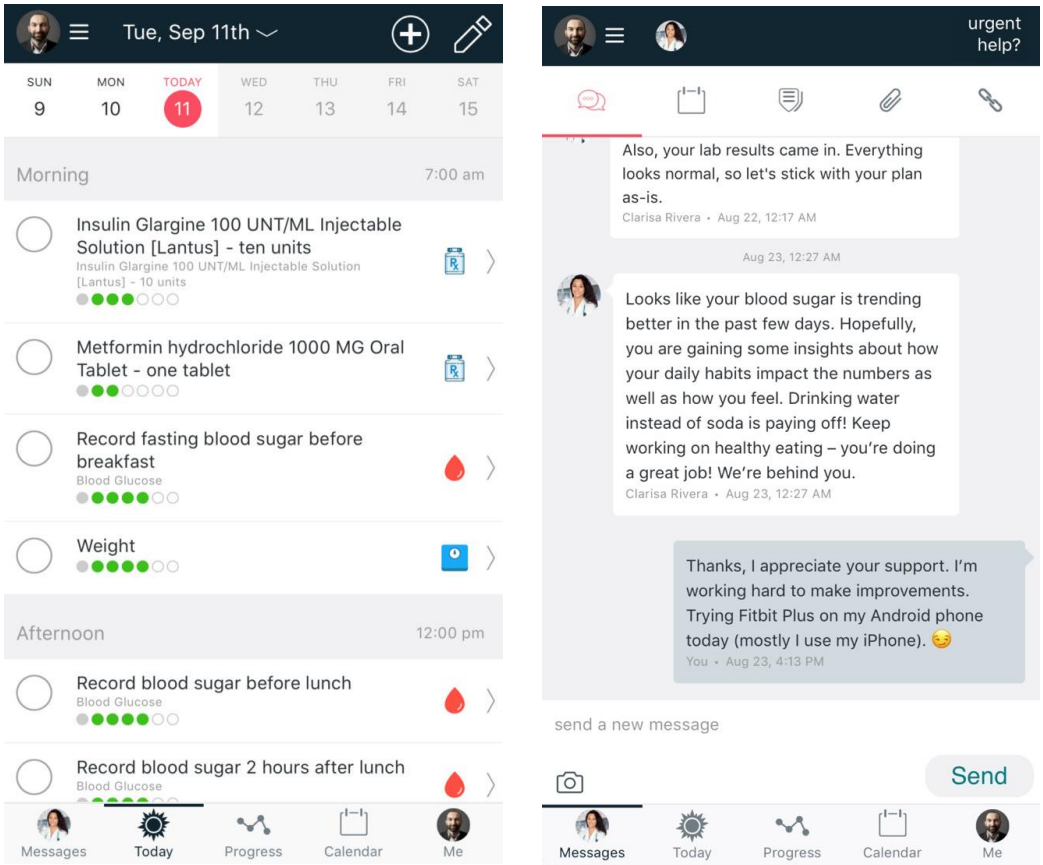

Figure 1. Examples of features of Fitbit Plus - Health Coaching, including a list of user's personalized health goals and a private consultation with a health coach.

[24] https://play.google.com/store/apps/details?id=com.twinehealth.client
[25] https://apps.apple.com/us/app/fitbit-plus-health-coaching/id866091325

Although Fitbit Plus – Health Coaching is free to download for everybody, it is only accessible by invitation from one's employer, health plan, or health provider[26], who act as brokers between Fitbit and employees or clients. Although the provider does not specify reasons for this exclusive accessibility, 'Plus' in the name suggests that those supplementary functions are only available to a selected group of individuals. Without a four-digit code, one cannot avail of the aforementioned services. Thus, in order to be part of Fitbit Plus, one first needs a Fitbit account, so that data gathered in Fitbit app is automatically transferred to Fitbit Plus.

5.1.3 Communal Self-Tracking

Although self-tracking is primarily a self-centred and individualistic activity, a vast amount of self-trackers see themselves as part of a wider community (Lupton 2013a, 2014b). Platforms such as the Quantified Self website, discussion fora and social media facilitate communication with other self-trackers, allowing users to share their findings, talk about the data and learn from others. As previously stated by Choe et al., (2014), some 'extreme users' get involved in regional QS meetups and conferences, where they meet fellow self-trackers with whom they exchange observations about their data, self-tracking methods, visualization techniques, and so on.

According to John (2012), who traced the emergence of a keyword 'sharing' across 44 biggest, most visited and historically significant Social Networking Sites (SNSs)[27], sharing one's data is an essential and crucial part of Web 2.0, which is characterized by the abundance of user-generated content (UGC) and sharing of this content on SNSs, especially of personal experiences. He concluded that sharing in the context of Web 2.0 is synonymous with participating.

This relationship between sharing and Web 2.0 is clearly evident in the Fitbit app, where users actively participate in creating content. There are several ways of participating, primarily by generating data while wearing activity trackers, and sharing it with the wider Fitbit

[26] https://play.google.com/store/apps/details?id=com.twinehealth.client

[27] The websites included AsianAvenue, aSmallWorld, Badoo, Bebo, BlackPlanet, Care2, Classmates, Dodgeball, Facebook, Fiverr, Flickr, Flixster, Fotolog, Friendster, Habbo, hi5, Last.fm, LinkedIn, LiveJournal, Meetup, Multiply, MyLife, Myspace, Myyearbook, Netlog, Orkut, PerfSpot, Piczo, SixDegrees, Skyrock, StumbleUpon, Tagged, Tribe.net, TwitPic, Twitter, Viadeo, WeeWorld, Windows Live Spaces, Xanga, XING, Yahoo! 360, Yfrog, YouTube and Zorpia.

community. This can be done in multiple ways. Thus, I will now discuss part of Fitbit's application infrastructure, which allows users to interact with each other.

Located in the bottom right-hand corner is the 'Community' section, which is divided into three tabs, namely *Feed, Friends* and *Groups*. As stated by the developer[28], "the Fitbit community in the Fitbit app is your home for fitness-related news, local events, connecting with friends, and discovering groups." In other words, it has some of the most common features of SNSs, closely resembling Facebook. As the overarching goal of Fitbit is to encourage its users to live a healthier and more active life, the community component facilitates the reaching of that goal by "connecting you with friends, other like-minded people, your local community and Fitbit. [They] aim to provide a safe space that motivates, supports, educates, guides, and inspires[29]" its members.

Starting with Groups, as the choices made in this section determine what one sees in their Feed, groups demarcate the type of content shared and seen by users. This is best illustrated with an example. Some of the most popular ready-made English language groups include *Healthy Eating* (3.3M members), *Daily Activity* (2.4M members), *Mind & Body* (2.3M members) and *Running* (1.8M members; all the amounts of members as observed as of July 2020). For easier browsing, such groups are assigned into broader categories, which are thematically organized. They include E*at Well, Family, Feel Good, Get Moving, Health,* and *Weight Management.* There are also other language groups, such as German, French, Italian, Chinese or Japanese and they are categorized in the same way as the English language one. Furthermore, users can create their own private groups of interest, for example *Tilburg Runners*. As an admin, one can add up to 2,000 Fitbit community members from their friend list. Accepting an invitation from the admin is the only way to join a closed group.

Upon joining an open group or being invited to a private one, members can write a post and 'Share your latest achievement' in the form of a dashboard, a picture, an exercise log, a badge, weight, sleep statistics etc. (see Figure 2).

[28] https://help.fitbit.com/articles/en_US/Help_article/2187
[29] https://community.fitbit.com/t5/custom/page/page-id/CommunityFeedGuidelines

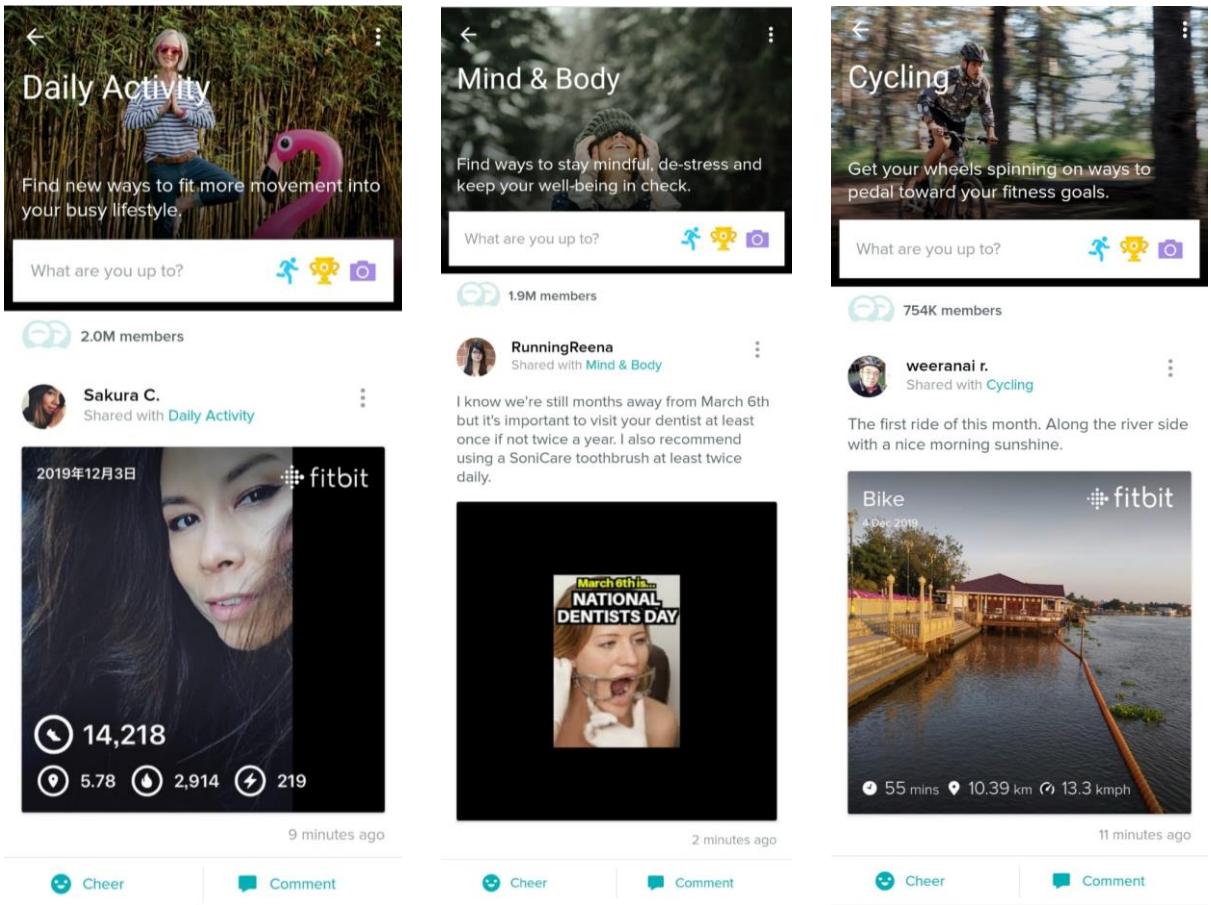

Figure 2. Examples of posts published in different groups. From left to right: an achievement dashboard, a regular post and an exercise log.

Most of the time users post content related to a specific group, for example, an exercise log from a session in the gym in the *Strength Training* group. However, there are also members who in the same group ask diet-specific questions, post content not related to health or well-being (see Figure 3), post motivational quotes, or demotivating memes, which would be better suited in a different group, such as in *Healthy Eating* or *Mind & Body*, or should be excluded altogether, especially the offensive and demotivating posts, if they are not in line with Fitbit's Terms of Service[30]. Because users willingly accept such terms and agree to obey the norms set by the platform, such behaviour shows how individuals deviate from the norms and become abnormal (Foucault, 2003). Apart from sharing their own achievements, members can also react to other's posts by clicking 'Cheer' or 'Comment,' which are the only possible reactions. Such infrastructure allows for a limited type of interaction that in turn, may shape the type of

[30] https://www.fitbit.com/legal/terms-of-service

posts uploaded by users. This may nudge them to share fitness-related content, and thus, obey Fitbit's Terms of Service.

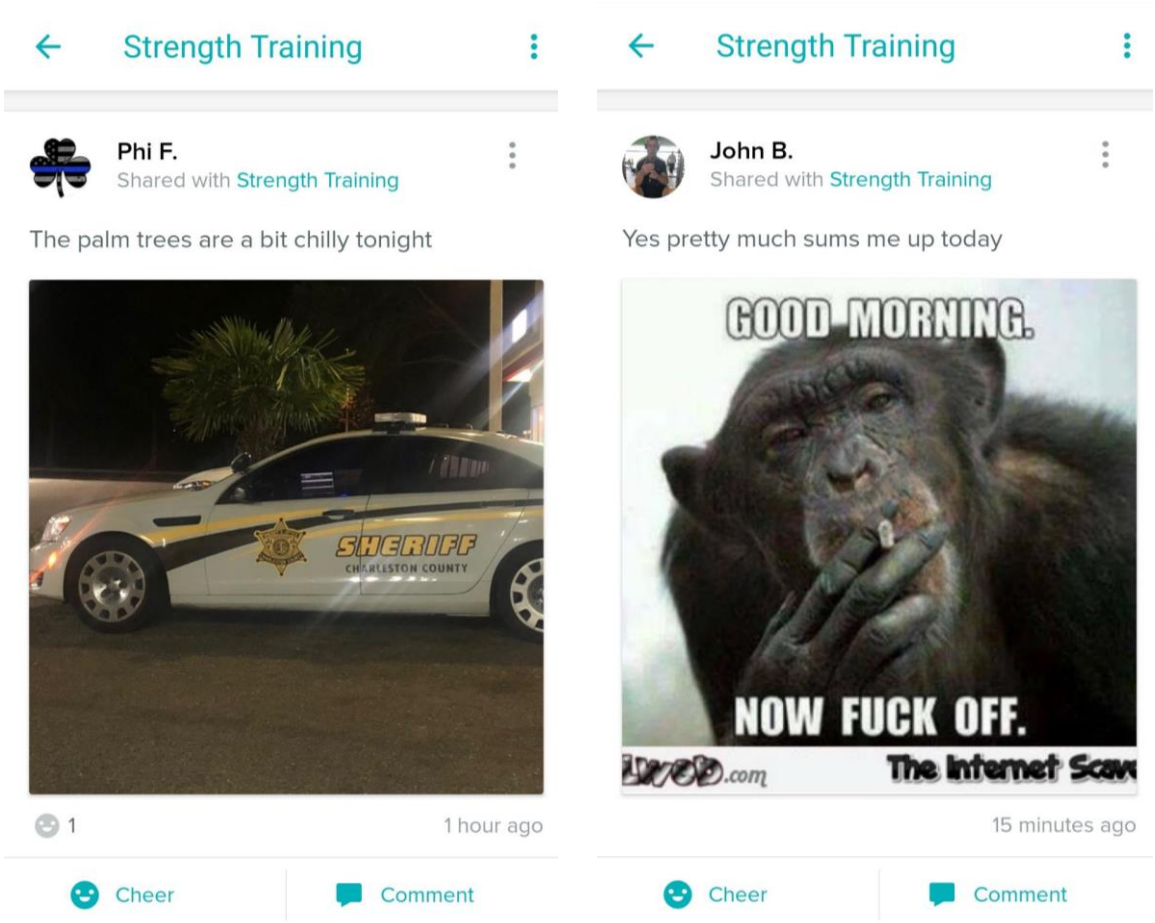

Figure 3. Examples of posts unrelated to health and fitness, such as offnsive and demotivating memes.

This last affordance, that is the interactional feature, brings me to the next tab, namely 'Feed.' As previously mentioned, being a member of certain groups, determines what one sees in their feed. It displays the most popular posts from groups that one belongs to. The popularity is measured according to the highest amount of cheers and comments under a post, which acts like the *popularity principle* prevalent in social media. As outlined by Van Dijck (2013, p.13) the online sociality is driven by quantification, where "the more contacts you have and make, the more valuable you become, because more people think you are popular and hence want to connect with you."

5.1.4 Care of the Self through Gamification

The care of the self as outlined by Foucault (1988), required an introspective approach, where individuals had to control their desires, learn to live in abstinence, and examine one's conscience. Today with the help of technology, many health and fitness apps, such as Fitbit, and online communities, such as the Quantified Self movement, extend this care of the self by adding layers of complexity, detail and proposed efficiency, which underline individualization and society's preoccupation with health, also called 'healthism' (Crawford, 1980). Tracking one's weight using pen and paper has been replaced with electronic scales that send one's data to their smartphone, where it is processed and displayed in a readable way. The same holds for other health parameters, which in the digital age are recorded in more detail using wristbands, smartwatches and apps. Furthermore, health tracking is taken up voluntarily and the whole quantification process is automated, showing a range of data about an individual that presents a wide-ranging image of their well-being (see section 5.2.5). Such basic form of the care of the self reflects a personal self-tracking mode (Lupton, 2014b).

Moreover, users are provided with a feedback that is intended to help them to reach their goals, often in the form of charts, graphs and other forms of visualization. Tracking one's progress is meant to help users to see the changes, even the most incremental ones, which ought to motivate them to keep going. The role of the challenges, goals, badges and scoreboards, which are part of the gamification features, is to turn physical activity into leisure that makes healthy living a more enjoyable journey overall. Therefore, because the motivation to quantify, control, and thus, surveil oneself comes from within, it does not reflect disciplinary (Foucault, 1977), nor consumer society (Whitson, 2015), that are both characterized by pushed self-tracking mode (Lupton, 2014b), which is imposed from the outside. Yet, this does not mean that individuals are free to do what they want, as the model and the instruments of control are deeply embedded in the app's infrastructure, which may be problematic to discern for an average user.

5.2 Nudging to Exercise through Gamification

In order to encourage people with low fitness level to take up exercise, and those already active to move even more, Fitbit developed several components that target an array of wellbeing aspects. They are divided into five categories, namely *Guided Programs, Challenges & Adventures, Workouts, Mindfulness,* and *Health & Fitness Stats*. All of those elements feature in the 'Discover' section of the app. A brief outline of each category will aid in understanding how this extensive infrastructure helps novice fitness enthusiasts reach their goals.

5.2.1 Guided Programs

The first category are the *Guided Programs*. There are 16 modules that offer knowledge about healthy eating and sleeping, and also provide general workout plans suitable for users at every fitness level. The programs' length varies from one to three weeks. While all of them are available to owners of the Fitbit Premium account, only three can be accessed for free. One of them is a two-week program called *Habits for Restful Sleep*. By completing a short survey, and thus using a retrospective approach, one can understand how their current habits affect their sleeping pattern. The overall aim is to change those habits so as to improve one's sleep. Having read some short, yet informative tips from the experts, the user is free to choose one bad habit that they will give up, and one beneficial habit that they will take up. The list of possible habits changes, depending on the issue the user wants to focus on, for example, falling asleep, feeling rested or staying asleep. After successfully completing the daily requirements, one can record their progress by ticking achievements off the to-do list (see Figure 4). The latter has long been associated with a feel-good factor and a sense of accomplishment. Other potential benefits include reduced anxiety, improved organization and better time management. Such incremental changes may constitute a good start to the overall behaviour change. In order for new habits to have a long-lasting effect, small changes in behaviour performed over time have proved more successful than radical changes implemented overnight. This holds true especially when it concerns changes in nutrition and uptake of physical activity (Hills, Byrne, Lindstrom, & Hill, 2013).

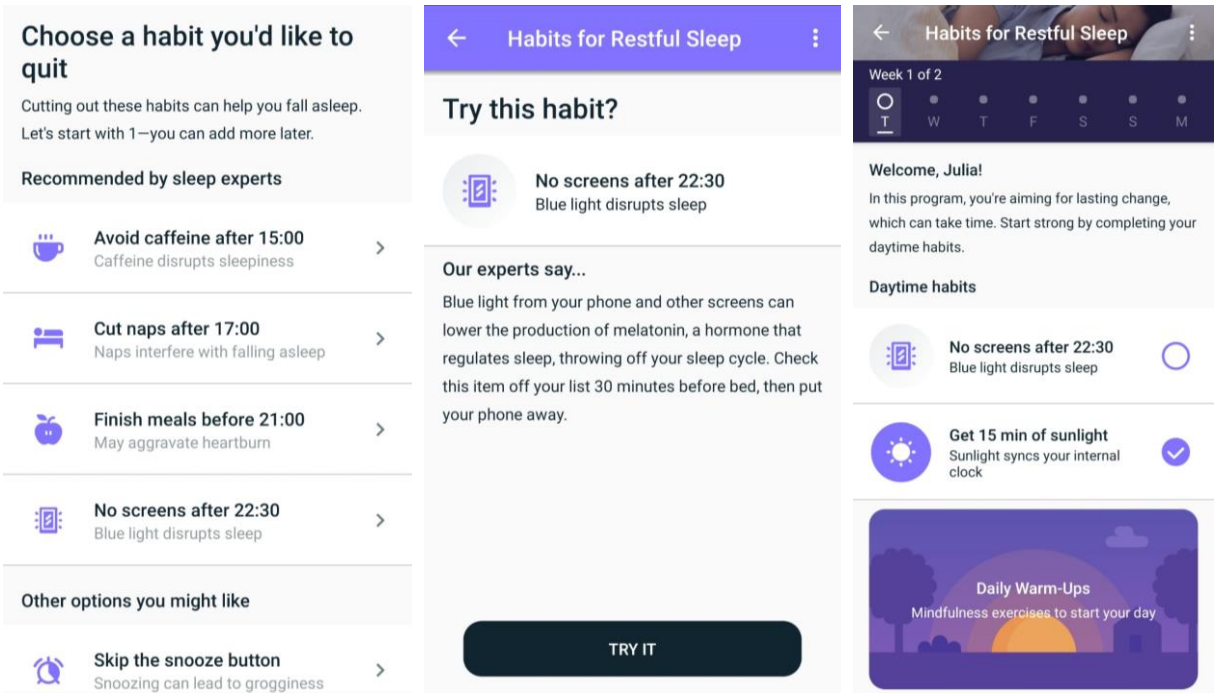

Figure 4. Different steps involved in registering for the Habits for Restful Sleep guided program. From left to right: a list of negative habits, a detailed information about the chosen habit and the program overview.

5.2.2 Challenges & Adventures

The second category are the *Challenges & Adventures*. This category is crucial in light of this research, because upon completion of a fitness challenge, the users are rewarded with badges and scores that feature their names on leader boards, and sometimes even on virtual podiums. The inclusion of such game features can be a motivating factor in itself, which further encourages users to compete against each other, all in an attempt to become fitter. Furthermore, there are also individual adventures. Taken together, they reflect various self-tracking modes that were discussed in the previous sections.

5.2.2.1 Virtual Premium Challenges

There are 12 Challenges & Adventures divided into four sections. The first are three Virtual Premium Challenges. As the name suggests, only users with the Fitbit Premium account can start those, yet they can invite non-Premium account holders to join. The challenges are as follows:

Get Fit Bingo[31]. The goal is to be the first to bingo. Once a user completes the action on the tile, they flip it, and once a winning pattern is formed, they hit bingo. The tiles include amount of steps, active minutes and distance. The player accumulates those by performing physical activity which is recorded with a Fitbit tracker, smartwatch or a MobileTrack[32]. The more active they are, the more tiles they can flip, and the closer they are to beating other players and winning. Throughout the challenge, players can access the leaderboard to see how they perform against others. The game offers incentives in the form of bonus tiles that encourage users to keep on playing, which indirectly may nudge them to exercise. The bonus tiles include a *free flip* of one of the tiles without completing the activity goal, a *free swap* of any two tiles, a *free activity* where the player is rewarded with extra steps, active minutes or distance, which helps them to flip more tiles in a shorter period of time, and a *shortcut* that reduces the activity goal needed to flip a tile (see Figure 5). All in all, such subtle nudges may change user's perception about physical activity, which in turn, can influence their performance of the activity itself. For example, by receiving a free flip or free swap bonus tile, the user does not have to engage in physical activity at all to progress in the game. This implies that exercising is secondary to competing in the game, and that the board can be partly completed without engaging in any physical activity at all. That may contribute to a higher retention of competitive players in the game who want to win by all means necessary.

[31] https://www.youtube.com/watch?v=qlK_NL75qR8
[32] https://help.fitbit.com/articles/en_US/Help_article/1875.htm

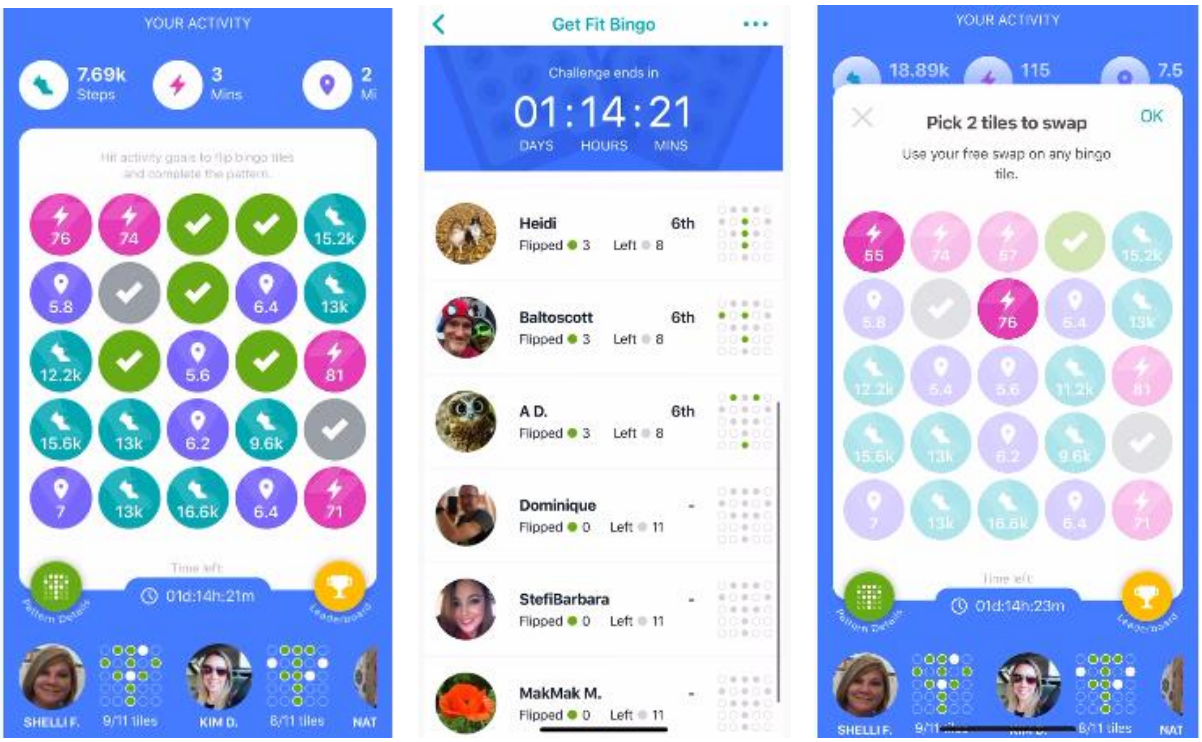

Figure 5. Examples from the Get Fit Bingo challenge. From left to right: the main dashboard, a leaderboard, and the bonus.

Custom Challenge. As the name suggests, the player starting this challenge can choose whether the focus will be on steps, active minutes or distance. Next, they determine the duration and invite friends and other participants to join. Whoever walks the most steps, accumulates the most active minutes or reaches the longest distance before the time runs out, wins. As of now (July 2020), there is a temporary stimulus when players take part in the active minutes challenge in the form of bonus active minutes. Only players taking part in this challenge can be awarded additional minutes. This helps them to reach their goal sooner, but it does not alter their statistics outside of the challenge. Similarly to Get Fit Bingo, the actual exercise becomes secondary to winning the active minutes challenge, as the bonus active minutes boost the user's statistics without engaging in any extra physical activity.

All for One. In contrast to the previous two challenges, the focus here is on collaborating rather than competing. The user setting up this challenge, can choose whether to focus on steps, active minutes or distance, and a time frame in which to complete the challenge. Once they invite other participants, Fitbit generates a goal for the whole team based on individual's average statistics, for example, a goal of 70,000 steps to be reached within six days for a team of four participants. Just like in the Custom Challenge, there is a bonus when taking part in the active minutes challenge. The difference here is that the extra minutes accumulated by each

player contribute towards reaching the team goal, and not the individual one. As previously mentioned, the All for One challenge reflects the communal self-tracking mode (Lupton, 2014b). A collaborative effort made by all participants indicates that users are striving to reach a common goal, supporting each other along the way, and sharing their findings. The results of each user are displayed in the challenge as a loading bar and a percentage (see Figure 6). Such an accessible visualization technique helps other players see how far they are from reaching a team goal, and how much each player has contributed. This may introduce a competitive element, where the user does not want to appear as 'the loser,' yet again prioritizing winning over exercising.

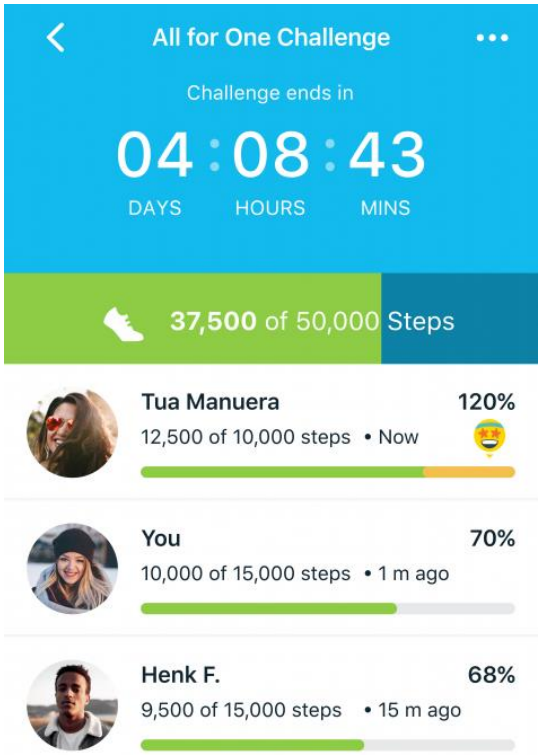

Figure 6. The All for One challenge dashboard.

Common characteristics across all Virtual Premium Challenges include the duration of the challenge, between one hour and 30 days, and the amount of participants that can join, ranging from one up to 100 users. Furthermore, there is a disclaimer in each challenge stating what aspects of one's profile are visible to other players, for example, a profile photo, name, tiles that they have flipped or activity. One can quit a challenge at any time, and also take part in several challenges simultaneously.

5.2.2.2 Challenges

The second section are the *Challenges*. The amount of participants is limited from one or two, up to maximum 10, indicating that these are best suited for friends and family. To encourage more people to join, the Fitbit friends that one invites can further invite their friends. This reflects a snowball sampling technique which mimics a chain reaction where existing participants recruit their acquaintances to join. All of the Challenges are related to the step count, yet their time limit differs. *Goal Day* is about reaching one's daily goal, and is the only challenge that can be carried out solo. Even if several players join, their target goals vary, as they are calculated based on personal achievements. *Daily Showdown* is a challenge that focuses on taking the most steps in a single day. *Weekend Warrior* is based on the same premise, but its duration extends over Saturday and Sunday. And lastly, the *Workweek Hustle* focuses on taking the most steps between Monday and Friday. Upon completion, the user can unlock a trophy once they satisfy particular criteria. For example, there are two trophies in the Daily Showdown, that is, *'Land 1st place and you'll land this trophy.'* and *'Outdo your Personal Best to get this trophy.'* In the Weekend Warrior, on the other hand, the options are as follows: *'Be the weekend winner to bring this one home,' 'Do better than your best to win this award,'* and *'Crush your goal both days to earn this one.'* Such an infrastructure, yet again pushes users to strive for better results and beat their personal best records, instead of earning a particular trophy only once. According to Fitbit, these challenges are best suited for 'deadline-driven steppers' and friends in different time zones[33].

5.2.2.3 Solo Adventures

The third section are the *Solo Adventures*. These are non-competitive, single player challenges, where users can digitally walk along three virtual tracks that have their counterpart in the offline world, namely, in the Yosemite National Park in the United States[34]. The trails

[33] https://blog.fitbit.com/challenges/

[34] For a brief amount of time there was also the *TCS New York City Marathon* Fitbit Adventure (https://blog.fitbit.com/lace-up-your-sneakers-for-fitbit-adventures-tcs-new-york-city-marathon/) that included three tracks, that is, NYC 3.1 Miles (8,000 steps), NYC 10 Miles (24,000 steps) and NYC 26.2 Miles (57,000 steps). While no official announcement was made by Fitbit as to why those adventures were removed, users expressed their opinions in the community fora that they deserve some kind of explanation, whilst blaming Fitbit for lack of transparency (https://community.fitbit.com/t5/Feature-Suggestions/Bring-back-the-New-York-adventures/idc-p/2925901#M182081). This move seems counter-intuitive to their needs, as many have been asking for more adventures, not less, even providing suggestions for new tracks. Some

include Vernal Falls[35] (15,000 steps), Valley Loop[36] (35,800 steps) and Pohono Trail[37] (62,500 steps). Just like in a video game, in order to progress to the next level, a player must complete a level of a lower rank. Hence, to unlock the Valley Loop track, the user must first complete a hike through the Vernal Falls. The main aim of the Solo Adventures is to finish a given trail while enjoying scenic landmarks along the way.

The fitness journey that one undertakes, is filled with a number of interactive and educational features. The aforementioned scenic *Landmarks* indicate important milestones. When a player reaches such a Landmark, they are awarded with peaks and vistas. In addition, the aesthetic aspect is highly valued, as the 180° pictures are taken by a world renowned photographer Chris Burkard. Next, are the *Treasures*. Described in the app as the *'fun tokens of wisdom,'* Treasures can be anything from fun facts about a given trail and a brief note about a particular health aspect, to nutrition tips, quiz questions, and mini fitness challenges (see Figure 7). Upon collection of all of the Treasures, the player is rewarded with a special badge, beside the standard one they receive for completing the trail. While the Solo Adventures are not competitive, Fitbit nudges users to exercise through a feature called *Daily Destination*. It displays a challenging, yet achievable amount of steps to be reached on a given day. This is calculated based on user's seven-day average. Once the Daily Destination is achieved, the next day's distance is increased, encouraging the user to walk more over time. It is not compulsory to reach one's Daily Destination, as there are no rewards or punishments awaiting the player. Yet, such incremental nudges introduced in the form of almost insignificant tweaks in behaviour, are meant to encourage users to strive for more, with the aim that in the long run, this produces positive effects on their health. Therefore, apart from reaching a set step goal within the challenge, the Treasures act as additional motivating factors.

users made an attempt at finding answers for themselves, others asserting that because Tata Consultancy Services (TCS) still remains a primary sponsor of the event, Fitbit's decision to remove NYC Marathon trails leaves them even more puzzled. TCS have signed an eight-year partnership in 2014 for the marathon title sponsorship with its organizers, the New York Road Runners (NYRR) (https://www.tcs.com/tcs-sponsorship-new-york-city-marathon). A change in the sponsorship could have been a reason to terminate the contract with Fitbit, but because no such change has occurred, the users cannot find a reasonable explanation for the removal of the adventures.

[35] https://www.nps.gov/yose/planyourvisit/vernalnevadatrail.htm

[36] https://www.nps.gov/yose/planyourvisit/valleylooptrail.htm

[37] https://www.yosemite.com/what-to-do/pohono-trail/

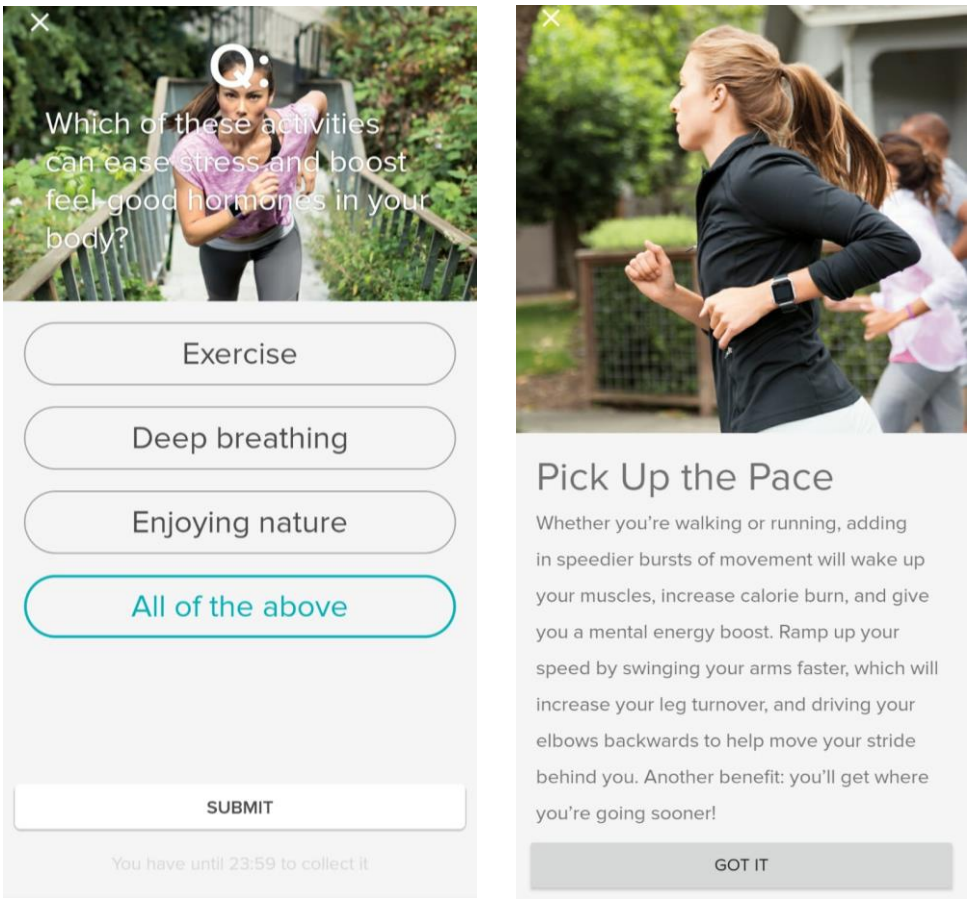

Figure 7. Examples of Treasures including a quiz question and a fitness tip.

The whole journey is documented in a *Journal* under the 'Messages' tab. It resembles a chat box with notifications about Landmarks, Treasures, tips and challenges that appear once the player progresses through the trail. Additionally, Fitbit solo adventures are an example of the private self-tracking mode (Lupton, 2014b), where the players are presented with the aim to improve their health and become more self-aware, by enjoying the virtual trails, learning new facts about health and fitness and reaching their Daily Destination. Fitbit frames the Solo Adventures as a very relaxed and informal way to exercise, as opposed to following a scheduled workout routine in a disciplined manner that users perceive as something they must do, rather than what they want to do. While the initial premise is to improve one's health through self-tracking, here in the form of a challenge, the infrastructure and design offered by Fitbit allow participants to share their results with other fitness enthusiasts, making it a communal activity. Yet this aspect is only reserved to users who decide to publish their results either in their feed section or elsewhere, and therefore, make this communal intentionally. Otherwise, the solo adventures reflect a private self-tracking mode (Lupton, 2014b).

5.2.2.4 Adventure Races

The last section under Challenges & Adventures section are the *Adventure Races*. They are a multi-player variation of the Solo Adventures, where up to 30 friends can compete against each other. There are only two trails available, namely, the Valley Loop (35,800 steps), and the Pohono Trail (62,500 steps), the two longer ones also available for the Solo Adventures. Here, on the other hand, the goal is be the first one to cross the finish line. While some features remain the same, like the Landmarks and the Journal, others, like the Treasures are not available in the adventure races. But to stay in touch with one's opponents, while trying to beat them, users can send each other messages, and can also view other player's position on the trail. Once a player wins, he or she appears on the podium under the 'Map' tab, together with users achieving second and third place. Furthermore, there is a 'Rank' section where a player's name appears once they finish the trail and sync their data before the race ends.

The Adventure Races are a reflection of the communal self-tracking mode (Lupton, 2014b), where the social aspect plays a crucial role in encouraging users to collectively strive to become fitter. Platforms such as Fitbit offer an infrastructure for interacting with others via Chat, Feed and Challenges, thereby encouraging the social engagement among its members. "Fitbit data shows that users with friends on the Fitbit platform take, on average, 700 more steps than users without friends." Furthermore, according to an internal study by Fitbit "users who have participated in both Fitbit Adventures and Challenges walk 2,000 more steps per day than users who have not been in a Challenge." (Kosecki, 2017).

While there are several widely known shortcuts and bonuses offered to players across the Challenges & Adventures with the aim of keeping them in the game, there is also an extensive list of tips that can help those extra competitive members win at a lower cost. For example, in order to lead in the step challenges like the Daily Showdown, Workweek Hustle, or the Adventure Races users must update their devices regularly by switching off 'Do Not Disturb' option, and by switching on low battery, step goal milestones, all-day sync option, and cheers and taunts notifications (Kosecki, 2018). The latter are supposed to tease others and motivate them to keep going, yet as expressed by the Fitbit community[38], the word 'taunt' has negative connotations for many users and should be removed altogether. Next, by enabling the 'Reminders to Move,' individuals are nudged to walk additional steps. According to statistics

[38] https://community.fitbit.com/t5/Feature-Suggestions/Remove-taunt-button/idi-p/774788

published on the Fitbit blog[39], 250 steps is the minimum amount one should walk in an hour, which takes about three minutes. If this is not achieved, one's smartwatch or Fitbit tracker can send *'gentle vibrational nudge'* 10 minutes before each hour is up, further encouraging users to stay active. Moreover, by multi-tasking, that is walking while carrying out mundane daily activities like brushing teeth or talking on the phone, one can easily increase their step count, and by interacting with one's rivals through viewing their goal progress, achievements, chatting and cheering, the user becomes more engaged in the competition. Contrary to some of the user's ideas, there are also few tactics that do not yield any results. They include shortening one's stride length, as this does not influence the overall step count, but is only used to calculate the distance, and entering the steps manually, which will not contribute to leader boards or challenges (Kosecki, 2018). Overall, such strategies are directed at advancing players' position in the game, and not directly encouraging them to engage in physical activity.

5.2.3 Workouts

The third category are the *Workouts*. There is a number of sections available here, depending on the type of the workout offered (*Dance Cardio and Kickboxing, Yoga*), or the area of the body it targets (*Abs and Core*). Other sections include exercises that can be done at home, do not require equipment, or last less than 15 minutes. There is also a series of videos for children. All the workouts are labelled according to their difficulty level (easy, medium, hard), and almost all of them are in a video format. If a workout does not feature the Fitbit or Fitbit Coach logo, it was introduced to the app via partnership with well-known fitness studios like Physique 57[40] or fitness apps like Aaptiv[41] and Down Dog[42], all of which have an extensive offer of online workouts on their own platforms. The exception to video workouts are *Audio Workouts* where users are vocally guided and motivated through their cardio sessions, focusing

[39] https://blog.fitbit.com/sit-less-move-more-with-hourly-activity-stationary-time-tracking/
Furthermore, sitting for prolonged periods of time is closely related with a range of negative effects on one's health, leading to an increased risk of cardiovascular disease, diabetes and cancer. All of those outcomes are independent of performing a physical activity (Biswas et al., 2015), which is why it is so important for sedentary workers to reduce those risks by stepping away from their desks regularly and walking even for few minutes at a time. Additionally, this reflects pushed self-tracking mode (Lupton, 2014b), where individuals are persuaded to monitor their activity in response to the outside stimuli, namely, the employer, who wants to promote active lifestyle and increase productivity in the workplace. This often yields a win-win situation for both parties, as the employees are rewarded with discounts on health insurance premiums, hotel stays, flights etc., in return for tracking their physical activity.
[40] https://physique57.com/
[41] https://aaptiv.com/
[42] https://www.downdogapp.com/

on breathing (*Breathe In, Breathe Out*), keeping a positive mind set (*Cheering You On*) or building up speed and intensity (*Incoming Intervals, Sprint to GR8NESS*). Only subscribers of the Fitbit Premium account can avail of this last option, but in all other categories there are many free videos that can be accessed by everybody. There are no badges or points awarded in this section, but users are being guided by well-known fitness instructors, which underlines presence of the 'star power' that helps to capture their attention (Thrall et al., 2008).

5.2.4 Mindfulness

The fourth category is *Mindfulness*. Its structure closely resembles the Workouts, with sections of different types of mindfulness including only audio files about *Mindful Minutes, Meditations for Sleep, Mindful Meals,* and *Relaxing Sounds* etc. A section called *Boost Body Positivity* reflects the aforementioned Audio Workouts, which are only available to Fitbit Premium subscribers. The remaining sections offer a combination of free and paid audio guides, which were introduced in cooperation with other meditation apps, such as Ten Percent Happier[43], Breethe[44] and Aura[45]. The audio guides vary in length and target both physical aspects such as breathing and digestion, and mental states like stress and anxiety. They focus on the care of the self, and on improving one's body and mind.

5.2.5 Health & Fitness Stats

The last category are *Health & Fitness Stats*. There is a number of tiles, such as *Wellness Reports, Sleep, Exercise, Heart Rate, Hourly Steps, Female Health, Weight, Water* and *Food*. They act as widgets that can be added to one's profile, in order to keep track of that specific parameter. While some require a Fitbit device to measure heart rate or hourly steps, others serve as a journal, where users can manually record their food and water intake, or keep track of their weight. They can set various goals for themselves, get reminders and view statistics about their physical activity and nutrition. Easy to understand, hence very accessible, yet detailed visualizations provide individuals with an overview of their health. This is a reflection of the private self-tracking mode (Lupton, 2014b), where users voluntarily engage in health monitoring activities. In addition, while all of the tiles are optional, the presence of exactly

[43] https://www.tenpercent.com/
[44] https://breethe.com/
[45] https://www.aurahealth.io/

those tiles and their affordances establishes the Fitbit app as the governing body who indicates which parameters are important, and which are irrelevant for cultivating self-awareness. Moreover, one can be self-aware in a very particular way, that is, in a quantified manner, which further shapes how the notion of ‘healthy’ should look like in the minds of the Fitbit users.

6. Conclusion

The main goal of this research was to investigate how users of the fitness app Fitbit were nudged to engage in physical activity. In doing so, I have adopted the walkthrough method to examine different self-tracking modes, in particular private, pushed and communal self-tracking, and how the characteristics of each were evident in the Fitbit app. Next, I have discussed how the care of the self, as outlined by Foucault, was materialized via gamification. Lastly, I have assessed gamification features, such as badges, trophies, leader boards etc., and their role in encouraging Fitbit users to exercise.

I found that private self-tracking is the most common mode of quantifying one's health, and that the motivation to self-track comes from the individuals themselves. The portrayal of self-tracking in the media as well as online, often depicts this private mode. A pushed self-tracking was in stark opposition to the private one, as the incentives behind monitoring one's health differed. It was often implemented in the workplace to improve employees' productivity, where they were rewarded with vouchers and health insurance premiums, in exchange for wearing a Fitbit tracker and allowing their employers to have access to their data. The third mode was related to a communal self-tracking, where users often shared their results on SNSs and fitness fora in order to connect with like-minded people and support each other. Yet their digital presence in the eyes of other members was often verified by the popularity principle (Van Dijck, 2013), where the visibility of each user was quantified through the number of Friends, Cheers and Comments they had. This was supposed to determine their online value, but the popularity criterion is questionable, as having more friends or comments does not mean that someone is more valuable than others.

Next, I have outlined how the care of the self was manifested through gamification, and that technological capabilities of today highlight people's preoccupation with taking care of their health. A possibility of receiving a quantitative feedback that is also visualized using graphs is an attractive feature when self-tracking. The choice of both hardware and software to monitor one's activity is always related with a certain level of control over the user, but the user might not always be aware of all of the ways their behaviour is shaped by such instruments of control. This is a point of concern, because the average user may take at face value what is offered by an app, instead of considering its implications and intended uses as outlined by the developer in their Terms of Service. For users, this may result in using the app for the wrong reasons, where they are nudged by developers to engage in activities they did not set out to do at first,

for example, tracking more health parameters than they initially intended, because according to Fitbit, more data can provide a more detailed overview of their health.

Lastly, by analysing different gamification features, such as bonuses, badges, and their affordances, I found out that while many users may perceive them as fun and motivating, their underlying principles are completely different. From the perspective of the app developer, such bonuses may increase users' activity in the app, because they are determined to finish a board game and win, but from the users' view, such affordances allow them to advance in the game without performing any physical activity at all. This puts an emphasis on competing, rather than on promoting physically active lifestyle, with the latter being part of Fitbit's mission statement. It further highlights that the role of gamification in the app is twofold. While most users may initially start playing to exercise, some of them later concentrate on playing to win, shifting the focus away from what this health and fitness app ought to promote.

Possible shortcomings to my research relate to methodology. In order to have a more coherent and comprehensive view of the Fitbit app, I would proceed with all the steps of the technical walkthrough, including the discontinuation of use. This can highlight a number of important points about the app, including the ways in which developers can obtain value from users after they no longer avail of the app's services, what happens with their data, and whether it is sold to third-party companies and data miners. In addition, the scope of this research could have been extended by exploring the privacy issues that Fitbit users face at any stage of the walkthrough method, or the minimum amount of personal information they have to disclose to be able to use different features of the app. These are only some of the topics that could have been discussed, given more time.

This research presented a critical analysis of only one fitness app, but everyday users around the world access many different apps for different purposes. With the concluding points in mind, I think that we should take a more critical stance more often, especially towards the apps that we use ourselves. The questions that we can ask include, for example: *Who are the actors here?; Is the focus on the users, admins, group moderators or the app's developers etc.?; What is their role in the app?; What are they allowed to do and how are they constrained by the app's design?*

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