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DOI (link to publication from Publisher):
10.54337/aau478414012

Publication date:
2021

Document Version
Publisher's PDF, also known as Version of record

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DISSERTATION SUBMITTED 2021

AALBORG UNIVERSITY
DENMARK

PRACTICE THEORY APPROACH TO WEARABLE TECHNOLOGY. IMPLICATIONS FOR SUSTAINABILITY

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ISSN (online): 2246-123X
ISBN (online): 978-87-7573-970-7

Published by:
Aalborg University Press
Kroghstræde 3
DK – 9220 Aalborg Ø
Phone: +45 99407140
aauf@forlag.aau.dk
forlag.aau.dk

Printed in Denmark by Rosendahls, 2022

ENGLISH SUMMARY

Wearables are design pieces coupled with technology that can be worn on one's body (Seymour and Beloff, 2008), such as a fitness tracker, or a swimsuit that measures a level of ultraviolet. As a rule, this kind of technology provides measurements and data exchange between a user's body and the environment around them (Malmivaara 2009). Though wearables have been known for quite a while (Ugur, 2013: 16), their recent development has reached an unprecedented scale in terms of functions and digital connectedness offered to their users (Wissinger, 2017: 1). As a result, wearable technology has penetrated various industries, including medicine, entertainment, gaming, fitness, and fashion.

Initially, wearable technology was met with enthusiasm on both the consumers' and producers' sides: the technology seemed promising in terms of lifestyle improvement (Ledger and McCaffrey, 2014), particularly physical activity increases and health monitoring. Implications for consumers regarded as vulnerable, such as elderly (Teixeira et al., 2021; Tun et al., 2021; Kekade, 2018), disabled (Anaya et al., 2020; Noamani et al., 2020; Allen et al., 2021; Lee et al., 2016), and patients with health problems (Franssen et al., 2020; Channa et al., 2020) have been emphasized. From the producers' perspective, the market of wearables represented a new niche with a high revenue potential (Dehghani et al., 2018; Dunne, 2010). Meanwhile, recent research and market trends might suggest that few of these expectations have actually come true.

On the one hand, an analysis of interconnection between the use of wearables and life quality increase has not yet been conclusive (Ridgers et al., 2021; Gal et al., 2018). For instance, there is critique over stress that can result from constant monitoring by wearables (Lupton, 2016; Moore and Piwek, 2017; Goodyear, 2017). Dataveillance, or a situation when one's personal data are used by corporations for commercial purposes (van Dijck, 2014; Lupton and Williamson, 2017) has also raised major concerns. On the other hand, there is a high abandonment rate among wearables' users (Ledger and McCaffrey, 2014; Attig and Franke, 2020; Fadhil, 2019), and the reasons range from dissatisfaction with measurements' accuracy to poor aesthetics (Brandao, 2016; Coorevits and Coenen, 2016). On the production side, wearables' sales volumes performed by start-ups have fallen far below expectations (Dehghani et al., 2018; Page, 2015; Shivery, 2018). Contrary to initial prospects, the goal of winning the market with one killer application turned out unachievable (Dehghani et al., 2018; O'Neill et al., 2003). So far, the market of wearable technology has been dominated by technological giants like Apple and Fitbit that can constrain market entry for smaller and less experienced players (O'Connor and Rice 2013; Oderanti and Li 2018). To sum up, previous research addresses that wearable technology might have a controversial impact on life quality of their users due to stress over monitoring and data theft; these devices turn out to have a short lifespan as they are quickly abandoned by consumers; and the market of wearables has been dominated by large players, while small-scale entrepreneurs struggle to survive.

These trends might be interpreted as a disturbing indicator of wearables' unsustainability in social, environmental and business terms, respectively (Purvis et al., 2019; Moldan et al., 2012; also Gurova et al., 2020). Yet, when approached from this perspective, there is a set of pre-defined criteria that reduces sustainability to certain fixed expectations (Silva and Figueiredo, 2017, 2020) and, hence, labels wearable devices as unsustainable. Meanwhile, there has been a call for a more diversified and nuanced view on sustainability (Silva and Figueiredo, 2017, 2020). To answer this call, this study discusses sustainability of wearable technology within a practice-based paradigm (Shove et al., 2012;

Warde, 2005). Specifically, it links the concept of sustainability to concrete activities (practices) with wearable technology carried out on a daily basis. This way, sustainability is taken not a set of pre-calculated characteristics that need to be achieved (Silva and Figueiredo, 2020), but as a phenomenon that occurs in the process of enactment and reproduction of practices (Shove, 2003). In contrast to previous research, the blame for unsustainable consumption or business failures (Guler et al., 2016; Dunne, 2010; Attig and Franke, 2020) is shifted from wearables to practices that are shaped by various factors, such as a context, availability of skills and material infrastructure, relations to other practices, and loyalty to a given practice, among others.

To create an encompassing picture of the market of wearable technology, this study looks at practices of both producers and consumers (Shove and Pantzar, 2005). In the former case, I scrutinize how small entrepreneurs have been commercializing their wearables in the market. While previous research elucidates design and manufacturing processes (Dunne, 2010), I prioritize the practice of commercializing, or an activity aimed at bringing a wearable into the market. Expert interviews with wearable entrepreneurs from the USA, Russia and Europe were conducted to collect data for this part of the study.

For the consumer side of the question, two groups of users were selected: consumers age 50+, and families with children. In previous consumer research, both groups have frequently been approached indirectly through their guardians (parents, relatives, doctors) (Al-Khafajiy et al., 2019; Duran-Vega et al., 2019; Oygür et al., 2020; Dardanou et al., 2020). The majority of research on mature consumers and wearables emphasize health-related issues (Cao et al., 2021; Ahmad et al., 2020; Kekade et al., 2018), thus, creating a one-sided perspective on this consumer group. Meanwhile, the need for child-centered research in consumer studies has been raised for a long time (Grønhøj and Gram, 2020). Data on the first-hand experiences of age 50+ consumers were elicited through semi-structured interviews. In cases of families with children, data were collected through diaries (audio, video and written) coming from children and parents. For both cases, the contexts of Russia and Finland were chosen, and a comparison was carried out across the countries.

In order to avoid a limited approach to practices as performances (Shove et al., 2012) of concrete producers and users, this study ‘zooms out’ (Nicolini, 2012) to more general patterns of a practice conduct referred to as practices-as-entities (Shove et al., 2012) and exemplified by media discussions on the use of wearables. I conceptualize portrayal of wearable technology in media as imaginary practices that can eventually become a template for wearables’ users and producers (Delgado et al., 2012; Lupton, 2017). Data from media supplements empirically collected data from the interviews and diaries.

By studying the sustainability of wearable technology through the lens of practice theory, this study contributes to the ongoing debate on wearables. The focus on daily use that depends on various factors offers a balanced view on the technology in question as opposed to the pessimistic ‘gloom and doom’ (dataveillance, stress of constant measurement) and over-optimistic ‘hype and hope’ (health improvements, higher physical activity) perspectives (Ouchchy et al., 2020) which often reach the public. The dynamism of the concept of sustainability is also considered by looking at different contexts for practices: this way, the study departs from a ‘one size fits all’ concept (Jucker, 2002; Schader et al., 2014), and demonstrates that the same practices can link to sustainability in a different way.

DANSK RESUME

Bærbar teknologi – *wearables* – er designprodukter kombineret med teknologi, der kan bæres på ens krop (Seymour and Beloff, 2008), såsom en fitness tracker eller en badedragt, der måler niveauet af ultraviolet lys. Som regel leverer denne form for teknologi målinger og dataudveksling mellem brugerens krop og miljøet udenom (Malmivaara 2009). Selvom bærbare teknologier har været kendt i et stykke tid (Ugur, 2013: 16), har de i den seneste udvikling nået en hidtil uset skala med hensyn til de funktioner og de digitale muligheder, de tilbyder deres brugere (Wissinger, 2017: 1). Som resultat er bærbare teknologier slået igennem i flere forskellige brancher, herunder medicin, underholdning, spil, fitness og mode.

I starten blev bærbar teknologi mødt med entusiasme fra både forbruger- og producentside: teknologien virkede lovende med hensyn til livsstilsforbedringer (Ledger og McCaffrey, 2014), især inden for forøgelse af fysisk aktivitet og sundhedsovervågning. Fordelene for såkaldt sårbare forbrugere, såsom ældre (Teixeira et al., 2021; Tun et al., 2021; Kekade, 2018), handicappede (Anaya et al., 2020; Noamani et al., 2020; Allen et al., 2021; Lee et al., 2016) og patienter med helbredsproblemer (Franssen et al., 2020; Channa et al., 2020) er blevet fremhævet. Fra et producentperspektiv repræsenterede markedet for bærbar teknologi en ny niche med et højt potentiale for afkast (Dehghani et al., 2018; Dunne, 2010). Nyere forskning og markedstendenser tyder imidlertid på, at kun få af disse forventninger faktisk er gået i opfyldelse.

På den ene side har en analyze af koblingen mellem brugen af bærbar teknologi og stigning i livskvalitet endnu ikke vist sig entydig (Ridgers et al., 2021; Gal et al., 2018). For eksempel er der kritik af stress, der kan skyldes konstant overvågning fra teknologien (Lupton, 2016; Moore og Piwek, 2017; Goodyear, 2017). *Dataveillance* – dataovervågning, en situation, hvor ens personlige data bruges af virksomhederne til kommercielle formål (van Dijck, 2014; Lupton og Williamson, 2017) – har også givet anledning til stor bekymring. På den anden side er der en høj kassationsprocent af produkterne blandt brugerne (Ledger og McCaffrey, 2014; Attig og Franke, 2020; Fadhil, 2019), og årsagerne spænder fra utilfredshed med nøjagtigheden i målingerne til ringe æstetik (Brandao, 2016; Coorevits og Coenen, 2016). På produktionssiden har salgstallene for bærbar teknologi fra nystartede virksomheder været langt under forventning (Dehghani et al., 2018; Side, 2015; Shivery, 2018). Drømmen om at vinde markedet med et enkelt stjerneprodukt viste sig at være uopnåelig (Dehghani et al., 2018; O'Neill et al., 2003). Indtil nu har markedet for bærbar teknologi været domineret af teknologiske giganter som Apple og Fitbit, der kan begrænse adgangen til markedet for de mindre og de mindre erfarne spillere (O'Connor og Rice, 2013; Oderanti og Li, 2018). Opsummerende kan man sige, at hidtidig forskning har omhandlet det forhold, at bærbar teknologi kan have en kontroversiel indvirkning på brugernes livskvalitet på grund af stress over overvågning og bekymring om datatyveri; produkterne viser sig at have en kort levetid, da de hurtigt opgives af forbrugerne; og markedet for bærbare produkter har været domineret af store aktører, mens små iværksættere kæmper for at overleve.

Disse tendenser kunne tolkes som en foruroligende indikator for manglende bæredygtighed for bærbare produkter, i henholdsvis social, miljømæssig og forretningsmæssig henseende (Purvis et al.,

2019; Moldan et al., 2012; også Gurova et al., 2020). Når man imidlertid ser sagen fra en bæredygtighedssynsvinkel, er der et sæt foruddefinerede kriterier, der reducerer bæredygtighed til bestemte faste forventninger (Silva og Figueiredo, 2017, 2020) og derfor klassificerer bærbare produkter som ikke-bæredygtige. Der har imidlertid været et ønske om et mere diversificeret og nuanceret syn på bæredygtighed (Silva og Figueiredo, 2017, 2020). Som svar på dette ønske diskuterer denne undersøgelse den bærbare teknologis bæredygtighed inden for et praksisbaseret paradigme (Shove et al., 2012; Warde, 2005). Konkret forbinder undersøgelsen begrebet bæredygtighed med en konkret aktivitet (praksis) med bærbar teknologi, der bruges dagligt. På denne måde betragtes bæredygtighed ikke som et sæt forudberegnede karakteristika, der skal opfyldes (Silva og Figueiredo, 2020), men som et fænomen, der opstår i processen med anvendelse og reproduktion i praksis (Shove, 2003). I modsætning til tidligere forskning flyttes skylden for ikke-bæredygtigt forbrug eller forretningssvigt (Guler et al., 2016; Dunne, 2010; Attig og Franke, 2020) fra de bærbare produkter til praksis, formet af forskellige faktorer som fx kontekst, tilgængelighed af færdigheder og materiel infrastruktur, forhold til anden praksis, loyalitet over for en given praksis, osv.

For at skabe et samlende billede af markedet for bærbar teknologi ser denne undersøgelse på praksis hos både producenter og forbrugere (Shove og Pantzar, 2005). I førstnævnte tilfælde undersøger jeg, hvordan små iværksættere har markedsført deres bærbare produkter. Mens tidligere forskning belyser design- og fremstillingsprocesser (Dunne, 2010), prioriterer jeg markedsføringspraksis eller aktiviteter, der sigter mod at bringe et bærbart produkt på markedet. Ekspertinterviews med iværksættere inden for bærbar teknologi fra USA, Rusland og Europa blev gennemført for at indsamle data til denne del af undersøgelsen

Hvad angår forbrugersiden, blev der udvalgt to grupper af brugere: 50+-forbrugere og familier med børn. Begge grupper er ofte blevet behandlet indirekte, gennem deres omsorgspersoner (forældre, pårørende, læger) (Al-Khafajiy et al., 2019; Duran-Vega et al., 2019; Oygür et al., 2020; Dardanou et al., 2020). Størstedelen af forskningen om modne forbrugere og bærbare produkter lægger vægt på sundhedsrelaterede spørgsmål (Cao et al., 2021; Ahmad et al., 2020; Kekade et al., 2018) og skaber dermed et ensidigt perspektiv på denne forbrugergruppe. Samtidig har der længe været talt om behovet for forskning i forbrugerstudier, centreret om børn (Grønhøj og Gram, 2021). Data om førstehåndsoplevelser hos 50+-forbrugere blev indsamlet gennem semistrukturerede interviews. For børnefamiliers vedkommende blev data indsamlet gennem dagbøger (lyd, video og skrift) fra børn og forældre. I begge tilfælde blev Rusland og Finland valgt som undersøgelsesobjekter, og der blev foretaget en sammenligning på tværs af disse lande.

For at undgå en begrænset tilgang til praksis i form af bestemte funktioner (Shove et al., 2012) hos givne producenter eller brugere, zoomer denne undersøgelse ud (Nicolini, 2012) til mere generelle mønstre af praksisadfærd, benævnt *practices-as-entities* (Shove et al., 2012) og eksemplificeret ved mediediskussioner om brug af bærbare produkter. Jeg konceptualiserer portrætteringen af bærbar teknologi i medierne som imaginær praksis, der hen ad vejen kan blive en skabelon for brugere og producenter af bærbar teknologi (Delgado et al., 2012; Lupton, 2017). Data fra medier supplerer de empirisk indsamlede data fra interviews og dagbøger.

Ved at studere bæredygtigheden i bærbar teknologi gennem praksisteoriens linse, bidrager denne undersøgelse til den igangværende debat om bærbare produkter. Fokus på daglig brug, der afhænger af forskellige faktorer, giver et afbalanceret syn på den pågældende teknologi i modsætning til det pessimistiske perspektiv om 'dysterhed og dommedag' (dataovervågning, stress ved konstant måling) eller det overoptimistiske om 'hype og håb' (sundhedsforbedringer, højere fysisk aktivitet (Ouchchy et al., 2020). Dynamikken i begrebet bæredygtighed betragtes også ved at se på forskellige sammenhænge for praksis. På denne måde går undersøgelsen væk fra et 'one size fits all' -koncept (Jucker, 2002; Schader et al., 2014) og viser, at samme praksis kan vis vej til bæredygtighed på forskellig måde.

AKNOWLEDGEMENTS

I would like to thank my supervisor Olga Gurova for her constant guidance and support, both professional and personal. My second supervisor Malene Gram provided a lot of helpful feedback for this thesis. I am also very grateful to an adminirtartive staff of the Department of Culture and Learning at Aalborg University, particularly Marianne Ellersgaard and Jeanette Arboe for helping me with organizational matters.

PREFACE

> *Lesley pushed back her shirtsleeve, and as she reached for an olive I noticed a rubber bracelet on her left wrist. 'Is that a watch?' I asked.*
>
> *'No,' she told me. "It's a Fitbit. You synch it with your computer, and it tracks your physical activity*[1]*.*

In his comedic essay entitled 'Stepping Out: Living the Fitbit Life'[1], David Sedaris – a humorist and author – reflects how the Fitbit fitness tracker transformed his daily routine and produced completely new encounters. In quite an ironic manner, Sedaris (2014) recalls how, thanks to his Fitbit, he was drawn into conversations with complete (and sometimes spooky) strangers, experienced seeing a cow in labor and even managed to overcome his long-time fear of snakes. Due to this last one, he began carrying around a special pole with a "claw-like" mechanism, originally designed to grab litter. Naturally, he ended up collecting garbage around the neighborhood, so that the local council even decided to name one of the garbage trucks after Sedaris. Then, suddenly, his Fitbit died: *'I was devastated when I tapped the broadest part of it and the little dots failed to appear. Then I felt a great sense of freedom. […] I lasted five hours before I ordered a replacement, express delivery. It arrived the following afternoon, and my hands shook as I tore open the box. Ten minutes later, my new master strapped securely around my left wrist, I was out the door, racing, practically running, to make up for lost time.'*

Sedaris admits that not everyone becomes so obsessed with a wearable like Fitbit. Many, he claims, actually put it into a drawer as soon as the battery dies, though re-charging or simply changing the battery is a question of a couple of minutes and dollars. Indeed, Gartner's 2016 consumer survey (Moore, 2016) revealed that 29-30% of smartwatches and fitness trackers' users abandon their wearables due to boredom. Lack of usefulness and device malfunctioning were among other popular reasons to leave the device behind (Moore, 2016).

Sedaris' story is exceptional in many ways. However, he raises a couple of extremely interesting issues connected to use of his fitness tracker. As I mentioned at the beginning, he points out how it changed his daily routine, and even recruited him into new, previously unthinkable, practices. This was one of the reasons this essay drew my attention: it is not just a dry listing of specific qualities of the wearable, but a very thoughtful reflection on manifold transformations connected to adoption of a new device.

Interestingly, Sedaris evokes – though not explicitly – a sustainability issue. On the one hand, his walker-turned-garbage-collector transformation is incredibly inspiring; on the other, he elucidates that the wearable is still a short-lived interest for many. Next, he has noticed healthy transformations in his body, but, on the other side, reminds the readers of unhealthy obsession with measurement exemplified in striving for more steps per day (with no limit).

[1] David Sedaris (2014) Stepping out. Living a Fitbit life. New Yorker, June 23, 2014. Available online: https://www.newyorker.com/magazine/2014/06/30/stepping-out-3 (retrieved 05.06.2021).

Overall, this balanced reflection offers plenty of food for thought. In this PhD thesis, I strive to shed light on similar matters: namely, how wearable technology transform practices of their users, and what repercussions these transformations bring for different aspects of sustainability, not only environmental, but also social and business. In contrast to Sedaris's very personal account, I approach these questions with scientific methods to reach out to wider user groups and gather their experiences.

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1. CHAPTER 1. INTRODUCTION

Could a swimming suit warn against a dangerously high UV level? Or could a dog's collar update the owner on their pet's health and mood? These are some of the functions that a wearable[2] —a design piece coupled with technology that can be worn on one's body (Malmivaara, 2009; Seymour and Beloff, 2008)—is already capable of carrying out. There are numerous technologies that can be labelled 'wearable': from an air-purifying dress to yoga pants that checks one's postures, wearable tech has been 'in flux' (Wissinger, 2017).

So far, wrist-worn devices (smartwatches and fitness trackers) have become the most popular type of wearable technology (Statista, 2021; Motti and Caine 2016), but there are other types of wearable products ranging in functionality and style (Seymour and Beloff, 2008). For instance, there is a dress that becomes transparent when its user becomes sensually awaken[3]. On the other end of the spectrum, there are 'regular' items, like a t-shirt that measures pulse, heartbeat, blood pressure, etc. While the dress prioritizes aesthetics over functionality and is rather a museum artifact, the t-shirt is suitable for frequent use (Seymour and Beloff, 2008). Overall, a public wearable database[4] has identified over 400 devices across different industries, including fitness, entertainment, medicine, gaming, and lifestyle. Alternatively, wearables can be categorized either based on a body part to which they are attached (e.g. legs, torso, head, etc.), or on their target group (adults, children, or even pets). Ultimately, wearable technology has been penetrating into our workplaces, study places and homes (Maltseva, 2020; Anderson and Kevin, 2017), so it is no overstatement to argue that wearables have been steadily incorporated into different daily practices.

Although wearable devices have been recognized for quite a while (Ugur, 2013: 16), the scale and 'the networked nature' (Wissinger, 2017: 1) of modern wearables reached an unprecedented scale during the 2010s. Forbes[5] and The Guardian[6] named the years 2014 and 2015, respectively, 'the year of wearable technology'. Media coverage, along with blogs and topical events, could have contributed to dissemination of specific sociotechnical imaginaries attached to wearable technology (Lupton, 2017a): for example, Time magazine nominated Google glasses as one of the best inventions of the year in 2012. Wissinger (2017) argues that the current generation of wearables has sought to overcome a rather grotesque image of a 'nerd's' or 'geek's' accessory and paved the way for their entry into the fashion industry. For example, Apple Watch was originally positioned as a fashion product. Similarly, Levi's teamed with Google to develop a smart 'Jacquard' jacket, followed by such fashion giants as Louis Vuitton, Ralph Lauren and even H&M with their own wearables.

However, a counter-narrative that criticizes wearables for being incapable of reaching expected sales numbers and receive long-lasting use has emerged (Lupton, 2017a). Despite an impressive

[2] Terms 'wearable', 'wearable technology', 'wearable device/gadget' are used interchangeably in this thesis.
[3] This is 'a fashion project that explores the relation between people and technology. Its high-tech garments are made of smart e-foils which become transparent based on the wearer's interactions with people, creating a sensual play of disclosure'. https://www.studioroosegaarde.net/project/intimacy (retrieved 04.01.2021).
[4] https://vandrico.com/wearables.html (retrieved 04.01.2021)
[5] http://www.forbes.com/sites/ewanspence/2013/11/02/2014-will-be-the-year-of-wearable-technology/#233546cc3e53 (retrieved 04.01.2021)
[6] https://www.theguardian.com/technology/2014/dec/25/apple-watch-spring-launch-wearable-technology (retrieved 04.01.2021)

technological development of wearable technology over years, only giants like Apple, Samsung, Fitbit and a few others have managed to successfully commercialize their wearable devices (Raj and Ha-Brookshire, 2016; Dehghani et al., 2018). Sales volumes of start-ups with projects on wearable technology have fallen below expectations (Dehghani et al., 2018), complicated by such factors as poor design, privacy concerns, and high product development costs. Dunne (2010) explains that wearables' manufacturing is a complex process that requires collaboration between several industries that rarely overlap. Additionally, it is argued that the fashion industry resists changes in the manufacturing process (Volonté, 2019; Dunne, 2010), whereas wearables' manufacturing requires flexibility (Dunne, 2010). Overall, contrary to initial expectations, the goal of winning the market with one killer application has not been achieved on the production side of wearable technology (Dehghani et al., 2018).

Optimistic expectations towards wearable technology have been fading on the consumer side as well. An interest towards wearables has been rooted in their promise of lifestyle improvement (Ledger and McCaffrey, 2014), particularly regarding increase of physical activity. For instance, Oura – a Finnish sleep-monitoring ring – promises to help 'understand how your lifestyle choices affect your sleep and performance[7]'. Implications for vulnerable consumers, such as the elderly (Teixeira et al., 2021; Tun et al., 2021; Kekade, 2018) and disabled people (Noamani et al., 2020; Allen et al., 2021), as well as patients with chronic diseases (Franssen et al., 2020; Channa et al., 2020) have frequently been prioritized in research. Another area where expectations of wearables' applications has been high is obesity control (Hu et al., 2020). Overall, wearable technology has been regarded as a potential means to promote social causes. For instance, UNICEF has initiated a 'wearables for good' campaign aimed at improving quality of life for children living in deprived areas (UNICEF, 2015).

However, an analysis of possible interconnection between use of wearables and life quality increase has not yet been conclusive (Ridgers et al., 2021; McCallum et al., 2018; Gal et al., 2018). Simultaneously, concerns have been raised over stress evoked by the constant monitoring by wearables as well as pressure to comply with the goals set by these devices (Lupton, 2016; Moore and Piwek, 2017). In this way, wearables have been criticized for being disciplining devices (Lupton, 2016) which generate data that can be used as a form of social currency and moral accounting (Gorm and Shklovski, 2016; Lupton, 2017). In relation to this, the Quantified Self (QS) has become a powerful concept (Lupton, 2016; Kristensen and Ruckenstein, 2018; Ruckenstein and Pantzar, 2017) that refers to individuals' constant engagement in a self-tracking activity that can result in stress. Another major concern in relation to wearables has been data theft and surveillance exemplified by the idea of 'dataveillance', when one's personal data are used by the third party, like corporations, for monitoring (Van Dijck, 2014). A radical reaction to these growing fears has been a call for an entire 'refusal to track the body' (Moore and Robinson, 2016).

Furthermore, despite the growing number of wearables shipping around the globe (Statista, 2021), there is a concern over the fact that users quickly abandon these devices. According to Ledger and McCaffrey (2014), half of the users in the U.S. leave their wearable devices behind after just six months. Other studies (Attig and Franke, 2020; Fadhil, 2019) indicate that wearables' abandonment rate has been higher relative to their usage rate. The traditional explanation for the high abandonment rates is technological 'failure' rooted in wearable devices. Reasons of consumers' dissatisfaction

[7] Official Oura webpage https://tinyurl.com/as9ncfvp(retrieved 03.09.2021)

vary, including but not limited to low usability (Fadhil, 2019; Maher et al., 2017), inaccurate measurements and data uselessness (Coorevits and Coenen, 2016; Fadhil, 2019; Fausset et al., 2013), or poor aesthetics and uncomfortable design (Harrison et al., 2015; Lazar et al., 2015). In this stream of research, a prevailing view on how to eliminate these drawbacks is 'fixing' wearable technology (Gorm and Shklovski, 2019). Recently, more studies have been acknowledging that reasons behind abandoning wearables should be sought elsewhere (Gorm and Shklovski, 2019; Kristensen and Ruckenstein, 2018; Clawson et al., 2015). Lomborg et al. (2018), for instance, argue that different users become engaged with the technology in a way that is different from originally inscribed by their developers. Overall, with wearables becoming more ubiquitous, questions about what kind of dynamics exists between wearables and daily life have been brought forward.

Further, Clawson and colleagues (2015) review advertisements selling used health-tracking wearables in the USA in order to identify the reasons behind relinquishing these devices. Drawing on approximately 1600 ads, the authors bring up a number of reasons, including getting a device as a present and thus not actually wanting it; mismatch between expectations and actual capabilities of a purchased wearable; and profound changes in users' life circumstances (health conditions, having a baby, reaching a fitness goal) (Clawson et al., 2015). Also, use of wearables can become quite emotional: as Lupton (2017a) mentions, 'users may feel enchanted by the possibilities of a wearable device, but also disappointed, guilty, ashamed or frustrated by its presence' (p. 8).

In a self-ethnographic account, Salmela et al. (2019), while digging into their reluctance of using a wearable in the bedroom, reflect on cultural norms attached to a practice of sleeping: '[Oura ring] is used during periods of sleep, a bodily practice that is itself culturally represented as highly personal, vulnerable, and culturally charged, taking place in the very private spaces of the bed and bedroom and shared only with sexual partners, young children, or companion animals, if anyone' (p. 262). Crucially, the cited studies acknowledge that there is a social and cultural dynamic that influences the context of wearables' use and, eventually, a decision to go on with the technology in question or leave it behind.

Recently, there has been a growing volume of research originating from human-computer interaction studies, sociology and anthropology that focuses on experiences accumulated through use of wearables (for a detailed overview, see Lupton, 2017a). Lazar et al. (2015), for instance, suggest that those who do keep using wearables manage to incorporate them into their daily routines and reach certain goals – an assumption that is reflected and supported in this thesis. However, what it is about these practices that makes them either friendly or hostile towards a new wearable device is left somewhat unrepresented, and the research of this thesis investigates this gap. Before elaborating further on this matter, the environmental impact of wearables deserves consideration.

Critically, the short lifespan (Evans and Cooper, 2016) of many wearables signals their high environmental impact, particularly in regards to uncertainty on how to dispose of small e-waste items (for an overview, Gurova et al., 2020). Gurova and colleagues (2020) mention that wearable technology might pose novel environmental challenges as it combines problems related to clothing or accessories and technology. To diminish their environmental impact, producers of wearables could follow a circular economy model (Stahel, 2016) or cradle-to-cradle principle (McDonough and Braungart, 2010), which prioritize a lifecycle thinking. In the case of wearables, these approaches would need to be inscribed in the product starting already from an early stage of design and lasting to the end of its life. Meanwhile, despite recent acknowledgment of environmental concerns,

producers and consumers of wearable technology have not yet adopted pro-environmental attitudes toward the products (Gurova et al., 2020).

To summarize, there has been controversy over wearable technology and devices based on it. On the producers' side, the growth of the wearable market has been slower than expected, and especially small-scale entrepreneurs have struggled. Additionally, few types of wearables (fitness trackers and smartwatches) have reached the market, though the range of devices working through wearable technology is more diverse. On the consumers' side, contrary to expectations, wearables have showed controversial results regarding their impact on life quality: for instance, wearables can evoke stress and anxiety due to constant monitoring and damage well-being instead of improving it. Finally, wearables have showed a high level of abandonment among users, which makes them a short-lived good.

This leads me to a question of how wearables and sustainability are connected. Here, I take a definition of sustainability as a 'condition of balance, resilience, and interconnectedness that allows human society to satisfy its needs without exceeding the capacity of its […] ecosystems […] to regenerate the services necessary to meet those needs' (Morelli, 2011). The patterns described in the market and consumption of wearables therefore can be interpreted as a indicators of wearables' (un)sustainability in business, social and environmental terms, respectively (Purvis et al., 2019; Moldan et al., 2012).

However, when evaluating wearables from this perspective, there is a set of pre-defined criteria that reduces sustainability to certain fixed expectations (Silva and Figueiredo, 2020) and, hence, labels wearable devices as unsustainable. Meanwhile, there has been a call for a more diversified and nuanced view on sustainability (Silva and Figueiredo, 2020) capable of capturing its diverse aspects. To contribute to this call, I propose to discuss sustainability of wearable technology within a practice-based paradigm. In this study, I suggest understanding sustainability as unfolding and manifested in the process of dynamic enactment of practices with wearables.

In a nutshell, wearable technology and wearable devices are a focal point of this research. In this study, I scrutinize a link between the use of these innovative devices and different forms of sustainability (Moldan et al., 2012). A novel feature of this work is the application of practice theory as a theoretical backbone. This framework is known for focusing on 'the dynamic that results from constellations of everyday activities or practices in relation to other practices both within the same time and space and across time and space' (Feldman and Worline, 2016: 304). Based on this assumption, I conceptualize sustainability as a phenomenon that emerges in the process of practices' enactment. Thus, in order to properly interpret it, it is necessary to consider the emergence and persistence of practices with wearables as constellations of various elements. Additionally, I place wearables within a larger picture: I discuss not only practices directly linked to wearable technology, but also zoom out to identify bundles of practices (Shove et al., 2012). These are larger complexes of related activities that can clarify a connection between use and production of wearable technology and sustainability. In what follows, I explain how I arrive at my research questions, and what potential benefits the chosen theoretical approach brings. I also explain what scholarships and debates on wearable technology and practice theory I wish to join and contribute to in this thesis.

As follows, a fundamental idea of practice theory is that various concepts like power, sustainability, identity, norms, etc. 'take on meanings as they are enacted through practices, rather than having

meaning as innate features of their being' (Feldman and Worline, 2016: 304; also Østerlund and Carlile, 2005). Hence, sustainability is taken not as a set of pre-calculated characteristics that need to be achieved (Silva and Figueiredo, 2020), but as a phenomenon that occurs in the process of reproduction of practices (Shove, 2003). This way, I intend to emphasize the dynamism of the concept of sustainability, and the way it might take on meaning in relation to practices. Another important characteristic of the practice-based approach is attention to a context (Shove et al., 2012). By considering contextual factors, I intend to depart from a 'one size fits all' concept of sustainability (Jucker, 2002; Schader et al., 2014), and demonstrate that the same practices can bear different meanings of sustainability depending on their context. It is important to note that I do not understate the discussed factors like use of resources, increase in hours of physical activity, or growth in wearables' sales, and I regard them as important for assessment of wearables' sustainability. However, I argue that there are additional aspects and interpretations of sustainability in relation to this technology that are worth considering. Specifically, I do not consider sustainability as an innate characteristic of a wearable. Instead, I focus on how a certain wearable is inscribed into a practice, and how an integration of the wearable shapes this practice. To sum up, this thesis evaluates how sustainable a wearable is through practices because I regard that sustainability is activated through an interplay of different aspects within practices: its elements, bundles, context, etc. Therefore, I argue that it is hard to evaluate sustainability of a given wearable purely based on its characteristics and in isolation from its use.

It bears mention that my approach is by no means an encompassing analysis of sustainability of wearable technology. I follow the suggestion that the practicality of theories should be sought not in their conceptual logics and labels, but rather in the questions they raise (Feldman and Worline, 2016). Weick (1989) argues that a theory's practicality derives from the way it shapes connections: 'to discover an unexpected connection is to discover a new set of implications' (p. 527). Accordingly, by implementing practice theory, I expect to uncover new nuances and interpretations of sustainability of wearable technology through its use. Therefore, practice theory is applied as a heuristic tool that might challenge the established assumptions that might be taken for granted, and, as a result, obscure less conventional views (Galvin and Sunikka-Blank, 2016).

Drawing on these assumptions, I have formulated the following research question:

> *Taken in practice-based terms, what implications for sustainability do the commercializing and use of wearable technology bring?*

On a general level, I focus on two types of practices with wearable technology: a practice of commercializing carried out by small-scale entrepreneurs, and a practice of use carried out by consumers. I approach these practices through the following concepts derived from practice theory. First, by tracing the integration of the elements of practices (Shove et al., 2012) with wearables, I intend to capture how and when a practice becomes an established routine capable of being sustained long-term. Second, I attempt to trace how the careers of wearables' users (Shove et al., 2012) within the practices develop and evolve over time. Specifically, I highlight the factors that either contribute or hamper users' loyalty towards these practices. Overall, with reference to the concept of prolonged use and lifespan (Evans and Cooper, 2016), practitioners' loyalty is understood as a proxy for sustainability that maintains users' desire for continuous use. Third, the way practices with wearable technology bundle (Shove et al., 2012) with other practices is scrutinized (Shove et al., 2012). This

way, wearable technology is located within a broader picture of daily life, and, instead of blaming wearable devices for unsustainable consumption or business failures (Dunne, 2010; Attig and Franke, 2020), I account for the factors activated via relations between practices (Warde, 2005; Shove et al., 2012).

This leads me to a question of how wearables and sustainability are connected. Here, as has been mentioned above, I take a definition of sustainability as a 'condition of balance, resilience, and interconnectedness that allows human society to satisfy its needs without exceeding the capacity of its […] ecosystems […] to regenerate the services necessary to meet those needs' (Morelli, 2011). The listed patterns in the marketing and consumption of wearables therefore can be interpreted as a indicators of wearables' (un)sustainability in business, social and environmental terms, respectively (Purvis et al., 2019; Moldan et al., 2012). I am aware that some of the analytical concepts borrowed from practice theory are better suited for explaining one specific pillar of sustainability, but taken together, they allow for a more complete picture. For a more nuanced and coherent analysis, I split the findings of this thesis into three parts, each based on its own empirics.

In a similar way, I distinguish between these aspects in my thesis by looking into production and consumption sides of the wearable market as well as into practices of different user-groups. Shove and Pantzar (2005, 2010), in their accounts of Nordic waking practices, emphasize that in order to understand how a certain practice emerges and why it takes a certain trajectory (Shove and Pantzar, 2007), it is necessary to consider both producers' and consumers' roles. The Finnish context of their research demonstrates how the practice has been institutionalized in the country through certain focal actors, such as the Finnish Sport Institute, stick producers and media (Shove and Pantzar, 2005). In contrast to their research, I am enquiring into a market that is still in the process of formation (Dehghani and Dangelico, 2017). Therefore, I am interested in understanding what players in the wearable market contribute to the shaping of practices. Dunne (2010), in her highly cited article on barriers to wearables' commercializing, discusses in detail challenges that occur on different stages of the production of wearables, followed by barriers for acceptance by consumers. Meanwhile, Dunne (2010) focuses particularly on design and manufacturing stages, whereas in this thesis, I am interested in the practice of commercializing, or a wider activity aimed at bringing a wearable into the market and finding their consumers. Following the logic of O'Neill et al. (2003), who argue that commercializing of an innovative technology might require innovative business models that are yet to be invented, I am interested in how wearable entrepreneurs commercialize their innovative devices. By focusing on the commercializing practice of wearables, I draw on the business side of sustainability (Purvis et al., 2019; Bansal and DesJardine, 2014).

Further, consumers are paramount for a practice to emerge and persist (Shove et al., 2012; Shove and Pantzar, 2007). When considering user-groups for this study, I was specifically interested in groups that has been portrayed as vulnerable. One group of consumers that drew my attention were users over 50 years of age. On the one hand, wearables have frequently been discussed as a means for their lifestyle improvement (Teixeira et al., 2021; Tun et al., 2021; Kekade et al., 2018). Importantly, research on wearables' application among mature consumers is often limited to health-related issues (Cao et al., 2021; Ahmad et al., 2020; Kekade et al., 2018). Additionally, they might be portrayed as passive recipients: for example, their experience with wearable technology is approached through a vision of relatives or guardians who track health conditions (Al-Khafajiy et al., 2019; Duran-Vega et al., 2019). By picking aged 50+ consumers, I aim to contribute to this field and offer a different angle on this group: the participants of this study do not have any significant known health conditions and

pursue an active lifestyle. This way, I intend to show how mature consumers apply wearables not designed specifically for health-related issues. Also, the participants' age bracket in this research is quite broad: from 50 to 73. I argue that studying practices of middle-aged users (40-60, sometimes up to 65) (Lachman, 2015) is important since it may elucidate how they prepare for the role of 'an older person' (Koskinen et al., 2017) which can be insightful for policy-related initiatives.

Next, wearables for children is a promising and fast developing area (Oygur et al., 2021; Garcia et al., 2018; Freeman et al., 2017). Yet, children's perspective on the use of technology has often been neglected in favor of parental views (Oygür et al., 2020; Dardanou et al., 2020). However, children nowadays have been playing a much greater role in family decision-making related to consumption (Gram and Grønhøj, 2016). As Gram and Grønhøj (2016) put it: '(W)e need to consider relational and emotional aspects of family consumption to understand what goes on' (p. 512). Hence, looking into practices of families with children might be an important contribution to consumption studies in general and practice theory in particular. Another intriguing detail is that children nowadays are frequently more immersed in technology compared to their parents, and might even act as digital facilitators by helping their parents get accustomed to technological innovations (Carrea, 2015; Katz, 2010). This assumption creates space for considering power relations within practices – a concept that has not been discussed much in the scholarship (Keller et al., 2016; for an exception, see Watson, 2016).

Another powerful agent in the market of wearable technology I wish to highlight is media. I have briefly mentioned that Shove and Pantzar (2005) take Finnish media's contribution to the shaping of Nordic walking into account. On the other hand, previous research suggests that sociotechnical imaginaries (Delgado et al., 2012) contribute to the design and eventual use of wearable technology (Lupton, 2017b). In this thesis, I intend to merge the theoretical paradigm of practice theory and findings of empirical research by conceptualizing images of wearable technology perpetuated by media as imaginary practices that can become a template for wearables' users.

Methodologically, the study relies on a set of methods: expert interviews, semi-structured interviews, diaries and scraping of media data. Data collection was carried out in different national contexts. The producers' side is represented by entrepreneurs from the EU countries, Russia and the USA. On the consumers' side, Russia and Finland are chosen for comparison. Finally, media context is studied based on data from Finnish newspapers characterized by a high level of readers' trust and growing number of subscriptions.

To make this thesis reader friendly, I further divide it into three sub-studies, based on the producers' or users' perspectives. Further, I refer to them as follows:

- Sub-study 1: Small-scale entrepreneurs from the EU, Russia and the USA and the practice of commercializing wearables;
- Sub-study 2: 50+ consumers from Finland and Russia and their practices of use of wearables (smartwatches and fitness trackers);

- Sub-study 3: Families with children from Finland and Russia and their practices of use of a newly acquired wearable (ReimaGo[8]).

The first two sub-studies correspond to Article I and Article II. They have been already published in *Journal of Consumer Culture* and *International Journal of Consumer Studies*, respectfully. The third sub-study was originally planned as the third article. However, its research was delayed by the COVID-19 pandemic. As a result, I decided to write an article on the portrayal of practices with wearables in Finnish digital media, and have submitted it as Article III. In this case, I managed to collect a larger set of data in a shorter time compared to data from the families, planned initially as an article. However, in order to cover various aspects of sustainability, I adhere to the originally planned structure of the study and include family practices with the wearable as a sub-study 3 in this thesis. Though it has not yet been developed into a journal article, I plan to do this in the future. Meanwhile, data from the articles on practices' discussion in media are used across all three sub-studies. I suggest that the portrayal of practices in media is broad and, thus, represents practices-as-entities (Shove et al., 2012), compared to individual performances (Shove et al., 2012) of practices by concrete carriers, as exemplified in the sub-studies.

With this study, I contribute to the ongoing debate on wearable technology. By focusing on the actual use of wearables, I attempt to offer a more balanced view on the technology in question as opposed to the pessimistic 'gloom and doom' (dataveillance, data theft, stress of constant measurement) and over-optimistic 'hype and hope' (health improvements, higher physical activity) perspectives (Ouchchy et al., 2020) commonly associated with wearables. Hence, I would like to bridge research on wearable technology and sustainability through a practice-based concept. This way, I offer re-considering the notion of 'sustainability' of wearable devices. With the practice-based framework, instead of 'fixing' wearables (Gorm and Shklovski, 2019), the core of the sustainability problem is searched for in the practices: their elements, constellations in certain contexts, and relations to other practices.

By including Russia, I stretch the context of research on wearables beyond the Western context that has so far dominated the field (for exceptions, Liu et al., 2017 on local and migrant elderly in China). Also, I encompass both the production and consumption sides of the wearable market: in doing so, I strive to create a balanced picture of the field without prioritizing either producers or users (Shove and Pantzar, 2005). On the producers' side, I analyze not just 'successful' examples of entrepreneurs who have managed to launch their wearable into the market, but also 'failures', or practices that have fallen apart (Shove et al., 2012). This is an addition to the literature on wearable entrepreneurs that usually focuses on businesses that persist (Usman et al., 2020; Fiorentino, 2021; Dehghani et al., 2018).

Regarding the participants of this study, I intentionally focus on age 50+ consumers and children, or the groups whose experience has often been either overlooked or studied through the experience of 'guardians' (parents, relatives, doctors). The majority of research on mature consumers and wearables elucidate health-related issues (Wang et al., 2017; Ahmad et al., 2020; Kekade et al., 2018), thus

[8] This is an activity tracker designed specifically for children. It is coupled with an online game where a child collects 'points' earned for being physically active. A detailed description of ReimaGo is available in Chapter 3, which covers the context of research.

creating a one-sided perspective on this consumer group. Meanwhile, the need for child-centered research in consumer studies has been raised for a long time (Grønhøj and Gram, 2020).

As far as practice theory is concerned, with this research, I intend to account for controversial and less-explored elements of it that are related to power (Watson, 2016; Keller et al., 2016) and media. In the former case, I explore a dynamic between parents and children within family practices. In the latter, I approach media as a powerful agent whose contribution to shaping of practices should be considered.

Methodologically, this study contributes to a discussion on how practices could be studied (Smagacz-Poziemska et al., 2020; Trowler, 2013): being a routinized activity, they are frequently carried out without much reflection (Trowler, 2012). Though there is no agreement on what is the best way to capture routines, I use multiple methods to approach practices with wearables. Throughout the process of data collection, I have attempted to stay reflective: as a result, in this thesis, I share what was successful methodologically alongside what hampered the process of data collection and analysis (Grønhøj and Gram, 2020).

1.1. THESIS STRUCTURE

This thesis has a complex structure since it is divided into three sub-studies united by the theoretical approach, but nonetheless different in terms of methods, participant groups and contexts. On a general level, each chapter is divided into sub-sections corresponding to the sub-studies of this research. In what follows, I briefly outline the thesis's structure.

I begin with an explanation of the theoretical foundation of this research in Chapter 2. Practice theory (Shove et al., 2012) defines the way sustainability is conceptualized in this study as well as how it influences my choice of methods. Therefore, I discuss the practice-based approach in general and its approach to sustainability in particular. I finalize the chapter by introducing the concept of sustainability that I apply in this study.

Afterwards, I move on to the contexts of this study (Chapter 3). I begin with a discussion of general trends in the market of wearable technology from a producers' perspective, later switching to the consumers' side. The consumers' perspective is further narrowed down to two target groups: aged 50+ consumers and families with children. Hence, these groups are discussed in detail, including specificities of the aging groups and parental styles in Finland and Russia. The chapter is finalized by a discussion of the media context in Finland.

Chapter 4 presents methodological considerations, including challenges of practice-based research in regards to how data on routines could be elicited. Each method of data collection is clarified separately, including the procedures and data analysis. Additionally, issues of ethics and the researcher's position as an outsider are raised.

Articles that are part of this thesis are listed in Chapter 5. In sum, there are the article on the producers (Article I), on aged 50+ users (Article II) and on media (Article III). In addition, there is a sub-study on the families' practices with wearables that has not yet been developed into an article but is presented as part of this thesis.

Due to the COVID-19 pandemic, the fieldwork with families had to be postponed. As a result, I changed the original course of the planned articles. In Chapter 6, the analysis of each sub-study is presented, followed by a discussion and conclusions (Chapter 7). I finalize the thesis with an outline of practical implications of this study.

2. CHAPTER 2. THEORETICAL PERSPECTIVE

In this chapter, I explain the theoretical approach adopted in this thesis, and how it influences the concept of sustainability that I enact, based on practice theory.

The long-established tradition to theorize sustainability as an outcome of individual decision making and consumption (Azjen, 1985; Hargreaves, 2011; Shove and Walker, 2010) promotes an idea that sustainability can be improved, on the one hand, through behavioral changes of consumers and, on the other, through the designing and adopting of efficient technologies. In this respect, it is an individual who is regarded as either a catalyst or a barrier towards a more sustainable mode of consumption.

Meanwhile, modest results in achieving pro-sustainable goals have generated criticism around the established theories on sustainability (Silva and Figueiredo, 2020; Rimmel, 2020; Isaksson and Hagbert, 2020). Baumgartner (2011) has outlined that, regardless of numerous definitions and models, claims about whether real 'progress' towards sustainability has been achieved are dubious. Hence, a need for alternative theorization of sustainability has been raised (Silva and Figueiredo, 2020).

This study adopts the practice theory lens that offers searching for sustainable solutions in daily routines. In sustainability studies, an idea of a link between sustainability and organizational and individual practices has been applied (Gherardi, 2012) to link agency and structure. Hence, within this study sustainability is understood as mediated between people, the wearables they use, and culturally determined social structures where the practices are performed.

I argue that sustainability is anchored in practices and their persistency. According to Hand and colleagues (2005) the persistence and ubiquity of the practice of showering is explained through technological innovation, changes in cultural conventions and socio-temporal coordination of everyday life. The focus is, thus, on how material structures, including the body, conventions and temporal rhythm are stabilized and harmonized vis-à-vis each other. In this research, I am interested in looking at coordination between these elements as a proxy for sustainability. Specifically, I am searching for contingencies, associations, tensions, etc. between these elements or between practices. An important property of practices is their continuous change and variability, depending on the context. Therefore, the understanding of sustainability also varies from one cultural context to another. In what follows, I will develop this assumption further.

In the first part of this chapter, I outline the central assumptions of practice theory. I explain how the theoretical framework has been developed, how a practice is defined, what role individual agency plays in practices, what elements a practice consists of, what types of practices are distinguished, and other central dimensions of the theory. Afterwards, I proceed to the topics of sustainability and sustainable consumption as conceptualized in practice theory. In the final part of the chapter, drawing on the previously discussed arguments, I develop a framework for analysis of sustainable consumption in relation to practices with wearable technology.

2.1. PRACTICE THEORY: FOCAL POINTS

Practice theory is an umbrella term for a family of theoretical approaches united by an idea of practices as a core object of research inquiry. The origin of the practice-based theoretical approach can be traced back to Bourdieu (1990), Giddens (1984) and other prominent scholars (Foucault, 1977; Butler, 1990; Latour, 1993). However, in this research, I am drawing on the so-called third wave of practice theory developed by such influential scholars as Shove, Pantzar and Watson (2012), Schatzki (1996, 2001), Warde (2005), Røpke (2009) and Reckwitz (2002). In principle, theories of practice are applicable to any domain of study, but they have become particularly popular within consumer research (Warde, 2005; Volonté, 2019), studies of sustainable consumption (Keller et al., 2016; Shove and Walker, 2010; Hargreaves, 2011; Welch and Warde, 2015) as well as within media and communication studies (Couldry, 2004) and health-related research (Maller, 2015). A variety of theoretical approaches have been using the term 'practices' without any explicit concept behind it. Practice theory, however, is a form of a cultural theory distinguished by a focus on practices as the unit of inquiry (Reckwitz, 2002: 245). Within this framework, the practice is located at a meso-level between an individual agency and structure, thus bridging holistic and individualistic explanations of societal phenomena (Warde, 2014).

On a more general level, practice theory might be an attempt to compensate for the previous hegemony of cultural explanations of consumption (Bourdieu, 1990; Warde, 2014). Within this approach, as Warde (2014: 282) explains, consumption is seen as a means 'by which individuals and groups expressed their identities through symbolic representation in taste and lifestyle, with their desires focused on symbolic rather than material reward.' Accordingly, theories of practice might be a tool for a 'double correction' (Warde, 2014: 286) to previous empirical studies: on the one hand, it provides an alternative explanation to the models of individual consumers' choice; on the other, helps uncover and explain societal phenomena previously concealed as a purely symbolic phenomenon. By shifting the focus towards another aspect of conduct, practice theory 'emphasizes routine over action, flow and sequence over discrete acts, […] practical consciousness over deliberation, […] the material over symbolic' (Warde, 2014: 286).

Though theories of practice remain diverse (Warde, 2014; Schatzki, 2011), they share a set of common features. A principal similarity among different approaches is a focus on a practice as an organized constellation of people's activities (Schatzki, 2011). This way, any practice is a social entity embracing multiple people. It is worth stressing, however, that characteristics of practices are conceptualized as belonging to practices rather than individuals, even if referring to embodied skills and features (Shove et al., 2012; Schatzki, 2011). At the same time, individuals are not conceptualized as 'passive dupes' (Hargreaves, 2011: 83), but are understood as skillful agents – carriers or practitioners – capable of undertaking and negotiating between a myriad of different practices in the course of daily life (Røpke, 2009; Reckwitz, 2002). As Warde (2014) suggests, application of the recent theories of practice has resulted in 'distinctive and defensible empirical analyzes' (p. 285).

A major attraction of practice theory, according to Schatzki (1996: 12) is that they are neither individualistic nor holistic, but 'present pluralistic and flexible pictures of the constitution of social life that generally oppose hypostatized unities, root order in local contexts, and/or successfully accommodate complexities, differences and particularities (Schatzki, 1995: 12). To summarize, Schatzki maintains that both individuality and structure are a result of practices (1996: 13). Similarly, Reckwitz (2002) appreciates that practice theories still account for cultural factors (such as norms, images, or meanings prevailing a given society) rooted in contexts, thus, avoiding the one-sidedness

of such models as homo economicus or homo sociologicus (pp. 245-6).

Beyond these major points of agreement, there is no unified practice approach (Schatzki, 2001: 249). One core issue is how to properly define a practice: thus, some theorists of practice theory focus on elements that comprise a practice (Reckwitz, 2002), whereas others prioritize connections between these elements (Warde, 2005). Finally, Spaargaren and Van Vliet (2000) approach practices as a bridge between people's live styles and larger socio-technical systems, like electricity or heating.

In this thesis, I rely on a widely cited definition of a practice by Reckwitz (2002: 249) who defines it as 'a routinized type of behaviour which consists of several elements, interconnected to one other: forms of bodily activities, forms of mental activities, 'things' and their use, a background knowledge in the form of understanding, knowhow, states of emotion and motivational knowledge.' Since Reckwitz's definition does not provide a comprehensive list of the elements, I also draw extensively on Shove and colleagues' (2012) 3-element model of a practice. According to their model, a practice is comprised of materials (technology, body, physical stuff), competences (skills, knowhows) and meanings (images, symbols) that have to be dynamically integrated through regular repeated performance by skillful carriers. For example, taking a shower, when conceptualized as a practice, can be regarded as comprised of a shower booth or a bath, a running water system, a measure of soap or shampoo (materials), skills (competences) for applying all these, as well as circulating images of the clean body. In accordance with Shove and colleagues' (2012) concept, practices emerge, stabilize and dissolve as long as the links between these elements are present or broken. Overall, practices are complex formations that consist of an open-ended number of various activities (Volonté, 2019; Schatzki, 2001) that are shaped by multiple dependencies among the body, mind, material structures, social rules, etc. (Reckwitz, 2002: 249; Shove et al., 2012: 7).

Hence, in this thesis, I focus on the daily life of wearables' users. I try to encompass a broad scope of their practices that are comprised of various activities, of which an activity with wearables is part. One of the decisive factors that influenced the choice of practice theory for this thesis is acknowledgement of the role of the body and material things: first, practices are embodied, and require mental and physical activity (Warde, 2005, 2014; Shove et al., 2012). Next, many practices would not be possible without tools and equipment operated through technology, be it tattooing or doing sports. In this respect, practice theory borrows from Actor Network Theory (Latour, 1987), the role of which in directing attention towards the agency of non-human actors has been widely recognized. As mentioned, Shove and colleagues (2012) have included materials as a necessary element of any practice. Meanwhile, focus on materiality within practice theory has also been criticized for becoming too domineering over other aspects (see Warde, 2014: 294). Schatzki (2001), for instance, though admitting the role of a material infrastructure, suggests treating materials as 'mere intermediaries among humans' (p. 2). Overall, it is accepted that many wearables are designed and acquired because of their capacity to enable certain activities. However, noting the mentioned critique, this study treats wearable technology and wearable devices as enabling or hampering certain activities within practices. Furthermore, their role as intermediaries or constrainers are approached as decisive in terms of sustainability and pro-sustainable solutions. I will develop this idea further in this chapter when discussing the sustainability concept within practice theory.

In order to clarify relations between practices and consumption, I refer to Warde's (2005) understanding of consumption as 'a process whereby agents engage in appropriation and appreciation, whether for utilitarian, expressive or contemplative purposes, of goods, services, performances, information or ambience, whether purchased or not, over which the agent has some degree of discretion' (p. 137). Therefore, consumption is 'a moment in almost every practice' (Warde, 2005:

137). Hence, in this study I am not focusing specifically on reasons behind purchasing or choosing a specific wearable. Instead, I am interested in the practices of use and commercializing associated with wearables. Furthermore, I adhere to a view that it is practices that generate wants rather than vice versa (Warde, 2005): 'it is the fact of engagement in the practice, rather than any personal decision about a course of conduct, that explains the nature and process of consumption' (Warde, 2005: 138). Based on this assumption, this study maintains that the use of wearable technology can steer daily practices into certain directions. As practices eventually produce needs and wants, and consumption in general (Warde, 2005), it makes sense to ask in what way, in terms of sustainability, wearable technology influences consumption through practices.

Further, practices can be differentiated on many dimensions, and this should be considered when studying practices. Firsts, it is important to distinguish between practices-as-entities and practices-as-performance (Shove et al., 2012; Schatzki, 1996: 89). Schatzki conceptualizes the former as a 'temporary unfolding and spatially dispersed nexus of doings and sayings' (1996: 89). By this, he means that doings and sayings hang together in specific ways: namely, through understandings of what should be done, through explicit rules and instructions as well as through purposes and beliefs (referred to by Schatzki as 'teleoaffective structures'). For Shove and colleagues (2012) the practice-as-entity represents a recognizable and durable conjunction of elements, a pattern with its own history and path of development (Shove et al., 2012: 7-8). However, any practice needs reproduction in order to be sustained. This is achieved through regular enactment by concrete practitioners that is understood as a practice-as-performance: 'a practice represents a pattern that can be filled out by a multitude of single and often unique actions reproducing the practice' (Reckwitz, 2002: 249-50). Schatzki (1996: 90) argues that individual performances 'actualize' practices. To summarize, practices are coordinated entities that nonetheless need performance by carriers in order to exist. This poses an important methodological puzzle that will be returned to in Chapter 5 on methodology.

In this respect, it is worth noting that, so far, empirical research has been predominantly occupied with practice-as-performances – or individual manifestations of practices. Yet, as Warde notes (2005: 295), research on mechanisms behind the creation of norms, standards and institutions that produce shared understanding and procedures of practices-as-entities is needed. Shove and Pantzar (2005, 2010), in their studies of Nordic walking practice, pay attention to the roles of Nordic walking sticks' producers and to the Sport Institute in Finland that promotes this practice. Interestingly, media has not been discussed in-depth in empirical research based on practice theory. For example, in an analysis of the CoolBiz campaign in Japan (which will be discussed in detail later) – a public initiative aimed at decreasing the level of energy consumption in offices – Shove (2016) mentions that the media campaign has contributed to its popularity, though stressing that it was only one contributing factor among many others. Further, in an account of the Nordic walking popularity in different contexts, Shove and Pantzar (2005) assume that media coverage contributes to popularity of this practice by perpetuating certain images that can reinforce key associations: for example, the images of 'health' and 'fitness' attached to Nordic walking.

Recently, practice theory has been gaining more attention within discourse studies (Keller and Halkier, 2014). For example, it is argued that media discourse can become a symbolic resource that consumers rely on when in need to justify participation in certain practices (Keller and Halkier, 2014). As Keller and Halkier (2014) put it: 'consumers position themselves as practitioners, they relate what they do in their everyday lives to other people and the interpretations of relevant media discourses, whether editorial content, educational expert texts, promotional messages or social marketing

campaigns' (p. 43). In contrast to Shove and Pantzar (2005), there is a shift towards acknowledgement that media discourse is capable of producing not just meanings, but also procedures to mimic in daily life, and 'normative contestations' of consumption (Keller and Halkier, 2014: 39). However, regardless the growing interest towards the role of media in practices, scholars emphasize that it is hardly possible to make conclusive claims regarding an influence of media coverage on reproduction of practices (Keller and Halkier, 2014; Shove and Pantzar, 2005). Meanwhile, inclusion of a powerful opinion-maker such as media (McCombs and Valenzuela, 2020) into analysis might contribute to understandings of power in practice theory (Keller et al., 2016), as well as of the arrival and shaping of general rules for practices-as-performances (Warde, 2005), especially in case of new and yet underexplored technologies (Nelkin, 1987). Specifically, while Shove and colleagues (2012) identify the elements of practice as possible targets to exercise power (pp. 152 – 163), the channels through which power operates are left little discussed (Watson, 2016). In this study, I assume that media can become such a channel.

Next, practices are differentiated between dispersed and integrative practices. Schatzki (1996: 91-2) indicates that examples of 'dispersed practices' are describing, explaining or imagining, and, hence, are scattered across various sectors of social life. These practices require a certain level of understanding of how to carry them out, including how to perform them properly (Warde, 2005). Meanwhile, integrative practices are 'the more complex practices found in and constitutive of particular domains of social life (Schatzki, 1996: 98), for example, cooking or doing business (Warde, 2005). Integrative practices, as a rule, incorporate dispersed ones, like cooking implies explaining (of recipes). Warde (2005) suggests that sociology of consumption is primarily interested in integrative practices (p. 135). Accordingly, this thesis deals with integrative practices like doing sports, domestic practices or commercializing. For example, I scrutinize the practice of commercializing in Article 1, and explain that it is comprised of dispersed practices, like negotiating with investors, selling, fundraising, buying fabrics, etc.

Drawing on these distinctions between practices, Warde (2005) concludes that practices, regardless of general rules and norms, are not 'universal planes' on which individuals embark. On the contrary, practices are internally differentiated: meanings attached to practices, or procedures adopted might vary across not just across different carriers, but also among different contexts. In terms of context, practices are considered 'homegrown' (Røpke, 2009; Shove and Pantzar, 2005), meaning an integration of these elements is done by the local practitioners. This can lead to different unexpected outcomes, as Shove and Pantzar (2005) exemplify in their study on Nordic Walking in Finland and the UK: regardless of availability of the walking poles and educational courses, Nordic walking gained limited popularity in the UK, as the elements of meaning (found in Finland) were lacking. Generally, practices 'do not float free of technological, institutional and infrastructural contexts' (Randles and Warde, 2006: 229), and contextual factors such as gender equality, political, legal, business and cultural norms should be considered (Røpke, 2009: 2493). Ultimately, context is another central dimension that influences a practice's trajectory and needs to be accounted for when applying practice theory.

Given the discussed characteristics of practices, Warde (2005) and Schatzki (2002) point out that practices have histories, or follow trajectories. These trajectories, however, are 'conditional upon the institutional arrangements characteristic of time, space and social context, […] dominant modes of economic exchange and cultural traditions' (Warde, 2005: 139-40). By enquiring into how a given practice evolves and develop, as well as into contextual characteristics, a question 'why do practitioners carry the practices the way they do?' might be answered. A practice trajectory is, thus,

a complex phenomenon that is influenced and shaped by many factors, including the role of collective learning, exercise of power in the shaping of understanding of proper and acceptable conduct of practices, access to resources, past experiences of carriers, etc. (Warde, 2005). Sustainable consumption is an integral part of these trajectories because modes of appropriation, use and disposal of goods and technologies shape these trajectories (Warde, 2005). In their example of car driving, Shove et al. (2012) create a historic account of how this practice has been shaped and perpetuated by social class composition, early car technical features and the arrival of highways. In a recent study on obesity, Blue, Shove and Kelly (2011) suggest approaching weight gain as a social phenomenon that emerges in the course of social practices' enactment across time and space. Specifically, by tracing changes in the practices connected to eating and leisure, the authors make claims concerning subsequent effect the practices have on the body, weight, and, eventually, on one's well-being.

Trajectories of practices are closely related to careers of individual carriers who undertake practices (Shove et al., 2012). Shove and colleagues explain: '[T]he careers of individual practitioners determine the fate and future of the practice itself. As more or different people become involved so the meaning and experience of involvement changes and so the practice evolves' (Shove and Pantzar, 2007: 154). Moreover, practices depend on the presence of loyal carriers who get 'recruited (Shove and Pantzar, 2007) into a practice and, thus, reproduce it. As Shove and Pantzar put it (2007: 164): 'without practitioners there would be no practice'. Recruitment and subsequent actual reproduction of a practice is also an illustration of an actual interplay between a practice-as-entity and practice-as-performance. For example, in their article on recruitment into practices, Shove and Pantzar (2007) trace how floorball as a practice has developed from an amateur sport into an institutionalized sport with sponsors, spectators, teams, branded equipment and star players. For a major part, this outcome is a result of capturing and retaining carriers who are 'busy reproducing and transforming floorball' (Shove and Pantzar, 2007: 164). To sum up, a practitioner encounters, gets recruited, has 'careers' within as well as defects from a myriad of different practices (Warde, 2005). Shove and Pantzar (2007) even go as far as provocatively comparing a practice to a vampire that captures populations of 'suitably committed' carriers in order to 'survive' (p. 166). Understanding the mechanisms behind the formation of this loyalty is paramount for this thesis, as questions of capturing and keeping wearables' users have repeatedly resurfaced (Attig and Franke, 2020; Fadhil, 2019).

Especially the first encounter with a practice is crucial for a practitioner and their recruitment into the given practice: 'For an individual, the pattern seems to be one in which positive experiences give rise to processes of repetition and reproduction through which the new entity becomes part of an individual's life' (Shove and Pantzar, 2007: 164). Hence, a positive exposure to a practice is likely to lead to recruitment and its subsequent reproduction in the form of regular performance by a carrier. On the other hand, carriers might resist or drop from practices, and these processes are also important for understanding the trajectory and persistence of a practice. Obviously, practitioners' careers within practices are interwoven with experience and its accumulation. Through repetition, a carrier draws closer to a practice in question, but, at the same time, their relation to the practice and position within it change. Warde (2005), for instance, stresses that the role of a practitioner within a practice evolves over time while they acquire new competences or change their attitudes (meaning) towards the practice. It is possible to differentiate between 'long-standing participants and novitiates, theorists and technicians, generalists and specialists, conservatives and radicals, visionaries and followers, the highly knowledgeable and the relatively ignorant, and the professional and the amateur' (Warde, 2005: 138). Therefore, the trajectory of a practice depends on practitioners' commitment: namely, their possibility or willingness to maintain it at a high level (Warde, 2005).

In continuation of the issue of carriers' position, individuals are always engaged in a great number of

different practices. In other words, a practitioner is a crossing point of various practices (Warde, 2005; Røpke, 2009). Taken recent consumption trends that offer almost endless possibility for a variety of pursuits (Mont, 2019), practices multiply and diversify, while individuals become engaged in a greater number of practices. Through consumers, practices form bundles (Shove et al., 2012; Schatzki, 1996: 96) within which they 'overlap, form hierarchies, and join to compose more complex practices'. Shove and colleagues define the bundles as 'stickier forms of co-dependence' that manifest in many forms, including 'sequence, synchronization, proximity or necessary co-existence' (Shove et al., 2012: 87; for an overview, see Hui, 2017). The intensity of these interactions also varies, so that some practices form dense clusters whereas others loosely 'hang together in different ways across time and space' (Shove et al., 2012: 152). Additionally, practices may share or clash over a constitutive element. If the element appears as an ingredient in several practices, it becomes a common ground or a 'point of connection' (Shove et al., 2012: 112-113). For instance, introduction of a new material element – an open kitchen – brought the practices of making food and socializing together into a new bundle (Cieraad, 2002). Technological innovations also bring substantial changes into the bundles of practices, either transforming or even completely ruling out outdated ones. For example, the introduction of a new freezing equipment substantially transformed and eased grocery shopping, food storing and cooking (Garnett, 2007).

The issues discussed above bring up an important point about how changes within practices occur. This is crucial since the discussed framework is focused on an inertial character of practices that might be perceived as a barrier for change (Warde, 2005). Meanwhile, Warde (2005) in his in-depth account of the theory argues that a practice contains both internal and external seeds for change. In the former case, carriers might challenge and re-configure existing routines and conventions in the course of their performances: for example, through improvising and experimenting. In the latter case, a change might occur as different practices come into contact with each other, and, for instance, share an element (Schatzki, 2013; Warde, 2005).

Ultimately, practice theory proved to be a vibrant tool for empirical research across different fields (Warde, 2014). Within consumer studies, attention to sustainability issues has been on the rise. Specifically addressing this, practice theory is concerned with mundane activities that nonetheless constitute environmental problems, such as use of electricity, laundry, food preparation, etc. As mentioned, a deliberate emphasis on materiality – like Shove and colleagues' (2012) inclusion of materials into a practice – presupposes that as much weight is given to physical things. As a result, research on laundry and washing (Shove et al., 2003), heating and cooling (Shove et al., 2013), use of electronics (Christensen and Røpke, 2010) as well as well disposal (Evans, 2011) has emerged. Recently, practice theory has been applied as a tool for explaining current trends in obesity, thus linking the practice-based framework to social sustainability (Liu et al., 2017). Overall, sustainability is perceived as an outcome of inconspicuous everyday consumption, where change in the patterns and course of practices might mitigate eventual environmental, societal or business outcomes. In the next section, I switch attention to the concept of sustainability within practice theory before proceeding to the concept of sustainability and practices with wearable technology applied in this study.

2.2. SUSTAINABILITY WITHIN PRACTICE THEORY

Before discussing how practice theory conceptualizes sustainability, I map out two other perspectives on sustainability. These perspectives are mentioned because practice theory is often juxtaposed with them.

It is beyond argument that problems related to sustainability are a result of human activity, including production (mineral extraction, water-intensive crops and soil erosion, use of pesticides) and consumption (food waste, washing with chemicals, shopping for cheap and short-lasting clothes) (Morone et al., 2019; Bodenheimer and Leidenberger, 2020; Si et al., 2020). In the longer run, these problems require large-scale solutions penetrating all the spheres of daily life across different industries and sectors (Ogata et al., 2020; Nishant et al., 2020). Many countries and supra-national organizations have introduced policy responses to the listed problems (Sun et al., 2020; Hasan et al., 2020; Kittler et al., 2020; Demeterova et al., 2020). For example, in September 2015, the UN member states approved 17 Sustainable Development Goals (SDGs), an ambitious agenda consisting of 169 purposes, including elimination of poverty, pursuit of equality, well-being and decent work (Imaz and Sheinbaum, 2017).

However, a key concern has been whether fundamental structural sustainability-related improvement is more achievable through behavioral changes of individual consumers or through actions of governments or corporations. With the rise of neoliberalism in politics across the world, the behavior of individual actors has been prioritized as a major point of intervention (Shove, 2010; Pappas and Pappas, 2015; Moore et al., 2017; Buckley, 2019), though responsiblization of individual has been criticized (Shove, 2003).

Numerous attempts have been undertaken to construct models that could determine the major sites of intervention into human behavior to make it pro-environmental (Lucas et al., 2008; Jackson, 2005). As a rule, these models rest on attitudes, beliefs and values that are proxies to predict one's behavior. A central assumption within these frameworks is that behavior is 'the outcome of a linear and ultimately rational process' (Harrison and Davies, 1998: 2) and, thus, can be rationally calculated and predicted. In what follows, I give a short overview of two of the most popular frameworks that rest on this approach. Overall, both approaches regard social norms (in classical sociology), attitudes (in social psychology) and preferences (in economics) as major drivers or obstacles on the path towards pro-sustainable consumption (for an overview, see Reisch and Thøgersen, 2015; also, Reckwitz, 2002).

The first approach contends that the failure to switch towards more sustainable modes of consumption has been explained through the gap between individual attitudes and actions. This assumption is based on the so-called 'portfolio model' (Hindess, 1990; Shove and Walker, 2010) wherein an individual has a relatively stable portfolio of beliefs and attitudes to negotiate her course of actions. Within the second approach – called the Theory of Planned Behaviour (TPB) (Azjen, 1985) – an individual is conceptualized as a rational subject capable of calculating the best course of action. According to TPB, an actor gives up harmful modes of consumption if they know they get punished. On the other hand, an individual adopts sustainable modes if they are motivated by reward, which is usually conceptualized in monetary form. Meanwhile, measures based on punishment-incentive dualism often generate only short-lived and incremental improvement (Shove, 2010).

According to Bamberg (2003; also Keller et al., 2016), persistence of these two approaches results from what he formulates as 'situation invariant orientation patterns' (Bamberg, 2003: 22). In other words, the policy interventions based on these approaches are relatively straightforward: this implies, for example, that as long as attitudes, beliefs and values that lead to unsustainable behavior are identified and targeted by intervention, pro-sustainable changes would emerge across different contexts and areas of individuals' lifestyles (Bamberg, 2003). For example, one popular instrument is awareness-raising, which has been considered a driver for sustainable change: individuals need access to adequate and correct knowledge in order to eliminate information deficits, that in turn will steer them towards more eco-friendly choices (Burgess et al., 1998; Owens, 2000). Though many policy interventions have been based on this assumption, the results have remained controversial (Boström and Klintman, 2008; Connolly and Prothero, 2008).

To summarize, a prevailing approach to the problem of unsustainable behavior has been rooted in the idea of encouraging more sustainable choices among individual consumers (Shove, 2010). Hence, consumers are conceptualized as rational and reflexive agents capable of calculated choices that they steer towards a desired (more sustainable) direction (Keller et al., 2016). Contextual factors are regarded as external to final decisions or as a barrier that needs to be eliminated (Keller et al., 2016). It has been argued that this framework, though 'simple and sufficiently workable' (Keller et al., 2016), fails to account for various ways in which material infrastructures, social relations and contexts are inherent to consumption (Hargreaver, 2011; Shove, 2003; Southerton et al., 2004; Spaargaren and Van Vliet, 2000).

Practice theory (Shove et al., 2012; Warde, 2005; Reckwitz, 2002; Schatzki, 1996, 2002;) is an alternative perspective that conceptualizes practices rather than 'individuals, citizens, societies, social groups or even sociotechnical systems' (Shove and Walker, 2010: 471) as the major source of intervention. According to practice theory, the roots of unsustainable modes of production and consumption should be sought in the elements of practices and the bundles shaped by related practices. This broader and more holistic framework (see Hargreaves, 2011) allows for discovering complex and less straightforward reasons for unsustainable modes of consumption and production and explain why they persist. Recently, sustainable consumption has become one of the major areas for application of the theory of practice (Welch and Warde, 2015), including energy (Shove, 2018), transportations (Shove and Walker, 2010) and food (Warde, 2015).

Practice theory, as I have already mentioned, is not a coherent framework, but a collection of different theories united by the idea of a practice as a study unit. It is a middle path between human agency and structure. As a result, everyday routines such as taking a shower, cooking, driving, or gardening have been suggested as an answer to this issue. By departing from previously discussed concepts of individuals' choices, sustainable and unsustainable consumption is seen as occurring as part of various practices (Warde, 2005). As Shove (2003: 9) puts it:

> [I]nvestigations into the beliefs and actions of self-confessed environmentalists represent something of a distraction. What counts is the big, and in some cases, global swing of ordinary, routinized and taken-for-granted practice . . . Only by setting 'the environment' aside as the main focus of attention will it be possible to follow and analyze processes underpinning the normalization of consumption and the escalation of demand.

Thus, unsustainable consumption must be associated with practices' inertia or established ways of doing things to which consumers are accustomed (Aro 2016; Keller et al., 2016; Volonté, 2019). The principal implication in relation to sustainable production and consumption is that practices and their transformations should be regarded as a source of pro-sustainable transformations (Warde, 2005: 140). Taking the element-based nature of practices (Shove et al., 2012; Warde, 2005), sustainable practices are to be made through linking proper elements, while unsustainable practices are to be re-made through breaking the links and re-linking them in more sustainable ways (Hargreaves, 2011). As mentioned in the previous section, Warde (2005) suggests that these changes can occur from both inside and outside: while practitioners can challenge conventional way of carrying a practice through improvising or resisting the established routines (inside), interaction with other practices can also trigger changes in a given practice (outside). A crucial detail is that social and material factors, and the way they steer practices, are approached as parts of the practices rather as external factors or barriers towards pro-sustainable behaviors (Keller et al., 2016): for instance, Yates and Evans (2016) discuss how the material aspects of laundry, along with social conventions of 'dirty' and 'clean', shape energy consumption of households.

To sum up, practice theory suggests searching for unsustainable patterns of behavior in practices. Namely, practices' inertia frequently leads to automatically reproduced patterns of behavior that might be environmentally harmful or unsustainable in social, business or environmental terms. In what follows, I use two empirical cases from previous research that illustrate this argument. The first example is Volonté's (2019) research on 'thin ideal' resilience in the fashion world. The second example is Shove's (2016) analysis of the CoolBiz campaign in Japan that shows how a practice might be transformed. Whereas the first example illustrates why a socially contestable way of practicing fashion persists, the second demonstrates the way a pro-sustainable solution can be introduced.

First, Volonté (2019) considers worshiping of the slim body within the fashion field as rooted in unsustainable practices circulating in fashion industry. Fashion practices with the slim body are coined unsustainable because they lead to serious mental illnesses, such as anorexia nervosa and bulimia nervosa. Volonté refers to a slim tyranny as a represented, among others, in a dominance of smaller than average clothes sizes and persistence of slim model bodies. To begin with, the author regards mass manufacturing – an established sizing system – as part of fashion practice that reinforces the thin ideal. On the one hand, it is admitted that standardizations have significantly simplified manufacturing. On the other, it is argued that technology of proportionally increasing measurements from size to size is not applicable to bodies beyond 12 size. Therefore, mass production is seriously complicated not only in economic terms, but also professional since a sophisticated tailoring practice is required (Volonté, 2019). Another important activity within the fashion practice is modelling, and Volonté traces how original mannequins were replaced with real bodies of similar sizes. Generally, Volonté (2019) elucidates that thinness per se is not 'a standard of perfection in people's minds' (p. 265), but rather an element of practice, and, thus, its resilience is not occasional, but has been inscribed into evolution of fashion practice.

Next, Shove (2016) offers the CoolBiz campaign in Japan as an example of a successful transformation towards a more sustainable consumption mode. It is argued that a change in meaning of 'business dress code' contributed to decrease in electricity consumption in the offices. Due to a hot climate and a very formal business dress code, Japanese offices used to consume an incredible amount of electricity to air-condition offices during the summertime. In 2005, the Japanese Ministry of the Environment initiated a 'CoolBiz' campaign with an aim to decrease office electricity consumption

by changing the way people dress for work (Shove, 2016). Shove stresses that it is through targeting the practice of dressing to work that a positive change was achieved. Various politicians and celebrities took part in 'Cool Biz' by providing an example of how to dress differently to work. National media and the clothes industry also contributed to the campaign. Over time, a new meaning of smart and appropriate business dressing emerged, along with new skills of choosing garments for work (Shove et al., 2012: 149). Additionally, the material element (clothing items) of Japanese office workers has shifted towards more relaxed clothes (e.g. short-sleeved shirts, no ties). By targeting the elements of the practice of dressing to the office, the 'Cool Biz' intervention resulted in more sustainable energy consumption in the offices as employees dressed up in lighter clothes and did not feel as hot as before (Shove, 2016). Overall, this case exemplifies that sustainability per se was indeed 'set aside' (Shove, 2003) in order to incrementally modify a concrete daily routine – the dress code – rather than targeting, for instance, air-conditioning technology or employees' values towards energy consumption. The reframing suggested by Shove draws attention to the fact that merely promoting new technology may not move consumers towards more sustainable consumption modes: for example, a new refrigerator 'may simply lead to the use of increased refrigerated space at the same cost' (Welch and Warde, 2015: 91). Instead, what matters is 'the relation between (more or less efficient) technologies, systems and appliances, and co-evolution of routines, habits and practices' (Shove 2004: 1054). This view also differs significantly from multi-level perspectives with vertical relations between various regimes, niches and landscapes where sustainability depends on efficient sociotechnical systems of provision (Shove and Walker, 2010).

To conclude, practice theory brings up 'radically different' questions (Hargreaves, 2011) regarding how to achieve more sustainable solutions. The emphasis shifts from individual attitudes and beliefs towards routinized practices: how they emerge, crystallize and persist, how they recruit carriers and keep (or lose) their loyalty, why carriers defect, and how practices shape bundles with other practices. Drawing on these assumptions rooted in practice theory, I further formulate the concept of sustainability in relation to wearable technology.

2.3. THE SUSTAINABILITY CONCEPT AND WEARABLE TECHNOLOGY

According to Brorström (2015: 26), the concept of sustainability has become quite powerful because 'no one opposes it'. Meanwhile, there are different ways to understand sustainability (Silva and Figueiredo, 2020): for example, a concept of three pillars, or triple bottom line (Purvis et al., 2019; Moldan et al., 2012) that discusses a broader connection between sustainability and society, has become powerful. Within this paradigm, sustainability is understood in business, social and environmental terms. Though interpretations of these aspects might vary, generally, the business pillar of sustainability might be understood in terms of the capability to maintain business across time, or to respond to its 'short-term financial needs without compromising their ability to meet their future needs' (Bansal and DesJardine, 2014: 70).

Social sustainability, in the broadest sense, refers to a system that is characterized by social participation, gender equality, fair distribution of resources, and equal access to public services such as health and education (Assefa and Frostell, 2007). In a narrower sense, social sustainability has become associated with well-being (Liu et al., 2017; Dodge et al., 2012) that encompasses various spheres of life, including economic (income to maintain a decent and socially accepted lifestyle) (Aro and Wilska, 2014; Kekäläinen et al., 2017), social (connectedness, participation in social activities) (Quinn, 2021), physical (maintenance of health) (Kekäläinen et al., 2017), and emotional (satisfaction with life) (Kekäläinen et al., 2017).

Finally, environmental sustainability represents a situation when one's needs are satisfied without exceeding the regenerational capacities of our ecosystems (Morelli, 2011). Overall, the idea of uncompensated and uncontrolled exploitation of finite natural resources (water, air, soil, natural resources, plants and animals) has been abandoned in order to diminish risks for future generations.

Though I accept many of the assumptions derived from this influential concept, and borrow some of them, I wish to answer a call for a more diversified view on sustainability (Silva and Figueiredo, 2020). Hence, I propose a hybrid approach wherein these three pillars of sustainability are re-interpreted from a position of practice theory. In a nutshell, I regard sustainability as manifested in the process of practices' enactment. This way, sustainability is taken not a set of pre-defined or pre-calculated indicators that need to be achieved (Silva and Figueiredo, 2020), but as a phenomenon that emerges in the process of reproduction of practices with wearable technology. I am aware that this approach does not present an all-encompassing picture of sustainability. Nonetheless, I claim that it sheds light on intriguing details that might otherwise stay undiscovered, including those deeply rooted in everyday life and often occurring unnoticeably (Shove et al., 2012; Hargreaver, 2011).

I assume that carriers are recruited into practices with wearable technologies – the primary unit of analysis in this research – in order to achieve certain purposes. As a reminder, Schatzki (1996, 2002) calls practices teleoaffective structures, whereas Warde (2005) argues that practices steer consumption. Through practices with wearable devices, individuals can, for example, navigate problematic situations towards workable solutions: thus, by measuring one's health indicators with smartwatches, a practitioner is capable of keeping their health under control. Meanwhile, the 'world talks back' (West et al., 2019: 541) by limiting and frustrating the intentions of practitioners: for instance, through cultural and societal norms, shortage of certain resources, legal constraints, or other practices undertaken by carriers. Hence, I am interested in identifying an interplay between these two

forces at the level of practices, and I interpret sustainability as emerging in the process of enactment, reproduction and disintegration of practices with wearables. To sum up, my definition of sustainability goes as follows: it is a result of enactment, reproduction and disintegration of practices with wearable technology that sustain their economic endeavors, contribute to their carriers' well-being and life quality, and organize their daily life in such a way that the lifespan of goods is prolonged.

When developing the framework for analysis of sustainability of wearable technology, I paid attention to the current trends in the market of wearables. First, the problematic process of wearables' commercializing was considered (Dunne, 2010; Tremblay and Yagoubi, 2017; Singh and Majumder, 2018; Martin and Welsch, 2018). Next, discussions surrounding wearables' use and well-being could not be ignored (Lin and Windasari, 2019; Buchem et al., 2015). Finally, high abandonment rates of wearable devices by their users presented a captivating issue to explore (Attig and Franke, 2020; Fadhil, 2019). These patterns raise concerns regarding the broader sustainability concept (Purvis et al., 2019). In this thesis, I link them to various dimensions of practices as defined by practice theory. I am aware that not all of these dimensions are applicable to different sustainability's aspects. However, I regard, that taken together, they allow for a nuanced picture of the interplay between sustainability and wearable technology.

In order to make claims concerning the sustainability of wearable technology from the practice theory perspective, I chose looking at the following characteristics of practices. First, I enquire into an element composition of practices with wearable technology, including circulation of elements, their availability in different contexts and the way they link with each other (Shove et al., 2012). By tracing the integration of the elements, I am trying to capture how and when a practice becomes an established routine, so it can be sustained long-term. Linking sustainability and persistence of a business model has traditionally been approached as a cornerstone of the business aspect of sustainability (Bansal and DesJardine, 2014), especially when talking about new markets or crisis periods (Obrenovic et al., 2020; Parente et al., 2019).

Second, I am inquiring into how careers of practitioners develop and evolve over time within the practices with wearables. Factors contributing or hampering users' loyalty towards practices with these devices are highlighted. In this respect, I adhere to practice theory's assumption that positive encounters with a practice leads to higher loyalty and subsequent participation in a given practice (Shove and Pantzar, 2007). Hence, I assume that practitioners' loyalty can be interpreted in sustainability terms: namely, through the concept of prolonged use and lifespan (Evans and Cooper, 2016). Lifespan of a product includes acquisition, use and disposal of a product. Optimized acquisition, prolonged use and careful disposal is associated with sustainable consumption (Evans and Cooper, 2016). For the last decades, it has been acknowledged that 'supply-side solutions alone such as eco-design are liable to prove ineffective' (Evans and Cooper, 2016: 321), thus calling for a greater attention to what consumers do to stretch the lifespan. This taken, I argue that users' loyalty to a practice with a wearable can contribute to the longer lifespan of the device. Noteworthy, in this thesis, such practices as acquisition of wearables and their disposal are not analyzed, though they are important to consider. This limitation might be regarded as a prospect for future research.

Next, I shed light on how practices with wearable technology bundle with each other, especially in cases when a wearable device becomes a shared element between several practices (Shove et al., 2012). This way, I place wearable technology within the broader phenomenon of daily use, and, simultaneously, evaluate the influence of various daily activities on sustainability. Thus, rather than

blaming wearable devices for unsustainable consumption or business failures, I am accounting for an influence of other factors activated via relations between practices (Warde, 2005; Shove et al., 2012).

Finally, my analysis of sustainabulity and practices with wearable devices considers contextual factors, and how they might either steer practices with wearables towards more sustainable solutions, or, on the contrary, constrain them. This apprach conceptualizes sustainbaility not just as a 'one size fits all' concept (Jucker, 2002; Schader et al., 2014), but as 'homegrown' (Shove and Pantzar, 2005) and dependent on contextual factors.

I summarize the concept of sustainability used in this thesis in Figure 1. It is crucial to understand that the characteristics I draw on are hard to separate since they are, as a rule, immanent for practices. However, as mentioned, some of them are more suitable for explaining certain aspects of sustainability rather than others. While I apply all of them to the analysis of each sub-study, as mentioned, some practice characteristics are more salient in a certain sub-study rather than another.

Practice characteristics	**How it is manifested**	**Link to sustainability**
Composition of the elements of practices with wearables	Availability of materials, competences and meanings, links and tensions between them	Sustainability of a practice with a wearable, reproduced and sustained practice in a longer-run
Careers of users within practices with wearables	Recruitment into practices with wearables, positive and negative encounters with a practice, users' experience within a practice	Growth of users' loyalty or erosion of loyalty, longer lifespan of a wearable within practices with high loyalty
Bundles of practices with wearables	Complexes of practices shaped around the wearables, supportive or competitive relations between practices	Better or worse management of practices around wearables, comfortable management of practices
Context of practices with wearables	Shaping of the elements of practices, presense of different focal participants, circulation of norms, images, meanings	Formation of practices, linking and disconnecting of the elements

Figure1. Summary of the concept of sustainability used in this thesis

To conclude, insights into how practices with wearable technology are evolved, performed, and differentiated across different cultural contexts may provide new inspirational ideas for alternative interpretations of sustainability (Silva and Figueiredo, 2020). As discussed, agency within practice theory is distributed between different human and non-human actions, so sustainable consuption is seen as emergent from practices of commercializing and use of wearables rather than needs and values, or characteristics inscribed into wearables.

Additionally, such an approach accounts for contextual characteristics: this makes an analysis conscious towards concrete countries or regions. Overall, I offer analyzing relations between sustainability and wearable technology through daily practices' dimentions: circulation and linking of elements (Shove et al., 2012); practitioners' careers within practices with wearable devices and their level of commitment (Shove and Pantzar, 2007); relations between practices inside bundles

(Shove et al., 2012); and contextual specificity that shapes practices (Shove and Pantzar, 2005). This way, sustainability is understood as a result of all these factors rather than a pre-determined destination that needs to be reached. Therefore, a more nuanced and detailed account can be formulated, instead of sugesting ‘one size fits all’ programs for sustainabilty.

3. CHAPTER 3. CONTEXT OF RESEARCH

In this chapter, I discuss the setting of this study. Since the context bears a significant impact on the way a practice is shaped, integrated and carried out (Shove et al., 2012), understanding its specificity is crucial for interpretation of the findings.

According to practice theory, practices are 'homegrown' (Shove and Pantzar, 2005) and depend on the context (Shove et al., 2012). Therefore, capturing and explaining the social world through practices becomes a fundamentally complex task: what is practiced in one context is not necessarily applicable to others (Shove and Pantzar, 2005). A study informed by the practice theory paradigm should be especially aware of contextual limitations and challenges in transcending these contexts.

This chapter is divided into three major blocks. First, the market of wearable technology from the producers' perspective is scrutinized. In this section, an emphasis is placed upon small-scale entrepreneurs and the practice of commercializing of various wearable projects. Further, I switch to the consumer side of the wearable market with a stress on aged 50+ consumers and young children. These are groups whose adoption of wearables has been growing. In addition to the discussion of specificities of these consumers, I narrow my research down to two national contexts: Russia and Finland. When exploring these contexts, I pay attention to their similarities and differences. However, I explain that, by following a process-oriented approach to comparability, I do not set any criterion for comparison beforehand, but develop them in the process of analysis (Sørensen, 2010) that I adopt.

Another issue I scrutinize in this chapter is the boundary between the 'real-world' and virtual contexts that have become intrinsically entangled in recent years. Though practices depend on materials and are frequently embodied, there have been calls for extending practice-based research beyond the physical world (see Trowler, 2013):

> Nowadays in media-rich contexts […] much greater attention being given to the significance of virtual worlds and their permeability with the physical world. Artifacts and practices are mutually permeable, and so are the virtual and physical world.

Drawing on this argument, I include the digital media context from Finland into my study of practices with wearables. Specifically, the Finnish media landscape is described. In order to capture practices-as-entity (Shove et al., 2012) I am looking into how practices with wearable technologies are normalized in digital media. As noted, media can play an ontological role in regards to how a new technology is normalized and used (Nelkin, 1987). Finland is chosen as a suitable context for this study, taken a homogeneous character of its media landscape, higher than average trust into media, and high reliance on digital media as a source for news checking (Newman et al., 2020).

3.1. MARKET OF WEARABLES: PRODUCERS' PERSPECTIVE

In this thesis, I examine the market of wearables from a perspective of small-scale entrepreneurs with wearable projects. The focus of my inquiry is the practice of commercializing that these entrepreneurs have carried out in order to launch their project into the market. In what follows, I outline the general trends in the market of wearables and explain why I decided to study small businesses.

The market of wearables has been showing a stable growth: between 2016 and 2022, a dramatic four-time growth in revenues has been predicted (Statista, 2021). The largest players in the market are Apple, Xiaomi, Samsung and Fitbit (see Figure 2).

In addition to these technological giants, there are medium-sized companies like Polar and Suunto (Finland) that produce fitness trackers and smartwatches; and fashion and technological entrepreneurs: for instance, a New York-based Wearable X offering a yoga outfit; or British Owlet Baby Care with an embryo's heartbeat tracker.

Recently, states and supra-national organizations have been showing an interest towards wearables. In Finland, several state-funded wearable projects have been developing (for an overview, see Harjuniemi et al. 2018). Next, a two-year initiative called 'Wear Sustain' has been introduced in the EU (Figure 3). This initiative, financed by the European Commission, resulted in the development of an online platform – available to everyone – that helps connect various players in the market of wearables, shares the best practices, and facilitates the wearable industry's sustainable development (see Figure 3).

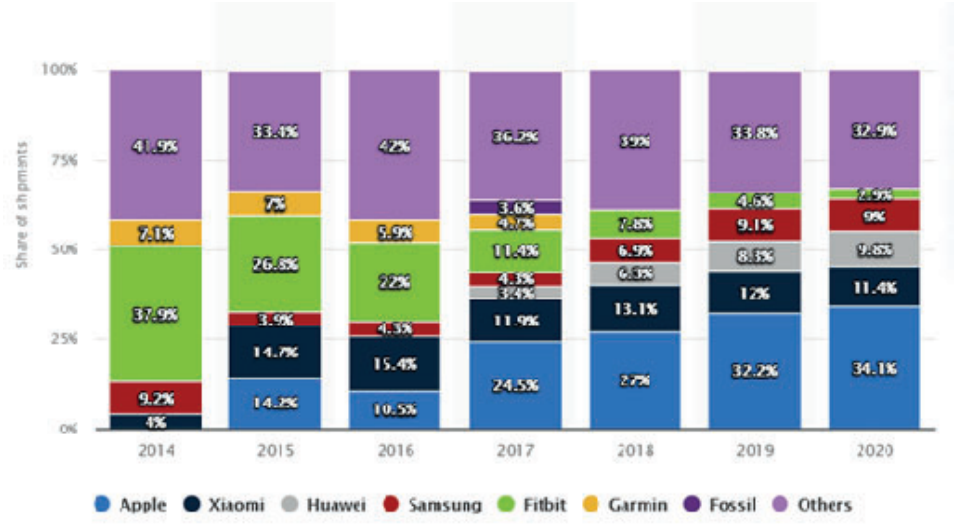

Figure 2. The major players (in terms of shipment share) in the market of wearable technology between 2014 and 2020. Statista, 2021, https://www.statista.com/statistics/435944/quarterly-wearables-shipments-worldwide-market-share-by-vendor/ (retrieved 05.05.2021)

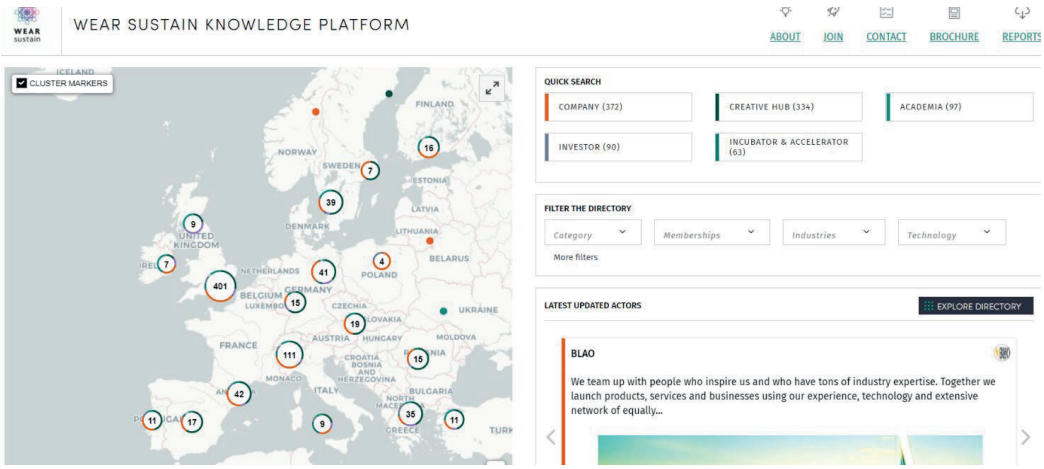

Figure 3. A map of 'wearable' hubs across Europe. Created within the 'Wear Sustain' project, https://wearsustain.eu/dashboards/home

However, regardless of public interest towards wearables, the start-ups struggle to commercialize their products (Berglin 2013; Zaheer et al. 2018): on average, they manage to survive for 2 years (Accenture 2015). According to Dunne (2010), the problems in launching a wearable into the market are numerous on all stages of its development. On the design stage, for example, aesthetics often has to be subdued to the range of available technological solutions, which can eventually lead to consumers' disappointment over what the wearable looks like. Also, previous research (Ariyatum et al. 2005) has revealed that there is a disconnection between developers' vision of the wearable device, functions included, and expectations of the consumers.

Next, manufacturing of wearables is a complex process since it brings together two industries (fashion and engineering) that are quite resistant to change and are unfamiliar with each other's internal processes (Dunne, 2010: 54). Furthermore, wearables must be manufactured in a way that guarantees their functionality, durability and comfort, but, at the same time, keeps costs at a minimum (Dunne, 2010). Alternatively, a DIY initiative has been developing in the market (Buechley et al. 2013). As a rule, these projects use basic materials and their functionality is limited, but, on the other hand, the manufacturing process and production costs also decrease (Dunne, 2010: 58).

Interestingly, when marketed and sold, wearables can bump into a specific cultural barrier (Dunne, 2010). Namely, wearable aesthetics have adopted quite a futuristic turn, in line with the cultural assumptions attached to these devices (Dunne, 2010: 60). Though quite acceptable in the early 2000s, aesthetic trends have since been shifting, making this futuristic look less stylish. This issue is connected to fashion industry cycles that change more quickly than technological advancement.

Overall, it has been acknowledged that expectations to enter the wearable market with one 'killer-application' that quickly generates big revenues is overestimated (O'Neill et al., 2003; Dunne, 2010).

Additionally, a desire to be ahead of competitors might backfire if a company rolls out an underdeveloped product and bumps into consumers' disappointment (Dehghani et al., 2018).

In a nutshell, the market of wearable technology has been quite heterogeneous in terms of producers selling their products. However, the position of these producers is imbalanced: the market has been dominated by large corporations, well-established in electronics as well as possessing enough funds to develop a new device and organize manufacturing (Dunne, 2010; Statista, 2021). With their huge resources, these corporations might put constraints on the arrival of other players, especially the small ones (Oderanti and Li, 2018). Meanwhile, start-ups are an important driver for economic growth as they often push forward innovative solutions as well as create jobs (Shane, 2009).

3.2. MARKET OF WEARABLES: CONSUMERS' PERSPECTIVE

Switching to the consumers' side of the wearable market, there is a certain disparity in the share of different age groups among wearables' users. So far, the '25-34' age bracket has been the most numerous in the USA (eMarketer, 2018) (see Figure 4), and this trend is similar in other countries, including developing ones (Statista, 2021). Meanwhile, consumers over 55 years of age, albeit one of the least numerous categories, have been showing the largest growth in terms of new users' arrival (eMarket, 2018).

At the same time, wearables have been scrutinized in relation to mature consumers (Buchem et al., 2015; Urban, 2017; Kekade et al., 2018). This group has been frequently discussed in the contexts of healthcare and chronic diseases (Teixeira et al., 2021; Majumder et al., 2017). This focus on health decay can reinforce stigma attached to the aging body (Oró-Piqueras and Marques, 2017) and develop a limited vision of what a lifestyle of an aging individual looks like. In addition, wearables for these groups are often approached from a position of caregivers rather than aging users per se (Dahlke et al., 2021; Larnyo et al., 2020).

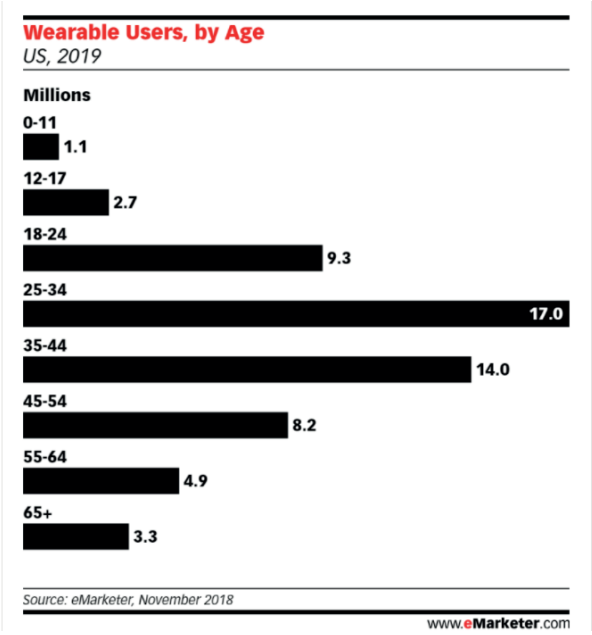

Figure 4. Predicted use of wearable technology by age groups, USA. By eMarketer,
https://www.emarketer.com/content/older-americans-drive-growth-of-wearables (retrieved 06.05.2021)

Another underrepresented group is children under 11 years old. (Figure 4). Meanwhile, the segment of child-oriented wearables looks promising: in 2019, it approached 350 million dollars (Oygür et al.,

2021). Wearables that facilitate children's formal and informal learning (Garcia et al., 2018) and physical activity have been especially popular (Müller et al., 2018; Oygur et al., 2021). A problematic issue with wearable technology for children is limited knowledge about children's perceptions of these devices, since parents' experiences have often been taken as a proxy (Oygür et al., 2020). In addition, previous studies accumulate data on the families that have already been using wearables, whereas the process of adoption and adaptation has been overlooked (Oygur et al., 2021).

Interestingly, mature people and children are two consumer groups who, though previously overlooked, have been gaining attention in consumer culture research. Researchers have been drawing attention to the fact that older consumers in the USA and Europe might actually be eager to spend more than their younger peers (Drolet et al., 2019; Jones et al., 2008): often, they have already raised children and paid off mortgages and other debts. However, their spending habits differ from younger groups. According to Blackwell et al. (2001), these consumers are interested in buying goods and services that are of a high quality, aesthetically pleasing and natural. Further, it has been suggested that mature consumers are more concerned with the practical rather than entertaining value of goods, whereas the latter is highly valued by younger age cohorts (Kumar and Lim, 2008). Also importantly, relations between technology and the digital world and mature consumers have been directed into two contrasting streams (Lee and Lyu, 2019). On the one hand, it has been argued that technology may improve life quality as well as help maintain social connections and an independent lifestyle of mature users (Choi and DeNitto, 2013, Hills et al., 2015). On the other, previous research argues that, compared to younger age groups, older consumers face greater barriers when dealing with technology, including perceived ones (Barnard et al., 2013). Meanwhile, resaecrh (see Kuoppamäki et al., 2017) addresses how biological or cognitive age might not always explain all aspects of consumer behavior, so that mature consumers should not be perceived as a homogeneous group (also Kuoppamäki et al., 2017). The lowest age limit for the target group is set at 50 years because this is when many age-related services become available (Sudbury and Simcock, 2009; Omar et al., 2014). Also, starting from this age, consumers have often suffered from ageism (Holliday et al., 2015), are considered ill-equipped for adopting new technologies (Lee and Lyu, 2019) or are regarded as particularly vulnerable, though these assumptions are not necessarily valid (Berg, 2015).

As far as children are concerned, it used to be common to regard children not as 'full-fledged consumers' (Ironico, 2012). Instead, they are approached as those whose consumption practices are in the process of shaping. This process of formation is referred to as 'consumer socialization' (Carlson and Grossbart, 1988; Moschis, 1987; John, 1999) or 'consumer development' (McNeal, 2007; Valkenburg and Cantor, 2001). Family, peers, school or kindergartens and media all provide interactions that contribute to the shaping of children's consumption habits (Moschis, 1987; John, 1999).

On the other hand, more studies have found that children do influence the consumption patterns of their families (Gram and Grønhøj, 2016; Buckingham, 2007). For example, Calvert (2008) suggests: 'From vacation choices to car purchases to meal selection, [children] exert a tremendous power over the family pocketbook' (Calvert, 2008: 207). Gram and Grønhøj (2016) study 'childing' practices as a separate type of food-shopping practice, paralleled to parental ones. Another interesting concept is 'reverse socialization' (Ekström, 2007), that explains situations when a child teaches their parents about certain consumption aspects such as technological products (Ekström, 2007) or ecological

consumption (Grønhøj, 2007; Gentina and Muratore, 2012). Overall, it has been accepted that the power dynamics between a child and other family members are mutual rather than one-sided (Kuczynski and Parkin, 2007). Moreover, children can insert their own meanings into the goods made for them, regardless of the ready-made solutions offered by parents, producers or marketers; they are even capable of imposing quite unexpected and situated meanings on toys: for instance, while playing with Barbie, children might perform through the doll not just 'a glamorous woman's' practices but also those of 'a bad girl' (Attfield, 1996). This taken, it is possible to conclude that children interpret their toys imaginatively, and these interpretations might diverge from those offered by manufactures or parents (Ironico, 2012).

To sum up, these are fast growing user groups whose perspectives on wearables' adoption and use is often overshadowed by the vision of caregivers (doctors, parents or guardians). In addition, aging consumers have often suffered from ageism (Holliday et al., 2015; Ahmad, 2002), are considered ill-equipped for adopting new technologies (Lee and Lyu, 2019) or regarded as particularly vulnerable, though these assumptions are not necessarily true (Berg, 2015). Similarly, children's influence on family consumption has been recently acknowledged (Gram and Grønhøj, 2016; Calvert, 2008), making youth consumers' position particularly captivating for studies.

For mature users, the lowest age limit is set at 50 years because this is when many age-related services become available (Sudbury and Simcock, 2009; Omar et al., 2014). Regarding the child participants, their age bracket was set between 3 and 11 years old by the Finnish wearable producer called 'Reima' (used in the study, more later), so I follow their suggestion.

3.2.1. CONTEXTS FOR COMPARISON: FINLAND AND RUSSIA

After delineating the consumer groups, I proceeded to select the countries for my research. According to Shove and Pantzar (2005), practices are 'homegrown', meaning that presence of the practice's elements in a certain country does not necessarily lead to their successful linking. For instance, Shove and Pantzar (2005) assume that a mere presence of special walking sticks (the material) does not guarantee the popularity of the Nordic walking in a given country, unless this material merges with competences and meanings (also, Shove et al., 2012). Similarly, I am interested whether wearables with overlapping functions enter the same practices if approached in different contexts. This, however, implies that I compare these contexts.

International comparative research has become a common methodology in qualitative research (Glaser, 1978; Strauss and Corbin, 1990), including research on sustainability (Herbes, 2018; Ehnert et al., 2016; Savaya et al., 2008). A comparative study gives an opportunity to contemplate a phenomenon through the lens of several systems (Kosmützky et al., 2020). Other benefits of comparative methodology include overcoming the narrowness of a concrete national context as well as departure from a 'single-country myopia', or the assumption that other contexts follow the same logic (Kosmützky et al., 2020). On a larger scale, discovering differences and similarities across several contexts lets us uncover more general patterns of use of wearables, and, potentially, sheds light on other connected domains within a given context: for example, on aging and the family structure. Meanwhile, comparative research might be problematic in terms of balancing the

uniqueness against the sufficient common ground of the chosen contexts (Goldthorpe, 1997; Sartori, 1991).

For this study, Russia and Finland are chosen as two cases for comparing the use of wearables among consumers over 50 and families with children. In what follows, I will provide a detailed explanation on both contrasting and overlapping characteristics between the two. However, I adhere to Sørensen's (2010) process-oriented approach to comparability. In a nutshell, this approach presupposes an inversion of the standard process of defining a comparative criterion at an early stage of research. Hence, comparison is perceived as a result rather than precondition of the comparative study: specifically, postponing the definition of comparison criteria until the end of research enables finding comparability between field sites we would intuitively never think could be compared (Sørensen, 2010: 75). Previous studies have already suggested shifting away from pre-formulated criterion for comparison (for an overview, see Kosmützky et al., 2020): this way, openness as a core characteristic of qualitative research (Kosmützky et al., 2020) is preserved.

3.2.1.1. CONSUMERS AGED 50+ IN FINLAND AND RUSSIA

In the context of aging, Russia and Finland are two cases with both similar and contrasting characteristics. They are discussed in detail in Article II, and here I reproduce them. First, opportunities offered for aging populations in these neighboring countries are sharply different. On the one hand, Finland is a welfare state with a universal support system (Nordmyr et al., 2020). Russia, on the other, is a transitional economy (Nissanov, 2017) where the notion of an aging individual differs from that in Western countries due to demographics, the retirement system and aging policy (Strizhitskaya, 2016). Statistical data demonstrates a striking difference between aging populations in Russia and Finland: the average life expectancy in Finland is 78.9 and 84.5 years for men and women, respectively (Eurostat, 2020), whereas the same indicator is 66.5 and 77.1 years in the Russian case (Statista, 2020).

Further, the Active Aging Index (AAI) is an important indicator of life quality among the aging population. In this respect, Finland scores highly in measurements connected to employment, social participation, access to medical services, independent living, and gender equality (Zaidi et al., 2018: 27). In contrast, Russia's results are controversial. For example, the scores are decent for indicators of paid employment pursued by older people. Meanwhile, the majority of Russian retirees prefer to stay employed due to low pensions, since one's salary has long been an important supplement of monthly income (Kolev and Paskal, 2003). Moreover, Russian pensioners often undertake low-skilled and low-paid jobs (Tchernina and Tchernin, 2002: 560). Hence, the high employment among Russian aging people might be misleading because it is based primarily on financial necessity.

Meanwhile, Russia's other AAI indicators are modest compared to Europe's average. Quite illustratively, aging people in Russia are four times less physically active compared to their European peers. Next, Russia shows the fifth lowest results regarding healthy and secure living for older people, and independent living for this category is among the lowest in Europe. Co-habitation with children is widespread, which is explained by the persistence of extremely close interfamily ties, but also a severe shortage of housing. However, co-habitation with grown-up children and grandchildren might

constrain the lifestyles of older individuals, especially women, who are at risk of being treated as a nanny (Ryabova et al., 2018)

Thus far, I have been comparing quantitative indicators of Russia and Finland that have been nonetheless interpreted from a cultural position. Next, I switch to qualitative factors. When addressing the public discussion on aging, Pulkki and Tynkkynen, (2016) notice a shift towards a neoliberal paradigm in Finland. Specifically, a new repertoire on active aging that puts forward an independent and self-reliant individual who takes care of their life and health has emerged (Pulkki and Tynkkynen 2016: 73). Overall, Finnish public discourse on aging, albeit without the direct economic underpinning, raises the dichotomy of being a burden (passive and dependent) vis-a-vis an asset (active and in control). In 2019, a political crisis related to welfare (especially provided for the aging population) broke out in Finland. First, serious mistreatments in several Finnish senior care homes were discovered, prompting heated debate on how to ensure decent aging (Care home scandals, 2019; Finland needs to spend, 2019). Measures that aimed to improve senior care should have been part of an ambitious social welfare and healthcare reform (SOTE) in 2019, but, due to its failure, Finland's centrist government resigned (BBC, 2019). Overall, Pulkki and Tynkkynen (2016) highlight that the perpetuation of the neoliberal view on aging goes against the principles of universalism and equity common in the Nordic countries.

In the Russian context, the portrayal of older age groups as deserving of care and help from the state has become common (Davidenko, 2019). However, this is puzzling, taken that the living standards of the majority of retirees are relatively low (Davidenko, 2019). Grigorieva (2006: 35) argues that opportunities for higher self-reliance and independence for post-Soviet citizens are yet to be created. It is controversial that, on the one hand, Russian soon-to-retire people agree that their pension would not be sufficient to maintain a decent lifestyle, but, on the other, still consider it the main source of income (Kuzina, 2007). According to Davidenko (2019: 613): 'The popular discourses that construct Russian citizens as in need of the state's care and unprepared to govern themselves constitutes a discursive field which individuals can draw on when making sense of bodily aging, in terms of both health and appearance'.

Also importantly, before 2019, the retirement age in Russia was fixed at 55 and 60 for women and men, respectively, while in Finland was set at 65 for all. Retirement is regarded as a significant life threshold (Strizhitskaya, 2016; Hansson et al., 2018). Thus, I might argue that different retirement threshold signified different perceptions of 'aged' people in Russia and Finland. However, in 2018, Russian society was shaken by the start of a reform of the retirement system that increased the age of retirement by 5 years for both men and women, now equaling to 65 and 60, respectively. This reform gave rise to a public debate on aging (e.g. Kluge, 2018), especially regarding Russian men's low life expectancy level, and dependence of many Russian people on pension as an additional monthly income that has now been postponed.

In the course of the mentioned reform in Russia, several initiatives for aging groups have been launched. In accordance with the neoliberal paradigm, a shift of care responsibility from the state to subjects has been exemplified through support of a healthy lifestyle movement (zdorovyi obraz zhizni, or ZOZH in Russian) (Chudakova, 2016). For instance, a 'Moscow longevity' programme

('Moskovskoe Dolgoletie[9]') that offers different hobby clubs for senior citizens (including sports, musing, painting, dancing, pottery and languages, all free of charge) has been introduced in the Moscow region, where the participants of this research reside.

To sum up, a discussion on what good and proper aging means has been ongoing in both countries. Notably, this discussion is steered towards the neoliberal discourse within which greater responsibility of aging individuals is emphasized (Steverink et al., 2005; Liu et al., 2017) through participation in economic, cultural, social and civic affairs (WHO, 2002). Drawing on these differences and similarities between Finland and Russia, it is intriguing to investigate how local consumers over 50 have been re-interpreting their age within the shifting paradigms, and how their perceptions are reflected in the practices with wearables.

3.2.1.2. FAMILIES WITH CHILDREN: PARENTING AND HEALTH-RELATED PRACTICES IN FINLAND AND RUSSIA

In this sub-section, I will outline the general characteristics of family practices and parent-child relations in Finland and Russia. However, before proceeding to this theme, I will first provide details about ReimaGo, a wearable device that was distributed among the families.

ReimaGo[10] is a wearable device developed by Finnish companies Reima and Suunto in 2017. As of July 2021, the companies decided to close the project down. The company agreed to partially supply me with their devices and the wristbands for them. In 2020, Reima asked for the details of my research, and based on my overview, agreed to support me with the gadgets.

ReimaGo is a button-shaped device that can be carried around either in the pocket or in a special wristband produced by Reima. In short, it is a basic activity tracker that does not have any screen (see Figure 5). An idea behind ReimaGo is to motivate children to exercise by offering a digital game experience. Specifically, the device measures children's activity and converts it into the points that can later be used in an online game (available on smartphones and tablets). In order to play the online game, it is necessary to download the ReimaGo application and create a personal account. According to an interview conducted with ReimaGo team manager, the device is best suitable for children between 3 and 11 years old.

[9] https://www.mos.ru/en/news/item/47993073/ (retrieved 03.10.2020)
[10] The official page of the wearable https://www.reima.com/int/reimago (retrieved 15.06.2021).

Figure 5. ReimaGo device located in a special wristband. Photo by the participants (Family 2, Finland).

The game is centered around a character called Goey that travels around the world: the pace of travel depends on how active the child has been during the day (see Figure 6). In order to collect the points, it is necessary to 'shake' the device in front of the phone's screen.

The parent can follow and motivate their children to exercise, so ReimaGo implies a co-use of the device by children and their parents. The personal account can be accessed on several devices simultaneously. In addition, the parents can choose a task from a list of 'challenges' or create their own 'challenge': an example of such a task is 'to swim 5 km in 5 days' (ReimaGo is water resistant). It is supposed that the parent offers a reward for the task accomplishment, such as money, an ice cream or a day in an amusement park. These 'rewards' can be defined as 'social' (Saksono et al., 2020), meaning that they were designed for initiating interaction that can satisfy the need for relatedness.

Reima developed a specific marketing campaign for ReimaGo, based on cooperation with schools and kindergartens in Finland. The device was distributed among the pupils in certain institutions, and teachers/instructors followed their activity. For this group activity, Reima developed a separate 'group mode' that followed the activity of all the children in the group simultaneously. Similar to the parents, the instructor could create tasks/challenges that the group accomplishes.

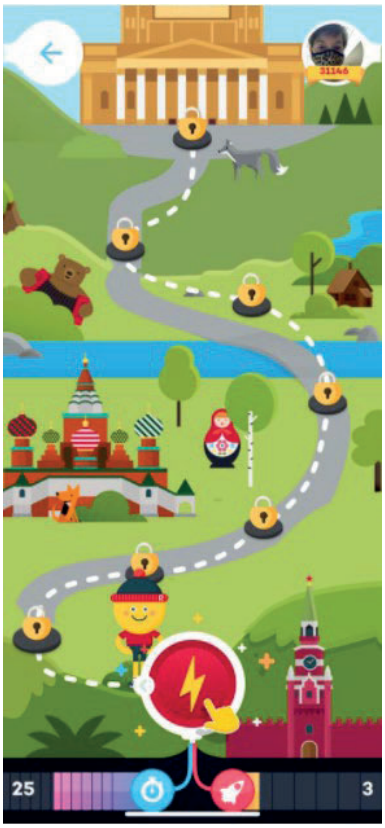

Figure 6. ReimaGo app interface (the author's private account in the game). A yellow character is controlled by the player. It moves forward, depending on how many points a child collects during the day. Points are calculated based on child's physical activity. A bar in the lower part of the screen demonstrates how many points the player currently has: points tied to duration of physical activity (25 points) and points tied to intensity of activity (3 points). Photo by the author.

Regarding the national markets, ReimaGo was available in numerous countries. The Russian market is important for the company: according to the official webpage of the company[11], Russia and Finland are their largest markets, respectfully.

Though the markets' volume and size have been important when making a decision on the context for this sub-study, a catalyst idea behind this choice was possible difference in parenting practices. According to Gram and Grønhøj (2016) context plays a pivotal role when studying upbringing and family practices: in Scandinavian countries, autonomy ideals, along with democratic family values, are more pronounced (Malpas and Lambert, 1993; Gram, 2007). Additionally, these countries are characterized by a low hierarchy between parents and children, which leads to the inclusion of children into a greater scope of family practices (Gram and Grønhøj, 2016).

Parenting practices with young children have become a major point of academic interest and academic debate (Eerola et al., 2021). They can be defined as 'a combination of hands-on care work (for example, putting a child to sleep, playing with and reading to a child), mental labour (for example, making decisions about care arrangements) and household labour (for example, cooking, cleaning the home)' (Eerola et al., 2021). In a nutshell, parenting practices have been undergoing major changes recently, including shifts in gender roles, increase in time dedicated to the family practices, and re-conceptualization of 'good parenting' (Eerola et al., 2021). Though the parenting and family practices in both Finland and Russia have been influenced by these major developments, the shift has occurred to a different degree.

The most discussed topics related to parenting are linked to three pivotal patterns. First, childrearing has become an increasingly demanding and labor-intensive endeavor for parents (Miller, 2017; Gillies, 2020). Next, under intensified expectations of 'good' parenthood, parents started to devote much more time to their children (Rose et al, 2015; Miller, 2017). Finally, due to changes in gender roles, including the spread of a more caring masculinity model, fathers have become more intimately engaged into parenting than before, mainly in the Western societies (Johansson and Klinth, 2008).

Regardless of this last trend, parenting is still strongly divided by gender (Rose et al., 2015). Recent findings address that young children are cared for predominantly by their mothers (Erola et al., 2021).

[11] https://www.reima.com/int/about-us (retrieved 13.05.2021)

Compared to other Nordic countries, Finnish mothers remain by their small children for a longer period and gender imbalance is greater (Erola et al., 2021). Russia, meanwhile, has been undergoing a transitional period in this respect. According to Chernova and Shpakovskaya (2013), the Soviet model of fatherhood seriously undermined men's role as fathers, pushing them towards a bread-winning model. In post-Soviet Russia, family practices and gender roles have been slowly renegotiated (Rozhdestvenskaya, 2020; Kukhterin, 2000): still, many men are not used to participation in family life, while mothers carry the double burden, being the primarily caregivers as well as staying active in the labor market. Hence, mothers are still more involved in mundane caring tasks compared to fathers who are more in charge of leisure and recreational activities (Rose et al., 2014). In addition, mothers usually undertake mental labor and managerial practices of childcare and family life in general (Miller, 2017; Eerola et al., 2021), whereas fathers prefer to opt out of tasks they find too difficult or less comfortable to carry out (Rose et al., 2014; Eerola et al., 2021).

Interestingly, previous studies (Sikiö et al., 2018; Gherasim et al., 2017) indicate that an authoritative parenting style has been prevailing in both Russia and Finland. Similar to many Western countries, an authoritative parenting style (for a review, see Sorkhabi, 2005) characterized by warmth and a positive and attentive attitude towards children's needs on the parents' side dominates in Finland (Sikiö et al., 2018: 245). In addition, this parental style implies better social skills and academic success among children (Baumrind et al. 2010; Chan and Koo 2011; Gherasim et al., 2017). In Russia, children also tend to perceive their parents' styles – particularly mothers' – as more authoritative (Glendinning, 2015). Researchers link this outcome to increased access to Western media and lifestyles that prioritize higher autonomy and independence for children (Barnhart et al., 2013; Gherasim et al., 2017). Hence, 'newer cohorts in Eastern Europe may report more favorable parenting behaviors' (Gherasim et al., 2017: 1023).

Since ReimaGo is linked to physical activity, it is worth mentioning that parental style is central to children's physical practices (Määttä et al., 2018). By observing their parents or co-participating with them in sport-related practices, children can become recruited into new practices (Bandura, 1986; Fuemmeler et al., 2011). Importantly, co-participation includes encouragement and support towards children on the parents' side, and it proves to be particularly important for pre-school children (Määttä et al., 2018), whereas the role of friends and other social environments increases as a child grows (Loucaides and Tsangaridou, 2017).

3.3. FINNISH MEDIA LANDSCAPE

The arrival of new and innovative technology often makes consumers contemplate whether they need to adopt it. For many, the reality of science and technology is shaped by media rather than through firsthand experience (Nelkin, 1987: 2). In this respect, media undertakes an ontological role of shaping a reality (Nelkin, 1987; Ruckenstein and Pantzar, 2019).

By examining articles on wearables published in Finnish media, my purpose is to investigate how wearable technology has been emerging and eventually perpetuating as a public phenomenon through media coverage (Horsbøl, 2013). Furthermore, I am approaching media depictions of wearables as disembodied versions of practices and their constituting elements (Pantzar and Shove, 2010). This way, they are regarded as general patterns offered to the readers as a possible toolkit for adoption. Given the novelty of the technology, media might be one of the channels for recruiting carriers into practices with these kinds of devices.

Additionally, from the late 1980s, issues related to sustainability have been re-surfacing in media, becoming more controversial and politicized (Horsbøl, 2013). Therefore, I also intend to scrutinize the discussion on wearable technology and practices connected to them in Finnish media, as well as link to different aspects of sustainability that underlie this discussion.

In a nutshell, media's impact on the emergence and construction of a certain phenomenon can be divided into three major aspects (for an overview, see Horsbøl, 2013). To begin with, the media selects the topics to discuss (Dearing et al., 1996). Next, 'the media make topics intelligible by relating them to existing frames, discourses, genres, and narratives' (see Horsbøl, 2013: 20). This way, frames are sustained or modified. Finally, the media brings forward certain agents positioned as 'experts', 'scientists', 'protesters', etc. (Horsbøl, 2013).

Though it is hard to evaluate the relationships between the media coverage and subsequent public effect (Ten Eyck, 2005), news media is still considered important because it is publicly available and informs readers on technological developments (Te Kulve, 2006). Additionally, few people have personal experience with a new technology, so media coverage becomes an important source of information for their assessment (Te Kulve, 2006).

Couldry and Hobart (2010: 31–37) suggest that the current trends in media increases opportunities for consumers to choose between various media discourses as well as reproduce and engage with the ones they trust the most. In this respect, popularity and high trust of media in Finland is one of the arguments for selecting it as a context to study the media discussion on wearable technology.

In this study, digital media is understood as an online format used to distribute the articles (see Couldry, 2004) by a newspaper or a broadcasting agency. Hence, I am not concerned with social media, nor do I look at the online activity by the readers of the online resources I study. On the contrary, I am interested in the virtual format adopted by two large Finnish players in the news media industry.

Finland is chosen as a context for several reasons. First, the Finnish news media landscape is quite homogeneous in terms of players: there is one strong state-owned broadcaster (a network of TV, radio and digital news media called Yle, with strong regional press represented by free-of-charge local

newspapers), one widely read national daily paper (Helsingin Sanomat) and two major tabloids (Ilta-Sanomat and Iltalehti).

Second, Finnish news media boasts one of the highest levels of trust among the readers in Europe – 56% as of 2020 (Newman et al., 2020: 14-15). To compare, only five other countries have trust level over 50% (Newman et al., 2020: 14-15). Finnish figures might be interpreted through a high trust in public institutions in Finland, and the absence of a harsh political divide between the Finnish mainstream news sources (Reunanen, 2019).

Finally, the majority of Finnish respondents of a recent study choose online news media platforms or their apps as the principal source to verify news (Newman et al., 2020). In comparison, elsewhere it is frequently either a search engine or social media (Newman et al., 2020: 14).

The Finnish media landscape is also an intriguing context for studying, since the habit of reading newspapers has always been strong in Finland: in 2019, 81% of Finns reported that they read digital newspapers weekly (KMT, 2019). Finnish news media has maintained a relatively high circulation rate: notwithstanding a drop in the share of weekly print numbers, the number of readers of digital newspapers has been growing (KMT, 2019). In 2019, 19% of Finns paid for at least one online news service, which was 3% higher than in 2018. Public broadcaster Yle is the most trusted digital news source, followed by local media (Newman et al., 2020: 14-15).

Another interesting feature related to my study is general interest towards science and technology in Finland: in 2019, seven out of ten Finns answered that they trusted science and followed the science news (Tiedebarometri, 2019). Media has reacted to this general interest from the public, and a repertoire of scientific projects and their commercializing has been featuring strongly in Finnish media (Väliverronen, 2001).

Also noteworthy, Finland has become known as a high-tech society (Rönkä, 2011) and a nation of innovative engineers (Valaskivi, 2016). The image of the technological nation has become a strong tool for Finns to present themselves to the world (Castells and Himanen, 2001) that replaced a previous association with forestry and the Soviet Union's satellite (Castells and Himanen, 2001: 139). Information technology proved to become a means to demonstrate to the world that Finland was no longer either poor or technologically retarded (Rönkä, 2011), and the media adopted a very positive view on the technology and the players in the market, primarily Nokia (Rönkä, 2011). Thus, there were few critical accounts related to their activity and technology in Finnish media (Rönkä, 2011).

For this study, I use data collected from two Finnish digital news platforms: state-owned Yle and the commercial Helsingin Sanomat (HS). Yle is a national public broadcasting company. It is financed by an annual tax and includes a TV, radio and online news webpage. All of these services are free of charge. In 2019, 96% of Finns accessed one of Yle's services at least once per week, and the resource has managed to appeal to a very diverse audience in terms of age, geography and political preferences (Horowitz and Leino, 2020). Regardless of state-funding, the state does not impose any editorial control over Yle's resources, and the recourse has been traditionally perceived as functioning across political lines (Sivonen and Saarinen, 2018). Furthermore, an unprecedented share of 90% of readers have evaluated Yle's reliability as "fairly or very reliable", making the platform the most trusted media brand in Finland, followed by HS (Matikainen et al., 2020).

Helsingin Sanomat (HS) is one of the largest commercial daily newspapers in the Nordic countries. Its online webpage was launched in 1999. Recently, HS has been tightening its online access policy, now giving access to only a limited share of content to unsubscribed readers. Simultaneously, HS started to offer flexile online subscriptions for a fee, frequently bundled with paper versions. In 2019, HS had around 100,000 regular digital subscribers (Reunanen, 2019), and an average number of daily readers exceeded one million (KMT, 2019).

Finally, I made a decision to focus on one national context in this sub-study. Though I agree that looking at international media platforms or official documents related to wearable technology and sustainability might have provided a broader perspective, enquiring into a local context may result in a more concrete examples important for decision-making (Horsbøl, 2013).

4. CHAPTER 4. METHODOLOGY

A practice-based perspective, as mentioned, re-positions the focus of attention from the individual actors and impersonal social structures to situated and extra-individual practices (Trowler, 2013). This bears several important implications that influence the nature of research (Trowler, 2013). First, practices are organized constellations of different people's activities, therefore, practices are social in nature (Schatzki, 2012). Further, practices represent co-constructed yet circumscribed realities (Trowler, 2013). Finally, practices are relational, 'involving patterned forms of social interaction' (Trowler, 2013: 19; Kemmis, 2009).

Practice theory occupies an in-between position regarding individualism and structuralism, assuming that both individuals and institutions are products or elements of different practices: 'both social order and individuality… result from practices' (Schatzki, 1996: 13). On the one hand, carriers can, to some extent, alter these practices through individual performances (Shove et al., 2012). On the other hand, the practice theory framework suggests that there is more to reality than social constructivism because there are also social structures – encoded into contexts – that have an effect on how practices emerge and crystalize.

Furthermore, the practices are rooted in materiality that is linked to control of resources and power to gain access to them (Giddens, 1984; Schatzki, 2002; Warde, 2005). Hence, the first concern is the nature of the researched objects within the practice theory paradigm: since they can be material artefacts, knowledge, meanings, doings, etc., the study should not rule out multiple understandings of the object (Trowler, 2013). For example, Mol (2003, 157) stresses that, in her research on atherosclerosis, the practical approach 'encompasses molecules and money, cells and worries, bodies, knives, and smiles, and talks about all of these in a single breath.' Such a stance implies that a researcher may decide on the factors that determine the conditions for practices' enactment and offer a conceptual explanation of factors that are important and significant (see Trowler, 2013). This view is compatible with a proposition by Galvin and Sunikka-Blank (2016), who recommend to regard practice theory as a heuristic model. They explain that, as a rule, 'a practice' is not something 'existing somewhere waiting to be found and described' (p. 66). Indeed, when I am talking about a practice of commercializing, it is rather a heuristically constructed concept through which I manage to get closer to the phenomenon of business sustainability. Similarly, when exploring the recruitment of families into practices with ReimaGo, 'recruitment' is a concept that helps me frame the problem of environmental sustainability. Overall, these are not statements about 'the way the world is', but rather how 'certain features of it can be usefully modelled in order to make other useful statements' (Galvin and Sunikka-Blank, 2016: 66).

4.1. EXPLORATORY RESEARCH

There are three general types of scientific purposes identified in the literature (Robson and McCartan, 2016): exploratory, explanatory and descriptive. This study is set to understand relationships between use of wearable technology and sustainability, conceptualized in practical terms. Hence, I define the purpose of this study as exploratory as it is about gaining understanding of a phenomenon rather than finding and explaining causalities. Exploratory research does not have any pre-set expectations regarding the outcome, and it seeks to gain knowledge about the nature of the study's issue (Saunders et al., 2012). As a rule, exploratory research relies on qualitative research methods which allow seeing the phenomenon in its own context instead of drawing on explicit and pre-existing expectations (as is the case of quantitative studies) (Silverman, 2014). Though exploratory research does not offer explicit causal explanations, it makes it possible to get close to the phenomenon, and enables thick and nuanced explorations of details that may otherwise remain undiscovered. By adopting the practice theory lens, this study seeks to explore in what ways systems of different and interconnected practices with wearable technology mutually shape sustainability. This strong emphasis on the dynamics of practices shifts attention from wearable technology as a source of problems and solutions, and turns attention to whether and how practices with wearables can account for sustainability.

4.2. HOW TO EMPIRICALLY STUDY PRACTICES

When deciding on the methods for this study, I had to consider two major issues. First, what methods let me capture the routines that are embodied and often performed automatically. This issue is referred to as a 'double nature' of practices (Smagacz-Poziemska et al., 2021) – meaning that social practices are 'both implicit and observable phenomena' (p. 65). Next, I had to define how to identify and delimit the practices when data are already elicited, with respect to practices-as-performances and practices-as-entities (Shove et al., 2012).

It might be challenging for people to verbally explain a given practice. Each person performs a myriad of complex practices that are normalized, often invisible to their carriers, but also embodied in terms of emotions, skills and assumptions (Trowler, 2013). Giddens (1984) summarizes these relations between practices and their participants as 'practical consciousness' that refers to 'simply knowing' how to 'go on' without conscious attention. Similarly, Bourdieu (1990) deploys a notion of 'habitus' that makes people intuitively feel what a 'right' thing to do is.

This taken, talk-based methods' effectiveness to capture the routinized character of the practices has been questioned (Martens, 2012; Warde, 2005; Hitchings, 2012; Keller et al., 2016). For example, interviewing has been portrayed as insufficient for grasping the dynamic nature of practices because it is difficult to properly articulate and explain one's own routine (Schatzki 1996, 126; Martens 2012). An assumption that the discursive form might not be appropriate for capturing practices stems from the position that an individual occupies within practice theory. Namely, human 'will' is de-centered and relegated to habitual behavior that is reproduced according to its internal logic (Schatzki 2002: 73). Hence, practices recruit individuals who become 'carriers' (Shove et al., 2012) and effortlessly drift along 'without giving it much thought' (Reckwitz, 2002; Hitchings, 2012).

However, interviews as a method for studying practices have been implemented in many prominent practice-oriented studies. For example, recognized practice theory proponents Shove and Pantzar (2005, 2010) analyze Nordic walking based on the narratives elicited though the interviews with consumers as well as business and NGO representatives. An interesting approach for studying organizational practices has been suggested by Nicolini (2009; also Gherardi, 2012): an interview to a double. This is a sort of a projective technique where an interviewee writes a detailed instruction on their practices to an imagined double. An interview's role is to make clarifying questions to ensure that the instruction is full and comprehendible.

Further, Hitchings (2011), in his reflection on the effectiveness of interviewing in the study of routines, stresses that the interviewees were well aware of alternative ways to perform practices and were eager to discuss them, thus rebutting the notion of 'impotent' carriers (Reckwitz, 2002: 250). Practice theory, according to Hitchings (2012) should be regarded as a 'framework' rather than a finite statement of truth (also Reckwitz, 2002: 257). Therefore, it can be acceptable that individuals still bear some scope of agency over their practices, as seen through amendments brought into practices through improvisations (Shove and Pantzar, 2007). Overall, regardless of 'hard-line' formulations in which 'wants and emotions' belong to the practices rather than individuals (Schatzki, 1996: 254), an in-depth talk can still provide a way to 'access these aspects' (Hitchings, 2012), much like a tennis player, preoccupied with the game in the course of a match, can still evaluate and discuss

the game afterwards (Burkitt, 2002: 230). Warde (2005), in a similar way, concludes that, taken the growing reflexivity of modern societies, the 'narrative form of explanation employed in empirical studies of practice is entirely suitable' (p.289).

The second issue is how to de-limit the practices in the study (Keller et al., 2016; Halkier and Jensen, 2011). Due to the analytical distinction between 'practice-as-entity' and 'practice-as-performance', it needs to be clarified what dimensions of a practice are scrutinized. Practice-as-performance is often individual and is built on unique resources, meanings and competences. Meanwhile, practice-as-entity represents a reservoir or a template of possible performances. While practices-as-performance can be a source of situated innovations that may provide insights into how to steer practices towards more sustainable directions, practices-as-entities are a more enduring and encompassing dimension, and it is their change that is fundamental for sustainable improvement (Shove et al., 2012).

According to Røpke (2009), it is necessary to find out what makes sense to the people who perform these practices. This way, it is the practice-as-performance that is recognized. On the other hand, Warde (2014) maintains that criteria for identifying a practice is whether it is possible to write an instruction, whether there is a special equipment needed to perform this practice, or whether there are disputes about the 'standards' on how to perform the practice in question. Therefore, it is rather the practice-as-entity that Warde suggests to research.

Ethnographic research on practices frequently draws on a hybrid of methods that combine several approaches (Trowler, 2013). Bissell (2010), for instance, emphasizes how many details within a routine lies outside the 'narrowly discursive' (p. 271), and, hence, calls for supplementing the study with auto-ethnographic work. In a study on pro-environmental shifts of practices, Hargreaves (2011) supports data from interviews with nine months of in-situ observations. Projective techniques when a participant is asked to imagine themselves in issues of another person or construct some situation are applicable, and can shed light on taken-for-granted knowledge (Trowler, 2013).

Accordingly, many researchers have been experimenting and exploring new methods and combinations of methods to uncover the practices (Trowler, 2013). There is an overall agreement (Martens et al., 2014) that a creative approach to 'praxiography' (Hine, 2000) is essential for development of the practice theory in general, and understanding of sustainable consumption in particular.

Finally, I was inspired by Nicolini's concept (2012) of 'zooming in and out' that helps operationalize the exploration of practices. 'Zooming in' refers to a deeper exploration of a single practice by looking at its performance: for example, at the materials, or temporal and spatial dimensions. 'Zooming out' means looking at a larger picture of the bundles of practices (Shove et al., 2012) and the role of the context.

To conclude, there is no clear and agreed upon scheme for how to empirically study practices. Trowler (2013: 19) offers a profound definition of what a practice-focused ethnography might look like:

> … fine-grained, usually immersive, multi-method research into particular social activities aimed at developing 'thick description' (Geertz, 1983) of the structured behavioural dispositions, social relations, sets of discourses, ways of thinking, procedures, emotional responses and motivations in play. Beyond that descriptive

agenda the approach seeks to uncover broader reservoirs of ways of thinking and practicing which are being differently instantiated locally.

Drawing on this definition and previous practice-based studies, I developed a methodology that encompasses a variety of methods that supplement and support each other. Figure 7 below summarizes the employed methods and basic details associated with them:

Method	**Participants**	**Dates**	**Location**	**Type of a practice**	**Documents**
Expert interviews (individual)	13 entrepreneurs working with wearable technology	October 2018 – June 2019	12 online, via Skype or WhatsApp, 1 face-to-face	Gathering individual accounts on commercializing practice, what materials, skills are needed and what meanings the experts attach to this practices: **practice-as-performance**	Audio files[12], transcribed interviews and memos
Semi-structured interviews (individual)	17 consumers aged 50+ and using smartwatches and fitness trackers	February 2019 – December 2019	14 face-to-face in public spaces (cafes, libraries, etc.), 3 online via WhatsApp	Gathering individual accounts on daily practices with wearables, meanings attached to this use, problems that the users have been facing, perceptions of age and aging: **practice-as-performance**	Audio files, transcribed interviews, memos and photographs
Audio-, video- and text- diaries (parents and children, either jointly or separately)	Families with children testing ReimaGo device	August 2020 – November 2021	Online (through the university email)	Gathering individual accounts of children and their children on adaptation of ReimaGo device to their family routines: **practice-as-performance**	Audio, video and textual files, photographs.
Data scraping with a Python code	Finnish digital news media	December 2020 – January 2021		Gathering all the corpus of articles between 2000 and 2020 on wearable technology, general discussion on how to use wearables: **practice-as-entity**	Text file with the retrieved articles, an excel table that summarizes general

[12] Transcripts of this and other sub-sections of the fieldwork are not included into Appendices, but audio files, transcripts and memos can be accessed upon request.

					information of each article

Figure 7. The empirical methods used for data collections

Following the recommendations by Trowler (2013), I rely on a mixture of methods, including visual and audio. Interviews and diaries elicit individual accounts on how specific carriers use their wearables in daily lives, including all the variations, unexpected situations and improvisations (Shove et al., 2012; Røpke, 2009). With data scraping (Saurkar et al., 2018), I intend to reinforce my research with data on practices-as-entities. Specifically, I collected a corpus of Finnish-language articles on wearable technology published online between 2000 and 2020. These data are a collection of a broad range of different users' accounts as well as discussions on how wearables should or could be used. Therefore, I regard these media data as suitable for capturing more 'general' repertoires that guide the practices with wearables. By employing several methods, I was also trying to enable Nicolini's 'zooming in and out' concept (2012) and move between single practices and bundles of several ones.

The detailed outline of the participants of each sub-study is available in the Appendices. A table on data from Finnish digital media is available from the author upon request.

4.3. COMMERCIALIZING WEARABLES: EXPERT INTERVIEWS

An expert interview is an empirical method that has been widely applied in social research since the 1990s, though with a clear dominance in the European context (Gläser and Laudel, 2004; Kaiser, 2014; Van Audenhove and Donders, 2019). The expert interviews are based on an expert's knowledge that is vital for exploring a specific filed (Döringer, 2021; Meuser and Nagel, 2009). Though there is no universal criterion on what one needs for being regarded as an expert, general agreement maintains this is someone who possesses a subject-sensitive knowledge, or holds a certain status or position within the studied community (Kaiser, 2014). Meanwhile, there is a call for acknowledging a broader specificity of experts' knowledge that goes beyond merely technical skills or systematic organized knowledge (Bogner and Menz, 2009; Van Audenhove and Donders, 2019). Accordingly, it has been suggested to investigate into experts' implicit knowledge that relates, for example, to power relations, group behaviors, access to information, problem-solving and realizations of concepts (Döringer, 2021; Meuser and Nagel, 2009).

Expert interviews might be divided into several types. One is the exploratory expert interview employed to gain first-hand information of the new and unknown field for further orientation. The interviewees are an internal source of contextual knowledge necessary to structure a new field and generate early hypotheses (Meuser and Nagel, 2009). The initial idea of the expert interviews, right at the beginning of my PhD work, was to follow this exploratory type. My intention was to collect technical and processual knowledge: the former means specific technical skills and know-hows necessary to design and commercialize wearable technology, whereas the latter is the knowledge of the processes happening in the market of wearables comprised by interactions, routines and social practices (Van Audenhove and Donders, 2019).

However, this original intention was reconsidered due to a specific event that occurred in an early stage of my fieldwork. I encountered an interaction problem with one of the interviewees who refused elaboration on a certain question and abruptly withdrew from interviewing (Roulston, 2014). Upon reflection on this episode, I realized that this reaction might be due to overall nervous atmosphere in the market of wearables caused, for example, by aggressive competition over copyrights (Mück et al. 2019). Indeed, the experts (many of whom are entrepreneurs and inventors of the wearables) have to present their prototypes in front of investors or during crowdfunding campaigns. This is when technological details of the wearables become public, and, thus, information theft can occur, which has been common in the world of technology (Barton, 1992). This episode made me re-think the design of my expert interviews. First, the idea of collecting technical knowledge was abandoned since I realized that the experts would hardly jeopardize the exclusivity of their wearables. Therefore, I concentrated on processual knowledge (Van Audenhove and Donders, 2019). More critically, I changed the scheme of the interviews from exploratory to problem-centered.

A problem-centered expert interview centers around a refinement of the field 'problem' jointly by the researcher and the expert (Döringer, 2021). In this case, I am interested in the problem of slow and often unsuccessful commercialization of wearables among small entrepreneurs. Expert interviews of this type are based on the previously acquired theoretical and empirical knowledge of the researcher and situated and individual knowledge of the interviewee (Scheibelhofer, 2008). The problem-based expert interview follows a specific procedure. The researcher begins an interview by asking an open-

ended question in order to facilitate a detailed narration structured and directed by an expert's individual concerns (Witzel and Reiter, 2012). This nature of the problem-centered expert interview 'corresponds perfectly with the interest in investigating the interpretive dimension of expert knowledge […] as long as it considers the specific role of the respondent in the conversation' (Witzel and Reiter, 2012: 21).

For this part of the study, I identified the experts based on their field-specific knowledge or position in the market of wearables (Kaiser, 2014). The general criterion was to interview small-scale entrepreneurs who had experience with commercializing a wearable product, including an already terminated wearable product, a product that was successfully launched into the market, or a prototype that was planned for commercializing. No particular country or wearable product was prioritized over others.

In order to find the participants, I undertook an online search: for example, I looked for potential interviewees within entrepreneurs' project webpages and portfolios. As a result, the group of thirteen participants consisted of designers, engineers, a sculptor, an artist, a marketing professional, a psychologist and an architect (the list of the participants is available in Appendix A). The participants were selected using a purposeful sampling technique that proved to be efficient for identifying information-rich cases when resources are limited (Patton, 2002). Purposeful sampling is also suitable for selecting participants who are particularly knowledgeable or experienced about the studied topic (Cresswell and Plano Clark, 2007).

On average, the interviews lasted for 50 minutes, and all but one were conducted via Skype or WhatsApp. One interview was carried out in person in Berlin where the expert resided, and I was taking part in an unrelated event. The interviews were recorded after the experts had given their permission.

Following the procedure of problem-centered expert interviews, I formulated my questions in a way that encouraged the experts to tell long and in-depth stories (Witzel and Reiter, 2012). However, the core idea behind my inquiries were the problem of commercializing of these innovative technological devices. The first block of questions touched upon the individual projects of the experts; afterwards, I proceeded to the second block dedicated to the experts' vision of the wearable market in general.

Though the interviewed experts comprised quite a heterogeneous group in terms of professions, I regard it as an advantage. As mentioned (see Dunne, 2010), the wearable industry has been suffering due to weak ties between the industries, such as fashion and engineering. In this sense, participation of professionals from different fields allows this study to capture a broader vision on the wearable market, as well as understand different approaches to commercializing.

Both men and women are equally represented among the experts. I regarded it as important to contact a sufficient number of women entrepreneurs. Wearables are technological devices, and women are still underrepresented in the technology sector (Ozkazanc-Pan and Clark Muntean, 2016).

Over a half of the experts were scientists: many of them hold a PhD degree, or have been employed as researchers. In recent years, universities have been crafting different policies to stimulate technological entrepreneurship among their students and researchers (Swamidass, 2013). Start-ups originating from university projects are referred to as 'spinoffs' (Abramo et al., 2012), and have been

regarded as problematic, mainly due to a profound difference between researchers' and entrepreneurs' identities (Jain et al., 2009). Therefore, I regard inclusion of wearable entrepreneurs who are simultaneously researchers as an opportunity for a comparison with those firmly rooted in purely entrepreneurial activity.

Finally, my search for the experts resulted in quite a wide geography: the participants are coming from Russia, the USA, and various European countries, including Estonia and the Netherlands. In addition to geographical variety, the wearable projects come from different economic sectors: private, public as well as purely artistic. Thanks to this variety, I manage to contextualize the practice of commercializing not only across different geographies, but also across different economic sectors.

To conclude, the group of the interviewed experts is heterogeneous, but 'researchers are dependent on the ability to categorize and delimit: our research fields as well as our objects and subjects of research' (Bloksgaard et al., 2012: 70). Though the participants' background is not homogeneous, I regard it as an opportunity to uncover unexpected and captivating details that originate from different fields, countries and backgrounds.

4.4. AGE 50+ USERS AND WEARABLES: SEMI-STRUCTURED INTERVIEWS

In order to understand practices with wearable technology undertaken by consumers over 50, I conducted 17 semi-structured interviews (for details, see Appendix B). The logic behind my choice of method was to obtain first-hand and in-depth descriptions of the interviewees' lived world with a focus on interpretations of the meaning of the phenomenon in question (Kvale and Brinkmann, 2009).

Gaining access to the research sites is individual in each case, and it is a researcher's task to gain knowledge on the research site to successfully negotiate an entry (Wanat, 2008). Two different procedures were used to locate participants in Russia and Finland. In the former case, my family connections were relied on to access to aged 50+ users of wearables. Since my parents are of the same age as my target group, they helped me recruit the first interviewee in Russia. After the first interview, I proceeded with a snowball sampling method (Bernard, 2005). This method is based on personal ties in a given community, thus opening access to trusted and suitable participants (Derrien and Stokowski, 2014). On the other hand, snowball sampling might prioritize certain socio-cultural features over others, thus resulting in a biased pool of participants. To avoid this, I tried to expand my 'snowball' starting points: namely, I was asking to suggest potential contacts after each interview. As a result, my empirical pool of interviewees expanded far beyond an initial network.

As far as Finland is concerned, the search for participants turned out to be a challenge and took longer than expected. In the beginning, I tried to rely on my social connections, as had been done in Russia. However, this yielded only a limited number of participants. Next, I tried to recruit the participants through public institutions, such as libraries. This way, I managed to find only one participant. Finally, I decided to access the target group though gatekeepers who are in a position of power to grant access into a desired group (Wanat, 2008). Gatekeepers can be formal and informal, and often protect both research settings and the participants who might be vulnerable individuals (Berg, 2004). I pinpointed several non-governmental organizations focused on activities of aging individuals. One of them provides help in handling technology for older users. The head of this NGO replied to my request and forwarded it to organization's members. As a result, five wearable users over 50 agreed to participate. For privacy concerns, I do not reveal the real name of this NGO and here refer to it as 'TechHelp'.

I am nonetheless aware that gaining access to interviewees through the gatekeeper may cause selection bias (Crocker et al., 2015), as the eligible interviewees might differ from the non-invited—specifically, in this case, TechHelp volunteers are technically literate individuals who have long been handling different devices. On the other hand, Russian and Finnish participants turned out to be similar in terms of income, education, and lifestyle. Additionally, almost all of them resided in the capital areas of their countries. Also importantly, none of my interviewees had any exceptional health conditions that required constant supervision. Appendix B summarizes the main characteristics of the participants.

The wearables used by the interviewees were wrist-worn devices made by Samsung, Apple, Garmin, Polar, Suunto and some unknown brands. Generally, the functions of the devices were similar to each other. On the one hand, these devices can connect to smartphones via Bluetooth and provide access

to messengers, phone calls, emails, eBooks, music, etc. On the other hand, they measure physical activity, sleeping cycles, and other health-related indicators.

The ages of the interviewees ranged from 50 to 73, with men and women equally represented. The shortest period of owning and using a wearable was four months, while the longest was over three years. For some, this was not their first wrist-worn wearable. Among the Russian interviewees, one was retired at the time of the interview. There were five retirees among the Finnish participants. All Russian interviewees earned a monthly income above the average (over 45,000 rub, about 655 euro per month) (Rosstat, 2019), were residing in Moscow at the time of the interviews, and were living separately from their children and grandchildren. There was greater fluctuation in monthly income among the Finnish interviewees, with the lowest being between 1500 and 2000 and the highest between 4500 and 5000 euros (Tilastokeskus, 2017). Six Finnish interviewees were residing in the Helsinki area, and one in Pori (a municipality on the Finnish West coast).

All the interviews were of a semi-structured, open-ended and flexible nature. However, an interview guide served as a guideline for the interview conduct. As a rule, at the beginning of an interview, I asked the participants to show me their wearable device and we casually chatted about what it can do. In this way I hoped to build a trust between the participant and myself and set a relaxed direction for our interview, one that could be described as a 'conversation with a purpose' (Hennink et al., 2011: 109). In all but one case, the interviews were conducted in the native language of the participant: Russian or Finnish. Only one Finnish participant wanted to be interviewed in English. This person, however, was a linguist, so her language proficiency was superb.

The interview questions were split into several blocks: first, I discussed overall lifestyle with the participants, afterwards proceeding to the use of their smartwatches and fitness trackers with particular focus on specific situations and actions they undertake with this technology. At some point, I noticed that eliciting data on the meaning of wearables' use was hard, so I decided to apply a projective technique common in consumer research (Donoghue, 2000; Trowler, 2013): I asked the participants what kind of a living being their wearable would have been and what relations they would have had. Though this question turned out to be difficult to some of the interviewees, generally, the participants managed to develop quite captivating storylines on their relations with an imagined wearable-character. This projection of a situation allowed the interviews to gain access to taken-for-granted knowledge, as well as uncover differences in perspective on the issue (Trowler, 2013).

During the interview, the participants showed me past measurements carried out by their smartwatches/fitness trackers, and this retrospective was helpful for describing and explaining interviewees' lifestyle and routine. A lot of follow-up questions that had not been formulated beforehand emerged in the process of looking through measurements. Therefore, the semi-structured nature of my interviews allowed me to account for the differences between the interviewees' lifestyles. To conclude, thanks to the semi-structured nature of my interviews, I managed to keep a balance between eliciting compatible data and staying responsive to unexpected and individual details unique for a specific interviewee (Hennik et al., 2011).

4.5. FAMILY PRACTICES WITH REIMAGO: THE DIARY METHOD

Shove and Pantzar (2007: 165) argue that 'practitioners' careers are shaped by an inevitable accumulation of experience' acquired through the performance of practices. In order to trace this accumulation, I adopted the diary method, which allows one to trace the emergence of new experiences on a regular basis.

A diary is a frequently kept record of personal experience and observations in which a person expresses her ongoing thoughts, feelings and ideas (Travers, 2011). Roth (2015) suggests that a diary is a 'prestructured self-observation' (p.340). Keeping a regular record on one's experience can result in rich data on personal motives, events, feelings and beliefs (Bartlett and Milligan, 2015). Considering the practice-based framework, the diary method helps eliminate two major problems: the retrospection problem and the space-time problem (Roth, 2015).

First, with the diary method, the time lapse between carrying out an activity and describing it is minimal, as compared to interviewing In other words, when an interview takes place, interactions with ReimaGo, emotions, dynamics, symbolic connotations, the context of use and other tiny yet important details are at risk to stay undiscovered. As Roth (2015) puts it: '(I)nterviewees probably forget specific interactions systematically, have false memories, and cannot remember the relevant details clearly' (p. 339). This is what is referred to as the retrospection problem (Roth, 2015.). As far as the space-time methodological problem is concerned, the material embeddedness of the practices, as well as its link to a certain rhythm, are crucial for interpreting the data. In-situ observations might have partially provided access to these factors; however, many practices occur in intimate space and are very dispersed in terms of time (Shove et al., 2012). Therefore, observations would be restricted in this respect, and could have gathered distortion data.

In order to recruit the families for this study, I contacted several NGOs in Finland, including an NGO that specializes on father-child relationships. As a result, four Finnish families were recruited. All of them had two children (aged between 6 and 10) and resided in the capital area. In Russia, I posted the call on various forums, including those focusing on pre-school education and re-selling of children's goods. Unfortunately, these posts brought no participants. Finally, I resorted to my personal connections and the snowball method (Bernard, 2005). This way, four families were found, each with one child of a suitable age (4 – 9). As in case of the Finnish families, all the Russian participants resided in their country's capital area. ReimaGo is an activity-tracking wearable, and the producer emphasizes its relevance to children with weight problems. Among the participants of this research, only one child (11 y.o., from Finland) had weight issues. This is a limitation, but also a prospect for further consideration in the future.

The diary method is often coupled with the interviews (Bartlett and Milligan, 2015). For this study, I also conducted 30-minute semi-structured joint interviews with each parent (mothers) and child prior to distributing the ReimaGo devices. On the one hand, the purpose of these interviews was to better know the families, their lifestyle, rhythm and hobbies. It is important to note, though, that the fieldwork occurred during the COVID-19 pandemic, and restrictions imposed in Finland and Russia (closed public spaces and institutions, working and studying from home) influenced the families' routines. One important block of questions was about their expectations concerning the wearable.

On other hand, I wanted to ensure that children are not pressured into the study (I will discuss this issue in detail in a section on ethics).

In addition, we discussed the format and the procedure of the diaries during these meetings. First, we agreed that a diary entry depended on a specific event: use of ReimaGo device. Hence, any activity connected to the gadget – putting it on the wrist, checking the level of activity, or collecting the game points – acts as a trigger condition for a diary account (Rausch, 2012: 183). Next, the diaries were semi-structured (Gubrium and Holstein, 1997: 17; Bartlett and Milligan, 2015). Introducing the structure was important for identifying the rhythm and repetition of a practice (Reckwitz, 2002). At the same time, I did not want to impose too rigid of a structure as this could have restricted the elicitation of emotions and reflections of the participants (Bartlett and Milligan, 2015: 42).

Overall, I asked the participants to capture as many details as possible, including circumstances of use (time and space, surroundings), skills that ReimaGo required, emotions (both positive and negative), interactions occurred in the process of use, etc. The respondents were not required to keep the diary for a specific period, but we negotiated the duration beforehand during the interviews. The general message was to keep the diary as long as the participants were interested. However, I explained that, for the purpose of my study, some continuity in their diary accounts was required. For the participants, duration between three and four weeks sounded bearable during the interviews (in practice, it turned to be too long for most of them). We also agreed that if the participants ceased the use of ReimaGo earlier, they would reflect why this happened.

Finally, an extremely important issue to consider is how to collect children's accounts. Children are indeed a specific category to study: they get distracted quite quickly (Boyden and Ennew, 1997), and their language and ways of expressing themselves might be specific: while a researcher can capture a standpoint of another adult, it might be challenging enough to understand the world from a child's perspective (Punch, 2002). Furthermore, taken the age difference among the children in this research, finding a format suitable to everyone was critical. Finally, children are often considered vulnerable participants: even though they possess greater power in today's society, children might still feel 'obliged' to follow the instructions of an adult (Buchwald et al., 2009).

Following Grønhøj and Gram's (2020) advice on developing engaging methods that can stimulate children's enjoyment, a video- or audio- diary format was chosen as well suited for children (Buchwald et al., 2009). These formats can make the process of data collection more exciting from children's standpoint (Punch, 2002), especially because it engages children as co-researchers (Chitakunye, 2012; Grønhøj and Gram, 2020). Children nowadays are very active with gadgets and handle them easily (Herdianto and Syahidin, 2020). Therefore, making a video might be a familiar activity with an element of fun. Next, children might encounter difficulties with filling in written diaries, as it relies on their writing skills, whereas an advantage of the video- or audio- diary is that it is based on a spoken language (Morrow, 2001).

The main risk with the diary method is a failure to gain participants' involvement (Roth, 2015; 343): 'the main challenge is to gain participants' willingness to integrate the recording of idea-related interactions into their everyday life. This point is extra crucial if […] participants' time and attention is widely absorbed by their work.' Unfortunately, three out of eight families dropped out after just one week of research. The length of the use period of ReimaGo varied from none (a family could not

agree on the use of the device) to approximately one month (diary keeping was terminated, though the family continued to use ReimaGo) (for details, see Appendix C).

One reason might be the semi-structured format of the diaries. Though my initial idea was to give the participants as much freedom as possible, open-ended questions required more time and reflection, thus, complicating the process (Roth, 2015). Another possible reason for dropouts might be vagueness over the goals and the procedure of the study. Though I organized the briefing to explain the purpose of research, I could have missed crucial details that eventually led the families astray. However, I continue to treat the accounts of these dropouts as data that could reveal interesting details about ReimaGo and the adoption of wearables: for instance, there were technological problems with connecting the device to smartphones. Hence, it can be linked to the 'competence' element of the practice (Shove et al., 2012).

4.6. 'SCRAPING THE SOCIAL': PRACTICES-AS-ENTITIES IN DIGITAL MEDIA

Methodologically, the sub-study on the depiction of the practices in media stands out since I deal with disembodied versions of practices and their constituting elements (Pantzar and Shove, 2010). Though this sub-study resulted in Article III, in this thesis, I use data from media as an addition to data elicited through other methods.

In today's media-rich contexts, it is crucial for a practice-based study to account for an interplay between physical and material worlds (Trowler, 2013; Hine, 2000). In addition, data on innovative technology are often structured by media. For many potential users, the reality of science and technology is shaped by media rather than through first-hand experience (Nelkin, 1987: 2). Hine (2000) suggests distinguishing between 'anthropological' and virtual ethnographies, also applicable to 'praxiography'. It is maintained that, with the virtual fieldwork, a concept of 'the field site' becomes less relevant as the virtual world is more open and often stretches beyond a local context (Hine, 2000). Given this call for opening practice-based research up to both traditional and virtual ethnographies, I have tried to mix these two sites. However, I also attempt to stay aware of the boundaries that data from Finnish media have: specifically, it is still local media written in Finnish and, thus, accessed by the Finnish-speaking community.

To elicit media data, I used a program code written with Python language in order to retrieve the whole scope of data available on two major news platforms. This procedure is referred to as web scraping or web harvesting (Saurkar et al., 2018). This is a technique for an automated search and collection of online data (Marres and Weltevrede, 2013). Shortly, scrapers are 'bits of software code that makes it possible to automatically download data from the Web, and to capture some of the large quantities of data about social life' (Marres and Weltevrede, 2013: 313). Since web scraping offers a new way to collect, analyze and visualize social data, this technique has become an object of 'hype', often advertised as a groundbreaking instrument responsible for 'the computational turn' in social research (Marres and Weltevrede, 2013: 314). In this research, I rely on web scraping as a means to study more general patterns of the practices with wearables. This becomes possible thanks to a rich corpus of data, collected with a key-word search. This does not undermine the performances of practices by individual carriers. By relying on different methods, my intention is to create a more encompassing picture of the wearable market and account for both individual performances and more general patterns of practices disseminated through media.

Scraping is a multi-faceted phenomenon that consists of a series of steps. Saurkar and colleagues (2018: 364) have nicely explained the core idea behind the technique:

> From the operation viewpoint, a web scraping look like manual copy and paste task. The difference here is that this job is done in an organized and automatic way, by a virtual computer agent. When an agent is following each link of a web page, it is actually performing the same operation that a human being would normally do when interacting with a web site.

Namely, the code sends a signal to open the needed page in the browser, to make a search for news articles containing a specific word, and to extract the URL of the needed article. Overall, these are

the same actions normally performed by a human being when browsing online and coping and pasting the needed data, but at a much greater speed and with fewer risks of making a mistake, such as duplication of articles (Saurkar et al., 2018).

I scraped data from two Finnish digital platforms: state-owned Yle and commercial Helsingin Sanomat (HS). Since HS offers only limited free access to their materials, I had to purchase a subscription. For both media platforms, I used their official webpages, yle.fi and hs.fi. In this case, I relied on purposeful sampling (Patton, 2002) since I used the two largest digital news media in Finland, where material on a broad range of topics has been published.

In the first stage, I made a list of Finnish key words related to wearable technology and wearables. There were general terms like 'wearables', 'smart clothes' and 'wearable technology', but also more specific ones, for instance, 'smart glasses' and a 'smart ring'. I did not set up any timeframe limitation, meaning that all articles with at least one of the keywords from Yle and HS archives were identified. For this sub-study, I limited my data to textual format only. Hence, I did not scrape any visuals that are included into the articles.

In the second stage, I applied a special automated tool for Python called 'Newspaper3k' (Ou-Yang, 2017). This tool was designed to analyze the structure of newspaper articles. Namely, it identifies the structure within the online text such as a title, text, authors, and a publication date. Additionally, it is capable of making a summary of the text as well as of identifying the keywords. The tool can distinguish between different languages, including Finnish (Ou-Yang, 2017). Based on the summaries, I selected the most relevant articles focused on wearable technology and excluded those where it was only randomly mentioned. As a result, 199 articles from HS and 247 from Yle were selected for the analysis, or 446 articles in total with over 1400 pages of text.

In the final stage, the articles from each platform were organized from the earliest to the latest as a *txt* file. Finally, the basic data about the articles (title, name of publication, authors, link, summary, rubrics) were presented as two tables – separately for Yle and HS – so that I could filter data and create graphs. Overall, web scraping proved an efficient and reliable technique that allowed me to effectively identify, collect and organize unstructured data from two digital news platforms. In this respect, my aim was to aggregate a large corpus of data into a new dataset ready for analysis (see Saurkar et al., 2018).

4.7. DATA ANALYSIS

4.7.1. INTERVIEWS AND THE DIARIES

As mentioned, both the expert interviews and semi-structured interviews with the users aged 50+ were recorded and transcribed. Further, the diary accounts were collected in textual, audio or video format. Further, audio and video accounts from the families were also transcribed verbatim. Finally, the articles scraped from two digital platforms were in textual format. Though I analyzed the data from each sub-study separately, I applied thematic analysis to all of them.

Thematic analysis is a procedure of searching for patterns essential for explanation of the phenomenon in question (Daly et al., 1997). Thematic analysis includes identification of recurrent themes through 'careful reading and re-reading of the data' (Rice and Ezzy, 1999: 258). Eventually, the defined themes become the analysis categories (Fereday and Muir-Cochrane, 2006).

For this research, I adhere to a hybrid thematic analysis steered by both data-driven (indicative) (Boyatzis, 1998) and theory-driven (deductive) coding (Crabtree and Miller, 1999). On the one hand, I integrate the tenets of the practice theory into my analysis; on the other, I am open to the themes that directly emerge from my data.

Crabtree and Miller (1999) suggest that the coding process can be based on a pre-determined template. These codes are relied upon as a tool for organizing the given text for a subsequent analysis. In this study, the elements of a practice (materials, competences and meanings) are the major pre-defined codes that were purposefully searched in the narratives. For example, while analyzing the practice of the commercializing of wearables through the expert interviews, I encountered different manifestations of the code 'meaning': some were pragmatic like 'earning money', 'gaining a stable income', while other were idealist, like 'serving people' or 'contributing to higher sustainability'. Based on these codes, I later developed a theme of proto-, ex- and integrated practices, also derived from the practice theory (Shove et al., 2012).

Meanwhile, the inductive coding process implies that, prior to interoperation, the researcher recognizes and encodes an important moment (Boyatzis, 1998). An important moment – or 'a good code' (Fereday and Muir-Cochrane, 2006) – is 'one that captures the qualitative richness of the phenomenon' (Boyatzis, 1998). Further, the codes are grouped into themes, or 'a pattern in the information that at minimum describes and organizes the possible observations and at maximum interprets aspects of the phenomenon' (Boyatzis, 1998: 161). For example, the whole set of codes related to the Apple brand, such as 'high price', 'Apple-addicted', 'Apple universe', 'modern and technologically advanced', later developed into a theme called 'conspicuous consumption'. Prior to the interviews, I did not expect such a theme to emerge, so it was completely data-driven.

4.7.2. MEDIA DATA

The analysis procedure had to be altered in case of the data scraped from the Finnish media. Since the data corpus exceeded 1400 pages, I decided to first conduct the content analysis (Vaismoradi et al., 2013), followed by the thematic one. Specifically, I combined qualitative and quantitative methods to identify the most widespread types of practices with wearable technology discussed in Finnish digital media.

In this part, I combine thematic analysis with content analysis. Content analysis is a systematic coding procedure applied to large amounts of information in order to determine patterns of words' use, such as frequencies, relations between words, etc. (Mayring, 2000; Vaismoradi et al., 2013). Using a free online instrument for the content analysis 'Voyant-tools'[13], I managed to identify the most frequent words related to my research. In addition, I could see how these words were dispersed between years 2000 and 2020. For instance, I checked the mentions' frequencies of the specific types of wearables, such as smartwatches, fitness trackers, smart glasses and rings. Furthermore, I could check how the codes, previously identified in the interviews' and diaries' narratives as practices (health, work, exercising, losing weight) were overlapping or diverging in the data from the media. After the major patterns related to frequency of use and coincidences of certain code were identified, I proceeded to the thematic analysis with particular attention to the most frequent words. With the thematic analysis, I carried out purely qualitative and nuanced data accounts (Braun and Clarke, 2006). To handle such a large amount of data, I used the NVivo data management program that is useful for storing files and systematizing the findings based on the number of categories.

Regardless of presenting the analysis procedure as linear, in reality the research analysis turned out to be an iterative and reflexive process. Tobin and Begley (2004) refer to this interactive back-and-forth process of qualitative inquiry as the 'goodness' principle. Accordingly, this study's analysis was carried out concurrently, meaning that the data was frequently reread to ensure the codes were indeed rooted in the data.

[13] The official page of the instrument for the content analysis https://voyant-tools.org/

4.8. ETHICS

There are several ethical issues relevant to my study. The first group of issues deals with the participants' anonymity, whereas the second touches upon the intimacy of daily lives that I am studying.

Anonymity is one of the basic priorities in all research-ethics codes (Van den Hoonaard, 2003). The quick spread of social science publications has made participants' anonymity an obligatory procedure (Murphy and Dingwall, 2003: 341). However, in certain cases simple erasure of given names and other personal information might not be enough to guarantee full anonymity (Murphy and Dingwall, 2003: 142). For example, the market of wearables is still quite small, and many participants are members of the same professional unions, give talks on the same conferences, and sell their products on the same online platforms. Therefore, there was an extra risk of de-anonymizing the wearable entrepreneurs that I interviewed. To guarantee the experts' anonymity, I made a decision to undertake extra measures of precaution and to create a thicker 'smoke screen' (Saunders et al., 2015) by changing some experts' gender. Additionally, there are very few details on the wearable products per se in the thesis, not least since the experts were reluctant to provide them. I attribute this situation to the high risk of theft that occurs in the technology markets (Barton, 1992). Before the interviews, I agreed with the experts that they could reveal as much or as little about their wearables as they wished, and I would not push forward for extra details of the product.

Next, research with children requires extra measures of precaution, and, in the case of this research, the problem was reinforced by the fact that ReimaGo measures personal data. Luckily, the device does not track GPS coordinates of the children, and the data it measures are very basic: for example, it does not measure health-related indicators, but only the level of daily activity and its lengths. Before the fieldwork, I insisted on meeting with parents and children in person, so that I could explain what the purpose of the study was. This way, I was trying to ensure on the one hand, that the future participants understood the purpose of research, and, on the other, that the children's participation was voluntary. When recruiting children into research, it is important to stay reflective (Danby and Farrell, 2005): as a rule, parents undertake an active role in engaging children into research, and often act not just as consent-givers and gatekeepers, but also as 'brokers' (Van Gelder, 2005; Lewis, 2008). Indeed, there might be situations when parents use their authority to persuade or even coerce children into research (Nilsen and Rogers, 2005). Therefore, my task was to ensure that all family members express a genuine desire to participate, and I attempted to achieved it through a face-to-face contact and dialogue. Hence, before proceeding to written consent, I talked to the parents and their children about their role and expectations from the study. Eventually, one of the children called their participation off as they felt they were being forced into research by their mother.

Another ethical issue that resurfaced in my research is enquiry into personal and often intimate details of daily lives. To avoid being too intrusive, I formulated the task quite generally, asking the participants to create a storyline of their use of ReimaGo including not just mere actions, but also opinions and emotions. Further, I sent the families a list of questions, albeit stressing that this is not an obligatory instruction, but rather a canvas that could guide them through their task. At the same time, I decided to talk with participants after the diaries were completed to ask for feedback (Browne, 2015). I was pleased to find out that the families did not see the diary as intrusive, but rather perceived

it as an old-fashion and quite amusing activity. Interestingly, several parents revealed that they had learned new things about their children, and they were eager to share their emotions with the diary.

Finally, to protect data, a separate storage drive within Aalborg university system was created. I am the only person who has access to this storage. Additionally, only photos that do not display faces of the participants are used. Even though I could have blurred the participants' faces, there would still be a risk of recognizing the surroundings as most of the visual material was produced in home settings (Noyes, 2004).

4.9. OUTSIDER'S PERSPECTIVE AND REFLECTIVE GAZE

In qualitative studies, a researcher cannot avoid being part of the world they study. Power dynamics and relationships between a researcher and the researched have become widely discussed and contested issues within qualitative methodology (Adeagbo, 2021; Sharma, 2019; Allan et al., 2018; Harrison et al., 2001). Hence, that implies a critical self-reflection and self-awareness of the dynamics between the 'self' and the 'others' has been encouraged in qualitative research (Reyes, 2020; Finlay, 2002 Davies, 1999). Being aware of one's own role in relation to the participants of the study gives way to better interpretation of the findings (Allan et al., 2018; Enosh, 2016), and eventually results in higher transparency and trustworthiness of one's results (Hammersley and Gomm, 2008). In order to comprehend this issue, the question I reflected upon was how my social identity and perspectives I hold impact the interpersonal relations during the fieldwork (Temple and Edwards, 2002: 10–11).

Traditionally, an 'insider/outside' perspective (Dwyer and Buckle, 2009: 58) has been helpful for the reflexivity process. Both positions have their pros and cons: for instance, proponents of the outsider position argue that it allows for a more objective analysis due to a detached stance; on the other, opponents maintain that the insider perspective lets a researcher better uncover and understand small and obscure details unnoticeable to an outsider (Dwyer and Buckle, 2009). Meanwhile, recent discussions on the subject recognize that the position of a researcher is not fixed, but rather shifts depending on social, political and cultural values of a given context or moment (Milligan, 2014; Arthur, 2010).

In the case of my study, I adhere to this latter view: indeed, I could relate to some of my participants, like Russian interviewees or entrepreneurs with academic background. However, for the majority of time, I saw myself as an outsider. As a result, I had to pass through several rounds of a reflective journey in order to learn from my mistakes and to ensure smoother and richer fieldwork. Looking through some of my memos after the interviews, I selected two episodes that made me further reflect upon communication and connection with the participants.

The first episode occurred within the second round of fieldwork, with the consumers aged 50+. In this case, the issue of age and aging was a sensitive topic, especially taken that I was searching for participants based on age, and one of the central topics of our interviews was measurement of body/health indicators. Even though the chronological age has been losing its significance, our society is still obsessed with youthful and healthy bodies (Cook, 2019; Joyce and Loe, 2010). At the same time, a similar age of a researcher and interviewee might facilitate communication due to similar life experience, though the latter is usually mitigated by other factors like social class (Manderson et al., 2006). During the interviews, some awkwardness resurfaced when interviewees were asking jokingly how old I thought they were. More unsettling, one interviewee in Finland was emphasizing their independency, both at work or in a family, and the overall rhetoric of their answers was quite defensive, as if my questions implied some age-related connotations. The most embarrassing episode during this interview was when I asked them to choose between different monthly income groups, and, though the interviewee chose a very high one, they added *'It used to be higher before retirement, but now ...'* Meanwhile, income is another sensitive issue that can be amplified in the context of aging (Steverink et al., 2005).

I undertook several strategies in order to balance power relations during the interviews with consumers aged 50+. The first was to conduct the interviews in the participants' native language (Finnish or Russian). This guaranteed that they could deliver their message relatively effortlessly. Chen (2011), for example, maintains that a non-native interviewer who is in a weaker position, might elicit richer data as she is obliged to let interviewees define the concepts they use. In this case, native interviewees act as a language authority, and power relations are re-negotiated (Chen, 2011). Only one of the Finnish interviewees preferred to communicate in English. However, this interviewee was a university professor with a very high command of English, so I was even intimidated by their clean British accent. In this case, choice of English possibly also became an attempt to negotiate power relations since it allowed the interviewee to demonstrate their high education.

After the first two interviews, including the one I discussed above in detail, I came up with a certain strategy. When introducing myself and asking the first basic questions about lifestyle and hobbies, I explained that I am an inexperienced wearable user and had very limited knowledge of these kinds of devices (which was true). This way, I attempted to stress that, among two of us, the interviewee was the expert in wearables, not me. I realized that this confession made a positive change in the interviews' dynamics. Importantly, the interviewees were showing me the graphs with the measurements without a second thought that I might judge their 'poor performance': I made it clear that I had never measured myself and had no idea what 'normal' indicators looked like.

Another powerful episode of self-reflection occurred during the fieldwork with families and ReimaGo. Having no experience with motherhood, I was again an outsider. Early in the fieldwork, I received an email from one of the mothers who had dropped from the study very quickly. In her message, the mother expressed her frustration over my limited engagement into motivating her children to use the wearable. My first reaction was irritation towards this mother over failure to understand the process of the study, which prohibited my interference. However, upon further reflection, I decided to try to use ReimaGo myself and keep a diary on my activities and impression. Though ReimaGo was designed as a wearable device for children, there are no specific limits that could have restricted its use by adults (for example, the size of the band is suitable for an adult wrist as well). So, I completed my ReimaGo set with a blue silicon wrist-strap and started my trial.

Some researchers (Wacquant, 1992; Spinney, 2008) suggest that in order to properly understand a practice (especially one related to sport) it is needed not just to be familiar with the rules, but also have skills and participate in it. Thus, Wacquant, while studying a French ghetto, became obsessed with boxing because 'few practices can be said to be more 'practical' than boxing. For the rules of pugilistic art boil down to bodily movements that can be fully apprehended only in action and place it at the very edge of that which can be intellectually grasped and communicated' (Wacquant, 1992: 58–59).

Following this suggestion, I started to experiment with ReimaGo, and recorded my impressions related to its use either by audio recording or short notes on my smartphone. Occasionally, I included screenshots with comments. Looking back, I note that, in contrast to most of the participants, my interest in the device increased with time: at the beginning, I was using it only when doing sports, but, eventually, I became more competitive. I wanted to get more points, so my character in the ReimaGo game could travel further. For example, I was interested in how different countries were

depicted in the game. At some point, my own mother even became interested in my progress and even randomly asked to see my results.

Though I decided not to use my own diary in the study, my activity with ReimaGo helped me better understand the device. As a result, I made three 'educational' videos that I shared with the families before they started their own trial (see Figure 8). The first video highlighted the basics about ReimaGo, including how to carry it, how to collect the points, and how to create an account. The second video pinpointed the application's functions. The final video demonstrated some of my sports activities with ReimaGo.

Figure 8. A screenshot of the educational video#1 made by the researcher and distributed among the families.

With this strategy, I was trying to support the participants, so that they would not feel overwhelmed with responsibility.

To conclude, by staying reflexive on every stage of my fieldwork and by trying to develop solutions to the encountered challenges, I was striving to be 'open, authentic, honest, deeply interested in the experience of one's research participants and committed to accurately and adequately representing their experience' (Dwyer and Buckle, 2009: 59).

4.10. LIMITATIONS

In terms of rigor and validity, the face-to-face interview has been traditionally regarded as a 'gold standard' (McCoyd and Kerson, 2006: 390). As a result, the choice of the online interview used to be perceived as the second option (Deakin and Wakefield, 2014). Drawbacks of online-interviewing include absence of non-verbal cues (O'Connor et al., 2008), embarrassment over being filmed and a requirement to obtain the correct software and maintain a stable internet connection (Hay-Gibson, 2009), need for identity verification, and exclusion of certain groups who lack the needed skills (O'Connor et al., 2008). Alternatively, there are studies that maintain that online interviews elicit richer and more personal data thanks to higher levels of visual anonymity (Joinson et al., 2010; Hanna et al., 2005). Additionally, there is an assumption that respondents actually provide more direct accounts during online interviews as they feel less inhibited: being interviewed in a familiar environment such as at home or their office makes the process more respondent-friendly (Gruber et al., 2008). For this study, the online interviewing of wearable entrepreneurs was preferred due to the dispersed geography of the participants (Janghorban et al., 2014). However, aged 50+ interviewees mostly preferred face-to-face interviewing, as many regarded it as an opportunity to socialize and go out.

Next, gaining access to interviewees through the gatekeeper, as in case of Finnish aged 50+ interviewees, may cause a selection bias (Crocker et al., 2015), as the eligible interviewees may differ from the non-invited. In this case, TechHelp volunteers are technically literate and highly educated individuals who have a long experience with technological gadgets. Another limitation regarding the sub-study of aged 50+ users was the invitation of only smartwatch and fitness tracker owners. Since wrist-worn devices have been the most popular wearable so far (IDC, 2019), searching for interviewees with this type of wearables provided a readily-available sample from both countries.

Another important limitation is inclusion of quite traditional families (Valiquette-Tessier, 2019; Ganong et al., 1990) into the sub-study of the family practices and ReimaGo. These were middle-class heterosexual families with working fathers and either working or stay-at-home mothers. Only one family from Russia was headed by a single mother, but data from this family were scarce. Therefore, other types of families (single parents, same-sex families, etc.) are missing. Additionally, only mothers answered my call for participants, though I invited both mothers and fathers. This selection bias might reinforce an existing stereotype of mothers as primary caregivers (Gershuny et al., 2005), though nowadays gender roles might vary (Gaunt, 2012).

Quite an unexpected limitation resulted from rigorous university rules: I was allowed to exchange the diary accounts through my university email only. This is done in order to adhere to the research-ethics code (Van den Hoonaard, 2003). Unfortunately, the interviewees regarded this method as slow and inconvenient: in their view, social media such as WhatsApp or Telegram would have allowed a more dynamic exchange of visual and audio data. However, I could not guarantee data security with these channels, and we had to limit our communication to emails only.

The qualitative nature of this research does not have generalization as its goal. Qualitative research has traditionally been focused on in-depth interpretations of relations and conditions in specific contexts (Demuth, 2018; Mayer, 2015). Therefore, the number of the interviews and the diaries were

based on the goal of an in-depth investigation rather than generalization. Additionally, when I realized that the number of collected diaries would be limited, I decided to improve the study by adding data from digital media.

To conclude, it is impossible to make any kind of conclusive statements independent of the context of this research. Meanwhile, it is possible to make claims in relation to similar contexts – a quality referred to as fittingness (Lindström and Polsa 2015). In the case of this study, I include Russia in order to stretch the fittingness of this research beyond the Western context (Dehghani, 2018).

5. CHAPTER 5. ARTICLES

In this chapter, the academic articles written within this PhD project are outlined. Two out of three are co-authored with Olga Gurova. The COVID-19 epidemic slowed the progress with the articles, so I had to change my initial plans. For example, the process of diary collection for the sub-study of the family practices with ReimaGo was complicated substantially (distribution of ReimaGo often required physical presence, as the parents and I wanted to have a face-to-face meeting to ensure that we were on the same page with the children regarding research purposes and procedure). As a result, I made the decision to substitute the third article with the one on media discussion of practices with wearables. While the first two articles have been published in the journals on consumption – *Journal of Consumer Culture* and *International Journal of Consumer Studies*, I tried to diversify the scope of the academic journals, and submitted the third article to *Media, Culture & Society* in order to reach broader academic audiences.

The articles, though united by the general topic of the practices with wearable technology and mutual theoretical framework, draw on different data sets and address different aspects of the use of wearables or their commercializing. The articles are presented chronologically, and the structure of analysis follows the same path. Article I (co-authored with Olga Gurova, a co-authorship statement is attached as Appendix D) discusses reasons behind successes and failures of wearable entrepreneurs in the market, and is linked to business aspect of sustainability. Article II (co-authored with Olga Gurova, a co-authorship statement is attached as Appendix D) focuses on social sustainability approached through the practices with smartwatches and fitness trackers of consumers over 50 in two different national contexts (Finland and Russia). Finally, Article III argues for inclusion of media rhetoric of wearables' use into analysis of practices. Though this article does not address sustainability directly, analysis from this text is useful for making broader claims regarding the practices-as-entities. The originally planned fourth article on the practices with ReimaGo and environmental sustainability is elucidated separately in the analysis part of this thesis and is planned to be developed into an article.

ARTICLE I

Title: 'How the practice of commercializing comes together and falls apart in a market of wearable technologies'

Publication status: Co-authored with Olga Gurova, e-published ahead of print in *Journal of Consumer Culture*, https://doi.org/10.1177/1469540521990862

Abstract: *Wearable technologies, or wearables, are a combination of design and technology worn on one's body. Regardless of initial optimistic forecasts for wearables' market growth, there are few examples of successfully commercialized wearables, except those by technology giants like Apple. In contrast, start-ups developing wearables, while numerous, struggle to survive. The goal of this study is to explore how wearable technology is commercialized on a new market and what role consumers play in commercializing of these wearables. Previous studies on commercializing failures suggest that this is due to poor design of wearables, inappropriate business models, or an extended time lag needed for customers to accept such novel technology. In this article, we add to the ongoing discussion by approaching the commercializing process as an integrative practice that consists of materials, skills, and meanings. Drawing on three examples of wearable start-ups that correspond to a proto-practice, reproduced practice, and ex-practice, we analyze how the practice of wearables' commercializing takes shape, perpetuates and falls apart, what problems accompany the practice, as well as how an understanding of commercializing can go beyond a traditional interpretation of profit increase. We argue that although mass consumption of wearables is yet to be seen, consumers contribute significantly to the formation of the practice of commercializing and integration of its elements, along with other elements and carriers of the practice. Therefore, our aim is to pinpoint the complexity and multiplicity of the commercialization process by outlining different participants in the market.*

ARTICLE II

Title: 'Being like others vs. being different: Wearable technology and daily practices of 50+ consumers in Russia and Finland'

Publication status: Co-authored with Olga Gurova, *International Journal of Consumer Studies*, 45(6), 1335 – 1356. https://doi.org/10.1111/ijcs.12656

Abstract: *This is a qualitative study of consumers aged 50+ and their daily practices connected to wearable devices (smartwatches and fitness trackers). Drawing on the practice theory, we seek to uncover how participation in such practices might enhance users' well-being as an integral part of social sustainability. We assume that both aging and well-being are not pre-given but they rather co-evolve when users of wearables engage in situated practices. Hence, wearables such as smartwatches and fitness trackers might positively reconfigure the existing practices of consumers over 50, or even recruit them into new ones, resulting in higher well-being and social sustainability. The phenomenon is examined in Russia and Finland, as aging has been high on the agenda in these countries due to controversial pension and social welfare reforms. Though these countries are different in terms of possibilities (access to medical help, employment, social participation, etc.) for their aging populations, an active aging framework with an emphasis on individual responsibility over one's well-being has been gaining popularity in both Russia and Finland. This framework is compatible*

with the use of wearable devices that measure physical activity and basic health characteristics. Based on data elicited through 17 semi-structured interviews with Russians and Finns aged between 50 and 73 y.o., this study suggests that engagement in practices with wearables might have a positive effect on consumers' well-being. This is achieved, for instance, by helping manage one's daily tasks, reducing stigma that is sometimes attached to aging individuals, and/or boosting feeling of togetherness in social interactions that might decrease with aging. In addition, an important difference between the two countries lies in how aging consumers see themselves in relation to other aging people when using a wearable: in Russia, the use of a wearable can signal one's social distance from an "average" aging person, while Finnish consumers regard themselves as doing what everyone of the same age does.

ARTICLE III

Title: 'A toolkit for an action: Practices with wearable technology in Finnish digital media'

Publication status: under review in *Media, Culture & Society*

Abstract: *This is a qualitative study of practices with wearables as depicted in Finnish digital media. Wearables are design pieces coupled with technology that can be worn on one's body, such as a smartwatch or smart glasses. Since these gadgets are quite new, and are yet to find their loyal users, the media can be the primarily source of information about this innovative technology. Drawing on practice theory, I elucidate what kind of routinized activities with wearables have been perpetuated on two popular digital platforms in Finland. I adhere to the view that, based on the examples from the media, readers can borrow the templates of the practices – or practices-as-entities – into their daily life. Drawing on 446 articles published on the most trusted news platforms in Finland between 2000 and 2020, the article offers a general summary of how a discussion on the practical use of wearable technology has been emerging and changing.*

6. CHAPTER 6. ANALYSIS

6.1. SUB-STUDY 1: PRACTICE OF WEARABLES' COMMERCIALIZING AND ITS ELEMENTS

In this sub-section, I scrutinize how the practice of commercializing wearables evolves in the market of this innovative technology. I narrow the analysis down to small-scale entrepreneurs, as these innovative businesses are crucial for economic growth and job creation (Shane 2009; Brüderl and Preisendörfer, 2000). They also face a high level of uncertainty in the emerging market of wearables, including lack of information on production facilities, investment opportunities and benchmarking examples (Amadi-Echendu and Rasetlola, 2011; Backes-Gellner and Werner, 2007).

The specificity of my approach involves understanding the market as a constellation of practices aimed at bringing a new wearable to consumers. Thus, a traditional view of a market as a supply and demand meeting point is abandoned. Instead, practice theory interprets it as a constellation of different practices and the circumstances in which they are embedded (Korkman et al., 2010, 237; Lindeman, 2012). Hence, in order to succeed, entrepreneurs either have to adopt already established practices or must develop their own through the reconfiguration and improvement of the elements of already existing practices (Korkman et al., 2010, 239). However, since the market in question is relatively young, there are no pre-established practices that can be taken as templates.

In this sub-study, I rely on the following characteristics of the sustainability concept that I have adopted: first, I look at the elements of the practice of commercializing: what elements are present or missing, and how they link and fall apart. Availability of the elements largely depends on the context (Shove et al., 2012). The presence of focal actors (Prenkert and Hallén, 2006; Storbacka and Nenonen, 2011) who contribute to the practice's formation is also determined by the context. Third, I am interested in bundles of practices that are related to the practice of commercializing: for example, whether they support each other or compete and, therefore, enable or hinder commercializing.

In sum, the focus shifts from market exchange to a practice and its elements—thus, successful commercializing is conceptualized not as an increase in profit through higher sales, but as a reproduced practice with smoothly integrated elements that can be sustained long-term (Kjellberg et al., 2011). This sub-study is based on Article I, but findings presented in Article III are also used.

6.1.1. THE CONTEXT. AVAILABILITY OF THE ELEMENTS

6.1.1.1. Materials

Experts' narratives address how the availability of the elements depends on the context where the practice of commercializing evolves. In this sense, since the practice is 'homegrown' (see Shove and Pantzar, 2005), it should be analyzed in relation to the country. I will further illustrate this statement with concrete examples from the experts' interviews.

First, Antti and Mika[14] are engineers working in a state-financed project in Finland. I selected them as an example of an integrated and reproduced practice that also illustrates how commercializing of a wearable might proceed in the public sector with the help of state money. Indeed, the Finnish state has been helpful towards wearable technology projects (on state-funded wearables projects in Finland see Harjuniemi et al., 2018). The topic has become particularly timely following the failure of healthcare reform in Finland (BBC, 2019), as wearable technology has the potential to become a tool for keeping elderly people and chronically ill patients at home (rather than the hospital), tracking their condition via wearable devices, thus reducing the burden on the state budget (Godfrey 2017; Danielsen et al. 2016). In this context, state support towards wearables projects was vital as it guaranteed the material element.

Strictly speaking, Antti and Mika are not traditional entrepreneurs. However, Antti stresses:

> *'We also need to have a commercializing aspect. The final work package in this project is actually to generate business models that are needed to bring these products into the commercial market. So, we are focusing on a big picture, on determining these expectations and potential consumers for smart clothing, developing these smart clothing and smart concepts. And then there is testing of these items, and we definitely need to have this commercial aspect included into our project'* (Antti, Finland)

After Nokia's dominance of the cell phone market faded away, the Finnish state faced a huge gap to fill in the national economy, particularly in regard to engineers' employment (Lane, 2016). Wallin and colleagues (2016) maintain that, since Nokia, Finnish decision-makers have been regarding new technological ventures as a prerequisite to economic development. Finland has also topped various rankings of the most innovative societies (WIPO, 2021).

Meanwhile, one wearable entrepreneur in Russia has been struggling with securing money for her project. Evgeniya is a start-upper in a Russian university who has not yet managed to launch the wearable into the market. Therefore, I refer to this example as a proto-practice, or yet-to-be practice that has a potential to develop into an integrated practice (Shove et al., 2012). According to Evgeniya's account, the material element for the practice is hard to secure. First, an option of state funding is regarded as complicated, slow and unreliable: *'This is extremely slow. We have [in Russia] some [funding] programs, but this is so far away from the European approach. Before getting any money, you have to present some prototype, but this also requires resources which we do not have. And by the time your project is approved and you receive money, the drive is lost.'* Previous research elucidates that the business environment is Russia might seem hostile due to behavior of state officials (Aidis and Adachi, 2007), and small enterprises frequently prefer to minimize dealing with the state (Yakovlev, 2006). On a general level, trust into public institutions has traditionally been low in the country (Edelman Trust Barometer, 2021).

Next, Evgeniya attempted to find a business partner from the market niche where their wearable could fit. However, according to the interviewee, a potential business partner wanted to receive all the documentation as well as the prototype without giving any guarantees regarding the investment: '*They wanted to receive all information [technical details, design, business plan] for free.'* The final funding option was an NGO that used to act as a mediator between start-ups and business investors/large

[14] These experts are presented as one case. They are commercializing the same wearables through a mutual project.

corporations. Though Evgeniya agreed to participate in the NGO's hackathon on wearable technology and even passed along the technical details and the prototype to the organizers, she felt betrayed as no subsequent investment followed. As a result, Evgeniya concludes: *'We changed the rules regarding communication with potential partners. For example, a partner asks for a proof of concept. And we now ask for a proof of money. We just approach it from too different of angles. […] As long as there is no clear copyright law in Russia… nothing will change.'* Licensing can substitute the practice of commercializing per se (Cantrell, 2009), and I will return to this argument later in this sub-chapter. Furthermore, due to historical reasons, Russia has evolved into a 'low-trust society' (Kuznetsov, 2008), or 'one in which strong family ties are coupled with an equally strong distrust of unrelated members of the wider community' (Hansen and Teague, 2005: 669). In case of Evgeniya, I conceptualize her activity as a proto-practice or yet-to-be practice (Shove et al., 2012) since its elements have not yet been integrated into a coherent entity. Namely, there is no material element necessary for the practice. Strictly speaking, there is material 'out there' (Shove et al., 2012) in the form of the state funds, or potential investors, but it is not integrated into the practice because of contextual factors: lack of trust, underdeveloped property rights law, etc.

Overall, the contrasting examples of Finland and Russia demonstrate that even securing of funding – or the material element in practice-based terms – proceeds differently in different contexts. As Shove and Pantzar emphasize (2005: 55), the cultural history and institutional environment are critical for the practice to evolve.

6.1.1.2. Skills

The next example, however, draws attention to how contextual factors can be eliminated. Diana is a wearable entrepreneur from Germany who has been developing two clothing lines: on the one hand, she designs illuminating and heating wearables; on the other, she makes 'conventional' women's clothing. Diana explains that wearable clothes are often *'an emotional choice'* for consumers, meaning that they want them *'here and now'*. Therefore, Diana cannot collect the pre-orders and produce the needed quantity, though it could have been a more frugal option for a small entrepreneur in the longer run as it advances the money flow (Belleframme et al., 2013). Since Diana's budget is limited, she must find a factory that produces small quantities for a reasonable price, conditions which were unachievable in Germany. As a result, the entrepreneur re-located the production from Germany: *'Our production is located in Eastern Estonia. This is a factory with highly qualified employees, and they are ready to produce small quantities.'* Indeed, organization of the production chain proved to be a serious challenge to small wearable entrepreneurs working in the fashion industry (Raj and Ha-Brookshire, 2016) (this issue will be further explored in the next section of this sub-chapter). Overall, relocation of the production into another region/context let Diana secure the needed material element: in addition to the needed infrastructure (a factory that produces smaller quantity), she reduced the budget due to lower prices for production in Estonia (Ferraro et al., 2018).

Based on Diana's interview, it is possible to distinguish between several competences that proved crucial for integration of the elements of the commercializing practice. First, Diana admits the need to delegate tasks: thus, she hired six people into her team: *'There are 6 of us. One is in charge of*

design and prototyping; another one for selling. The third person is in charge of PR; then we also have a classical intern and an accountant. […] What do I do? Everything! (laughs).'

Delegation has indeed been one of the cornerstone problems among small-scale entrepreneurs (Baldwin, 1997; Spreitzer and Mishra, 1999). In a similar vein, Papulová and colleagues (2007) argue that 'delegation is a skill that is critical to business success and for a healthy work life balance.' Additionally, previous studies suggest that the small companies with the best practices are more likely to empower employees through delegation (Drummond and Stone, 2007). On the other hand, Dunne (2010) stresses that wearable development and commercializing is hampered by difference in skills and knowledge among the professionals involved: mainly, engineers and designers. Diana also addresses this problem, but comments that she manages to reconcile these differences: *'There is definitely this temptation to add as many functions [into a wearable] as possible. You should be aware of this when dealing with engineers, they are just in love with their technology and know all about what it can do. But you should learn to cut off the unnecessary functions. After all, we do not want our clients to look like a Christmas tree [in an illuminating wearable].'*

However, integration of the competence element does not proceed easily for all the experts interviewed for this study. Antti and Mika (Finland), as mentioned, were working with private companies within the project partially financed by the state. Some of these companies were interested in introducing the wearables for their employees, and it was Mika's task to interview these workers and identify critical moments in their work that could be improved with wearable technology. In the interview, Mika reveals that the interviewees were feeling suspicious towards the prospect of tracing their location and measuring body indicators: *'Trust [was an issue]. Well, if you think about IT, this is something through which you're monitoring people. It is very descriptive, and this is one kind of thing that was a challenge because it can be easily misunderstood – what for are we carrying out [measurements]. Or what we are aiming to do with a prototype. Even if we are saying that 'this is for your work safety' and so on… someone might still think 'they are monitoring what we are doing'. […] So, privacy and data security were very much discussed during the interviews.'* Indeed, wearables at a workplace has been a controversial topic (for an overview, see Maltseva, 2020; also Moore and Piwek, 2017). Though wearable devices are believed to increase workers' security and productivity, or even enrich one's work experience, they can also alienate an employee from the organization, increase the power imbalance between the organization and employees and reduce the employee's status from a human to a resource (Maltseva, 2020).

For Antti and Mika, the practice of commercializing was at risk of falling apart because they could not elicit information vital for the development of the wearables. In addition, reluctance of the employees (and future users) to cooperate could have resulted in eventual failure of the developed wearables. Mika acknowledges that, in the process of interviewing employees, he had to identify strategic topics over which the employees were eager to cooperate. For example, they agreed to identify together concrete situations where the use of the wearables was accepted; as well as those where it could not be tolerated: *'Finally, employees admitted that they were ready to reveal their location through the wearables – for example, when being in the building site. But they were absolutely against tracing their location during the lunch breaks. […] You have to kind of… make a deal beforehand… for what reasons information is used.'*

Shove and al. (2012) argue that competences and skills are often leaned and acquired in the process of carrying out a practice. Also, Raj and Ha-Brookshire's findings (2016) maintain that wearable enterprises are a productive environment for acquiring tacit knowledge: as a rule, these are vibrant environments that require a lot of trials, communication and socializing. Accordingly, Mika recalls that the encountered situation required extra effort in terms of communication, interviewing and negotiating.

Evgeniya (Russia), in contrast, has relied on her formal training (see Røpke, 2009). With two university degrees – one in IT and another in marketing – she has been applying both competences within different tasks. On the one hand, Evgeniya participates in the development of the technical characteristics of the product; on the other, her marketing skills enhance her role as an 'ambassador' behind the product who negotiates with potential investors.

6.1.1.3. Meanings

The meaning component refers to what makes sense of the practice of commercializing. This includes, among others, the ideas and images of what the given activity is good for (Shove et al., 2012; Røpke, 2009). Though commercializing has frequently been associated with profitability (Bansal and DesJardine, 2014; Knudsen and Swedberg, 2009; Aage and Belussi, 2008), only Evgeniya (Russia) attaches a purely profit-oriented image to this practice. She states that her team will be willing to form *'a fair partnership'* with either Russian or foreign partners, where 'fair' refers to guaranteed payments for the idea, technology and prototyping. However, this image of commercializing is not specific to wearable technology, but rather universal across different industries.

Meanwhile, the meanings attached to the practice by Antti (Finland) and Diana (Germany) are more altruistic. Diana is interested in designing and launching wearable garments into the market because working with this technology allows her to stay creative and keeps her interested in fashion: *'After all, fashion industry is about selling ordinary jackets and T-shirts, money is made this way. But I felt bored at some point. I needed something else.'* Therefore, Diana regards wearable technology as 'a beautifying accessory' that improves clothes and makes her garments less 'ordinary'.

Antti, however, contemplates upon the development of wearable technology and its application. He distinguishes between several levels of wearables' use, and hopes that the industry will at some point reach the highest level:

> *'We have noticed that there are three levels of data. The most primitive level of information is just data. For example, a sensor that measures CO2 level or temperature measurement devices. These data need to be cultivated in such a way that they are transferred into information. For example, temperature is crucial for evaluating thermal sensations of a person. […] The missing link is how to cultivate these data into information, and how to later turn this information into a concrete service. […] For example, in our project, we are interested in reducing the number of accidents [at a*

building site], and what would be a realistic estimation of savings in terms of both employees' health and money.'

Antti's meaning also reflects the long-term vision for his career within the practice (Shove et al., 2012): he thinks about his role in helping direct it from the 'primitive' level of data collection to the highest or most sophisticated level of service provision through wearables, and that image propels him carry on and reproduce the practice.

In a nutshell, the examples above illustrate how three elements (materials, competences and meanings) shape the practice of the commercializing of wearables, and how diverse these elements could be across the countries. Evgeniya's (Russia) example is the proto-practice that lacks the materials in the form of money, funding or investment. This is mainly due to the specificity of the country's context characterized by a low trust among potential business partners. On the other hand, the examples of Diana (Germany), and Antti and Mika (Finland) are integrated practices of commercializing; yet, the way the elements of these practices are manifested differs as well as the context and the market sector (private vs public).

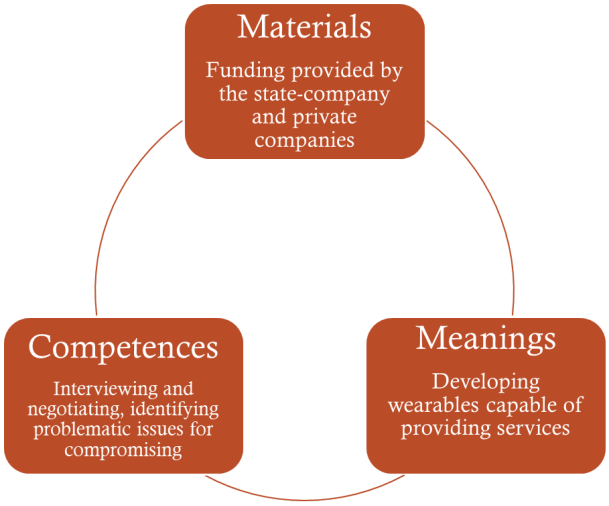

Figure 9. Integrated practice of commercializing the wearable (Antti and Mika) in Finnish context.

Figure 9 above is an illustration of the commercializing practice carried out by Antti and Mika. Importantly, the cases I rely on address that the path for wearables' commercializing should not be limited to the private sector of economy, but in certain contexts can be stretched to the public sector as well.

6.1.2. BUNDLES OF PRACTICES

6.1.2.1. Business Failure: a Competitive Bundle

In what follows, I analyze an example of an ex-practice (Shove et al., 2012), and contemplate why the initially integrated practice of commercializing could not be sustained and eventually fell apart. I argue that the main reason behind this disintegration is a competition between the practice of commercializing and research.

Matti, an e-textile designer from Finland, used to have a successful wearable start-up. Regardless of the initial integration of all the elements of the practice as well as a favorable context in Finland, Matti ceased his wearable project and eventually switched to the career of a university researcher.

At an early stage, the material element for the practice was well-secured: on the one hand, the wearable project received funding from the EU and a Finnish state-owned company, tailored specifically for the technology applied by Matti. On the other, Matti launched a successful crowdfunding campaign. The entrepreneur explains that the crowdfunding was challenging due to the lack of competences, but he trained for the needed skills in the process: *'We had to send trillions emails to journalists who could write about [the wearable] every day. […] We contacted so many journalists and maybe 0,01% of them actually wrote about us. […] It was just to sell everyday, to go to different events and really sell to potential customers. It was not like just pressing an online button, and then people find your product and your [web] page. It was the hardest work. I appreciate all the sales people much more than before.'*

Thanks to availability of the materials, Matti became a full-time entrepreneur: thus, the practice of commercializing did not have to compete with other practices (Shove et al., 2012) – like an extra-job – as he could support himself with a salary.

At the early stage in the practice's career (Shove and Pantzar, 2007), Matti's adherence to a user-centered design (Pratt and Nunes 2012) helped spur users' interest towards the wearable. He organized testing of the wearable at schools in order to identify the product's drawbacks that could betray future users' expectations: *'We had three workshops at schools. In two different schools and three different classes. […] We had different sizes of prototypes and asked the kids about their preferences, like do you prefer organic shape […]. So, all design decisions were made with kids. The parents came at a later stage.'* In his narrative, Matti stresses that even though he had appreciated the initial design of his wearable, he made a decision to change it based on the received feedback from children and parents. Shove and colleagues (2012) argue that 'for any individual, the experience and process of becoming a competent practitioner is important' (p. 51). Frequently, competences acquired in one setting can be reproduced in others, as happened with Matti: he acquired the user-centered design skills when studying at a university as an e-textile designer, and later managed to successfully apply these skills for the practice of commercializing. This example may also engage with the critique that wearables' design is driven by technological innovations rather than users' needs (Dunne, 2010; Novak, 2020).

Thanks to the design improvements, Matti's practice of commercializing accelerated: the number of subscribers to the start-up's mailing list and Facebook page soared along with orders. At this point, problems with the elements' integration occurred (Shove et al., 2012): to meet the demands of the customers, the need for scaling the production up became obvious. In order to organize and sustain the production chain, Matti had to undertake unfamiliar tasks: *'We just could not figure out the production chain fast enough. There was this bottleneck, the final steps of the production since we had no previous experience from producing. We should have had someone in the team who was an expert, or then find a partner who was able to take this part over. […] We did not have enough freedom with our budget. If you have a budget, you're like "Ok, I can put some extra amount into the project to outsource". But we did not have enough freedom in this sense, so we had to do so much ourselves.'*

In daily life, acquiring new competences through doing something occurs non-stop, often without noticing (Shove et al., 2012). Meanwhile, some skills require little training or few repetitions, whereas others can be mastered only through a dedicated training (Shove et al., 2012: 48). As follows from the quote, Matti found himself under pressure to solve new urgent tasks. At some point, Matti wanted to hire an additional staff member who would be in charge of the production, but a state-owned company that had commissioned Matti's project refused to find additional personnel. At this point, lack of the competence element jeopardized the persistence of the commercializing practice.

Meanwhile, Matti's narrative contrasts the entrepreneur's position against that of a university researcher. For instance, in the following quote, Matti explains how restrictions that he faced as a wearable entrepreneur disappeared when he switched to researching: *'…the aim is different. When you're aiming to develop something that you should sell in 3 months, you need to utilize the stuff that is available right now. And as a small start-up company, you need to rely on the stuff that is proved to be functional. But in the context of research, I have more freedom to explore. I feel that I am in the position when I can suggest: 'Hey, I think this perspective makes more sense', instead of just taking what is [available] right there.'* Based on the quote, Matti finds meaning of the practice in freedom and experimenting with technology. Interestingly, the practice of commercializing featured the same meaning in the early stage when the user-centered design was applied. However, since practices are dynamic, their elements are 'extended and eroded' while the practice unfolds over time (Shove et al., 2012: 55). Frequently, when a new meaning arrives, it can displace previously established images associated with a given practice (see Shove, 2003; Hand et al., 2005). In Matti's example, the practice of commercializing became disintegrated as the meaning element eroded. As soon as he was offered a university position, Matti left commercializing behind.

To sum up, at the beginning, the practices of researching and commercializing were corresponding: since the wearable required a design improvement, commercializing held the meaning of exploring and researching that Matti appreciated. In the longer run, the development of the practice of commercializing required other competences such as managing and organizing the production chain

that Matti did not possess. The image of exploring and researching was also overshadowed by new images that required quick and less innovative solutions in order to meet the consumers' demand. At this point, the practice dissolved and was displaced by researching.

In the next section, I will proceed with discussing relations between the practice of commercializing and researching, and the consequences that their bundling might have for the sustainability of wearables' commercializing.

6.1.2.2. Researching and Commercializing

As a knowledge-intensive product, wearables are often a result of intense research (Khalifa et al., 2018; Zhao et al., 2020), and many of the experts in this research have or used to have an academic career. Figure 9 below illustrates how a frequency of the mentions of the words 'research' and 'entrepreneurship' have been dispersed in Finnish state-owned media Yle between 2005 and 2020.

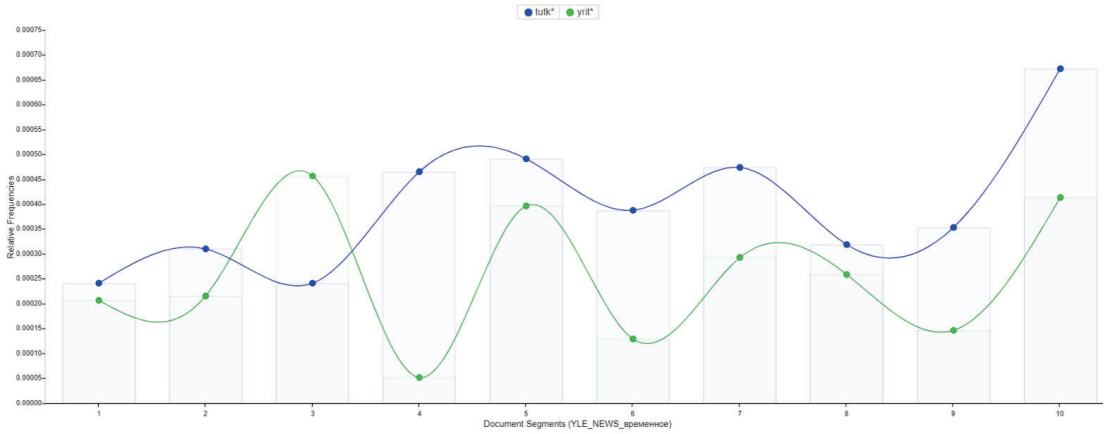

Image 10. Frequencies of mentions of research (blue) and business (green). By voyant-tools.com.

Interestingly, the research repertoire (Swidler, 1986) has always been present in the discussion on wearable technology in the Finnish digital media. Moreover, it has dominated over the 'business'-related repertoire most of the time: one exception is a period between 2014 and 2015 when Apple Watch was introduced (see Campbell and La Pastina, 2010 on the 'cult'-rhetoric in media that has been surrounding Apple products).

Recent surge in the frequency of discussions on research in the digital media in Finland can be associated with the COVID-19 epidemic: as devices that measure health-related indicators, commercial wearables could reinforce their market position through offering additional functions related to COVID-19 prevention (Amft et al., 2020; Roblyer, 2020; Higgs et al., 2021). Oura Health ring – a commercially successful Finnish wearable sold predominantly abroad – joined a study in a

Californian university to research the wearable's potential in diagnosing COVID-19 (Karppinen, 2020). In one of the articles, Yle informs:

> *'Oura has delivered 2,000 rings to California, and they were distributed among employees of two San Francisco hospitals. Rings are to measure their body activity. According to Hannu Kinnunen, Director of Science department in Oura, employees [of Oura Health Ltd.] record their possible symptoms. The information produced by the ring and the workers' symptom diaries are later compiled at the University of San Francisco, and are also combined with any confirmed coronavirus diagnoses'* (Karppinen, 2020).

Swenson and Wagner (2014) suggest that spin-offs like media coverage can contribute to business sustainability of an enterprise as it increases its recognition in the market. In this sense, the practice of research can be regarded as forming a supportive bundle with the practice of commercializing of this smart ring.

Based on the expert interviews, Nina – a wearable entrepreneur from the Netherlands – also participates in the research practice. Specifically, Nina develops two types of wearable projects: commercial ones as an outsourced designer; and scientific products that she does not sell. In the following quote, Nina explains how her research projects proceed:

> *'So every now and then you see a very nice technology right 'around the corner', but you don't have a client for it. Or you have a very nice application area in mind, but you don't have costumers or whatever. So I'm trying to motivate the industry myself by using [new technology], by making an example. So we make some prototypes, we are trying to issue a publication about it, sometimes in popular media which is more fun, but also in scientifically oriented media. And we make some pieces, and we order a good photoshoot to get as much PR as possible. This is kind of the main goal. This is not for sale, this is really for PR and portfolio building'* (Nina, the Netherlands).

The start-upper admits that the funding for the research-based wearables is available thanks to the commercialized projects: as a rule, large technological companies like Philips outsource Nina to develop a needed device. After Nina's job is done, the company is in charge of production, selling, and marketing. Overall, Nina's case exemplifies how the practices of commercializing and research share the elements in a harmonious way (Shove et al., 2012): while the commercial activity guarantees the material element, the practice of researching brings in meaning. Hence, the sequences where the practices share an element become a pre-requisite for a fruitful 'collaboration' through which both practices are sustained.

6.1.2.3. Intellectual Property Rights and Commercializing

Initially, a question on the intellectual property rights was not included in the interview guide with the experts. However, based on the first interviews, it became clear that the topic of copyrights might be worth exploring. Specifically, one of the experts ended the interview abruptly under the pretext that I was trying to steal the design of his wearable's prototype. Upon reflection, I included the question on the property rights and patenting into the subsequent interviews.

Acquiring of intellectual property rights increases revenues and competitiveness of a company-owner, so an interest towards patenting has been high in the wearables' market (Mück et al., 2019). So far, the majority of patents related to wearable technology belongs to the large players, such as Samsung, LG, Sony and Apple (Statista, 2021, see Figure 11). As far as small-scale entrepreneurs are concerned, the patent has a positive effect on their chances to secure funding (Graham et al., 2009) as well as improves their negotiating position (Cohen and Musson, 2000). Furthermore, small entrepreneurs do face a risk of theft (be it a design idea or a technological solution) when presenting to potential investors, initiating a crowdfunding campaign or launching the first prototype into the market (Barton, 1992). Hence, the copyright license is a barrier against theft of ideas and technology for companies, and might be regarded as a substantial support for the commercializing of a technological device.

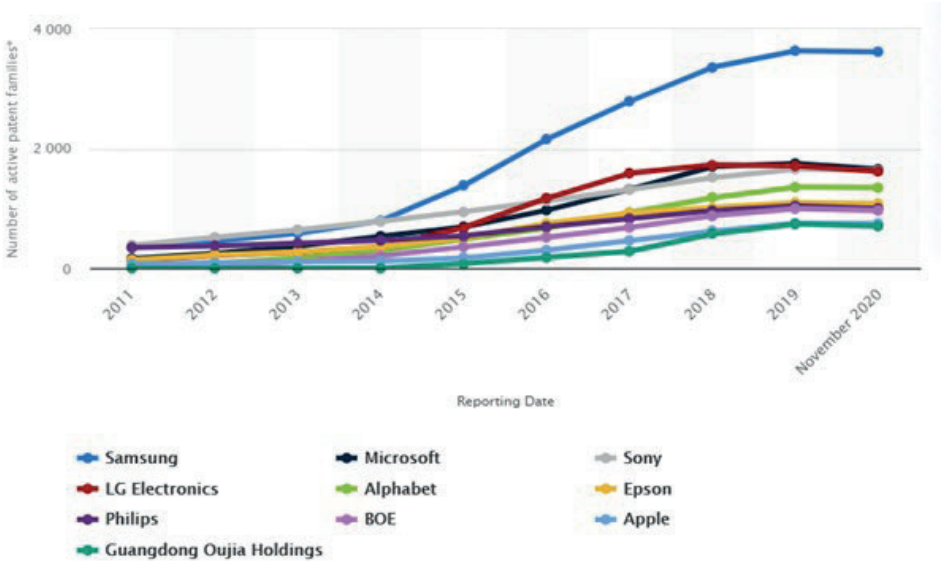

Figure 11. Number of active patents in the market of wearables 2011 - 2020. By Statista, 2021, https://www.statista.com/statistics/1032996/worldwide-wearables-patent-owners-trend/ (retrieved 05.05.2021)

Interestingly, the participants of this research do not regard the property rights of their wearables as a support for their entrepreneurial activity. None of them has a patent, though the reasons for this varied. James (USA, integrated practice), for example, explains: *'I am an idealist. […] I recognize that products that are made in the private sector are usually better, they do usually function better, they have more money. And open-source alternatives are usually not as good. But even if a small number of people are engaged with them, I think it's better.'* Overall, James regards the design of his wearables as *'a pattern book'* or *'a recipe book'* available to everyone.

Diana (Germany) argues that intellectual property rights might be useless in case of her start-up as legal costs associated with it would be unbearable: *'It's hard to register an international patent. Anyway, if some Chinese company copies my products, I will be tired of all these legal matters and paying attorneys' bills. […] If Louis Vuitton copies your idea, their name will work for them.'*

Nina (the Netherlands) makes wearables for large companies as an outsourced designer, so these wearables belong the ordering company, not Nina. The designer explains: *'It takes quite a lot of time and money, to get patents for whatever. I prefer moving forward to the next project, and think about the next step, and the next one. This is how I'm trying to keep up [with the industry] and push the industry forward.'*

Based on the quotes, the interviewed experts do not participate in the licensing practice. Though admitting certain advantages that the property right could have brought into their commercializing practice, the experts nonetheless perceive it as expensive and restrictive. For James, the restricting nature of licensing contradicts the meaning of a wearable as an open recipe book that shapes his commercializing practice. Diana's example addresses that international property rights, as a rule, require skills and material components that a small start-upper cannot afford, in contrast to a large fashion retailer (Fiano et al., 2020). According to Nina, registering of the property rights is a long and complicated procedure that steals time from a more meaningful activity: namely, testing new technology in order to push the wearable industry forward. Overall, the findings of this research suggest that the licensing practice might rather hamper and restrain the practice of commercializing for small-scale entrepreneurs.

6.1.3. DIY WEARABLES: GOING GREEN

Discussion on environmental sustainability has been ongoing (for a review, see Gurova et al., 2020; Smelik et al., 2016; Bayramol, 2017; Hermsen et al., 2017): issues of energy accumulation by smart clothes/textile (Smelik et al., 2016; Bayramol, 2017: 199), use of ecological materials in wearables' manufacturing as well as means to prolong the lifecycle of wearable devices (Hermsen et al. 2017) have been resurfacing in the academic literature. Wearables have also been discussed as a cause of stress and a means through which data theft can occur (see Lupton, 2014, 2017; Van Dijck, 2014); and these are the factors that might put one's health and privacy at risk. Out of all the interviewed experts, James (the USA) stands out due to a clearly articulated environmental agenda. Ultimately, I decide to discuss his case separately as an example of an environmentally-friendly commercializing practice in the wearables' market.

James is a proponent of DIY wearables that are autonomous from the digital environment, in contrast to smartwatches, for example, that operate solely through applications: *'A lot of commercial wearables are still disproportionally focused on digital space. Like collecting data, or allowing you to interact with social media accounts. So, really, my idea is sort of emphasizing physicality.'* Similar to James' account, the issue of the rootedness of wearables in digital world has been problematized: for example, the already mentioned notion of 'dataveillance' (see Lupton, 2016; Van Dijck, 2014) refers to the self-tracking culture that often results in digital surveillance by companies and institutions of wearables' users, thus putting their privacy at risk.

James' final products are educational videos that demonstrate how to make a wearable at home with simple materials that can be purchased in a local shopping mall: a fan, scissors, umbrella, glue, etc. James reaches potential users through a personal webpage and presentations/workshops organized in museums and galleries. Reliance on the simple and mundane tools requires imagination and an unconventional approach to how they are assembled into a wearable. James stresses that he has to do a lot of online searching in order to find alternative solutions:

> *'It usually takes a couple of tries [to create a wearable]. […] So, first I try the easiest way I can find. One of my biggest problems is mobile power [needed to activate the wearables] […] I usually search on forums, I look how somebody has solved… like a parallel problem or some piece of the problem. And I did ultimately find somebody had modified an e-cigarette thing to make a fog [that I needed for one of my wearables]. So, I adopted this idea. […] I can barely sew, so I had to purchase a sewing machine, and my first prototype was really messy. But it has improved, and I am just kind of trying to keep learning new things. [...] I was not thinking about finding someone [to solve technical problems] because this process [creation of a wearable] is a challenge, and I am interested in trouble-shooting and solving problems myself.'* (James, USA)

It is important to acknowledge that James' attention to acquiring new competences (sewing, for example) has been common among skillful carriers of DIY practices (Røpke, 2009). Based on practice theory, acquisition of new skills and competences while practicing commercializing may be regarded as an 'intrinsic' award (Røpke, 2009). Therefore, James' practice of commercializing of DIY wearables might be interpreted as a way to express his capabilities and ambitions (Shove et al., 2007).

Furthermore, James' preferences for basic materials and specific ways to handle these materials do not require a lot of energy consumption (Smelik et al., 2016; Bayramol, 2017: 199). More critically, James departs from an idea of organizing any sort of physical production of his wearables. Instead, he offers tutorials that anyone can follow to create James' wearables. Throughout the interview, James emphasizes that his purpose is *'to make the wearable replicable in a home environment'*. When discussing the meaning of popularizing the wearables and finding consumers for them, James expresses the core environmental idea of his practice is the following way: *'the user herself perceives that she needs this wearable, it is not like a producer forces it on her.'* In other words, James sees that whenever a consumer decides to replicate the wearable from his videos and to invest her time and skills into it, she will eventually use the wearable. This view prioritizes an open knowledge when a user may adequately evaluate functionality of a given wearable as well as whether she really needs it (see Perner-Wilson et al., 2011). James' practice of commercializing might also be at least a partial answer to the situation of quick abandonment common among wearables users (Attig and Franke, 2020; Fadhil, 2019; Ledger and McCaffrey, 2014). Overall, the integrated practice of commercializing DIY wearables carried out by James is a captivating example of how a small-scale entrepreneur with limited resources can launch their wearables into the market. It stands out in many respects, including absence of physical production, videos as a final product, basic raw materials for making a wearable, digital independence of these devices, and constant development of the competences by the entrepreneur.

In this section, I looked at the practice of wearable commercializing as a constellation of the elements (materials, competences, meanings). Additionally, I zoomed out for a fuller picture and trace what other practices relate to commercializing. In this section, I illustrate some of the combinations that either result in the practice's integration, or, for various reasons, do not link. Drawing on the concrete cases of the wearable entrepreneurs operating in different countries, I predominantly analyze practices-as-performances (Shove et al., 2012), or individual doings of separate carriers. However, certain topics are supplemented by larger data from Finnish digital media.

In the next two sub-sections, I proceed to the consumers' experience with wearables, and will address issues of aged 50+ consumers and families with children, respectively.

6.2. SUB-STUDY 2: DAILY PRACTICES, WELL-BEING AND WEARABLES. CASES OF AGING IN RUSSIA AND FINLAND

In this sub-study, I am looking at aged 50+ consumers of smartwatches and fitness trackers who have been using them for some time. Since age is one of the decisive characteristics when choosing the participants, I must briefly outline how age and aging are understood in this thesis, as well as what aging has to do with sustainability.

Though there have been resurfacing assumptions that age has lost its societal significance, society is still obsessed with youthful and healthy bodies (Cook, 2019; Joyce and Loe, 2010). It is usually chronological age (Koskinen et al., 2017) that is referred to in this case, however, there are broader concepts such as cognitive age that means 'the age one perceives one's self to be' (Stephens, 1991: 37) and encompasses such dimensions as feel-age, look-age and do-age (Chang, 2008). Therefore, the cognitive age presupposes that the actions of an individual and the way they perceive their age are interconnected.

In a nutshell, aging might be associated with a loss in well-being (Steverink et al., 2005; Liu et al., 2017). According to the argument (Steverink et al., 2005: 235), with aging, individuals switch or even lose some of their social roles – for example, the role of a wage worker – which subsequently leads to loss of various activities and resources, such as income, social ties with colleagues, access to paid services etc. Therefore, aging individuals might indeed face a higher risk of decrease of well-being compared to younger age groups. During the COVID-19 pandemic, when various restrictions leading to social isolation, loneliness and little physical activity have been influencing daily lives of older populations (Brooke and Jackson, 2020), investigation into how to support older age groups is especially timely. On a large scale, this misbalance between different age groups means lower social sustainability for society as a whole, with resources, services and opportunities distributed more unevenly (Assefa and Frostell, 2007). Taken that aging population has been steadily growing across different countries (Van den Heede et al., 2019), the problem is paramount.

Smartwatches and fitness trackers, in addition to tracking activity, help manage daily tasks: these wearables connect to cellphones through Bluetooth, so a user can keep the track of their emails, messages, calls, etc. This is important because it has been acknowledged that maintenance of decent level of well-being is not a matter of heredity only, but also of how well an individual manages and controls their aging process (Steverink et al., 2005).

In this sub-study, I look at the composition of the elements of practices with wearables carried out by users over the age of 50. I adhere to the view that the users re-negotiate their age and aging in the process of practices enactment. Next, I am interested in how a smartwatch or a fitness tracker can become a linking element between several practices, clustered into bundles. Finally, the context is also crucial, because I deal with two countries where age and aging are perceived differently. Article II is a backbone for this sub-study, but data from Finnish digital media is also used to supplement the findings.

6.2.1. MANAGING DAILY LIFE WITH WEARABLES

As I argue in Article II, the practices with wearable technology among aged 50+ consumers in Russia and Finland are similar, since the functions of these devices overlap. For the most part, these are the practices connected to physical activity (number of steps per day, distance covered), health (heartbeat, blood pressure), dieting (calories/water consumption), and stress (with sleeping cycles included).

In practice-based terms, the aged 50+ participants of this research are a 'unique point of intersection' or carriers for these practices (Reckwitz, 2002). Through their carriers, the practices bundle and form complexes (Shove et al., 2012) where relations between the practices vary. For example, doing sports and working rarely intersect, while listening to music and exercising go well together. Gilmore (2016) refers to wearables as 'everywear' that enables a user to 'wear' their habits all day long: this is exemplified in measurements and graphs by wearables.

With a fitness tracker, Jussi (65, Helsinki) ensures his exercising is balanced and he does not overload himself: *'Average heart rate raises if there is no rest between the trainings. This is a stressful situation [for one's body]. I've noticed that if I am taking a break [between the trainings] my average heart rate is back to normal. The same with sleeping: if you have bad habits or stay up late, then your average heart rate and stress level raise. This way [with a tracker], you have your life mirrored.'*

This narrative is in line with earlier findings by Pantzar and Ruckenstein (2015) who maintain that, through tracking technology, users learn to recognize and appreciate their practices. In addition to this, wearable technology may help balance certain practices against others (like exercising in Jussi's case). Similarly, Raisa (65, Russia) has long experienced sleeping problems. Drawing on the measurements of her fitness tracker, Raisa can reconfigure other practices in order to compensate for lack of sleep: *'Sometimes I do not even realize, am I sleeping or not? […] So, I am interested [in measurements], I want to draw conclusions: how well did I sleep last week? If I see it was not enough, I plan how to compensate [for the lack of sleep]. I do not worry now, I just change my routines.'*

Regarding balancing practices, an issue of 'recovery' has become prominent in discussions on wearable technology in Finnish digital media (HS), particularly between 2010 and 2018 (see Figure 12):

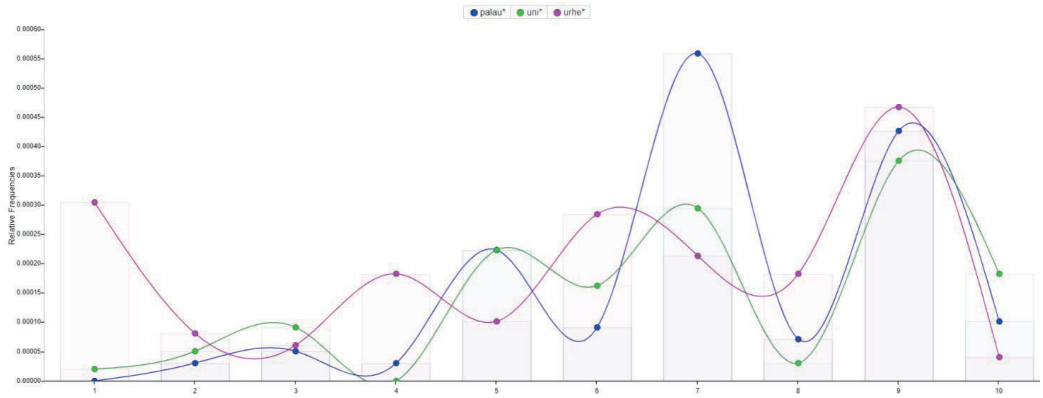

Figure 12. Frequencies of mentions of 'recovery' (blue) and 'sleeping' (green) and 'sports' (pink) in HS between 2000 and 2020 (years divided into periods on the vertical axis). By voyant-tools.com.

Recovery is explained as one's bodily ability to restore after different types of stress (in HS: Rissanen, 2017; Väärämäki, 2019; Tiainen, 2019). Exercising and sleeping are frequently discussed in relation to this concept: while the former is exemplified as a form of stress for the body, the latter is understood as one of the indicators of how well the body recovers. Within this discussion, it is brought forward that *'before it was just the quantity (duration) of sleeping, today there is an understanding that quality does matter'* (Rissanen, 2017) or that a wearable's user can *'plan the day, according to her recovery level. [A wearable] can also advise when it makes sense [for the user] to go to bed'* (Tiainen, 2019). The concept of recovery resonates with the quotes from the interviews that also raise wearables' balancing role within different practices.

6.2.2. CARRYING A WEARABLE ON YOUR WRIST: MEANINGS

Lupton (2017) explains that, by placing a wearable on one's wrist, a user communicates a certain subject position: for instance, of an individual caring about their health, or learning about their body. On a larger scale, a person might communicate the responsible and entrepreneurial self (Lupton, 2016). Having a smartwatch or a fitness tracker on one's wrist may instigate interest and excitement from others, especially in cases of an innovative device (Wilmott et al., 2017).

In this research, the interview narratives suggest that the participants are aware of a possible effect their wearable might have on others: specifically, they do contemplate how others might interpret their social position through their wearable device. Here, a striking difference between older Russian and Finnish consumers becomes obvious.

Russian aged 60+ consumers (age of retirement for women in Russia) distinguished themselves from what they refer to as an 'average' Russian aging person. When elaborating, Galina (63, Moscow) explains:

It's untypical that I am still working at my age… Many women—I think around 70%—retire. Well, if we're talking about Russia. . . . Also, I am working in the private sector, in a commercial sector, and women in their 60s, as a rule, do not hold high managerial positions. And I still do. Well, it's not very typical that I often swim. . . . Not everyone can travel. Well, I cannot say that I am travelling for new experiences. I rather travel for visiting my relatives. However, wherever I am, I am trying to go somewhere, to see something. . . I think all this is untypical."

Interestingly, Galina interprets her social role as an aging person through the practices she can undertake. She lists the practices unavailable for many aging Russians: going to a swimming pool, traveling, having a decent job, going to museums, taking a taxi (Tchernina and Tchernin, 2002: 560). Galina, in contrast, holds a managerial position in a private bank, travels abroad several times per year, has a yearly pass to a fitness center, and lives separately from her children and grandchildren. Given the disadvantaged position associated with aging in Russia, it might have been expected that the Russian interviewees would try to distinguish themselves from a typical pensioner (Calasanti et al., 2018).

Raisa (65, Moscow), has just retired and still in the process of negotiating her new 'lower' status: *"I used to work every day, in the evenings and on the weekends as well. After I retired, I bought a country house to keep myself busy, to direct my energy into some serious task. […] Talking of [lifestyle] changes [after retirement], I woke up early and returned home late … I drove a car, and was not very active, physically. Now I also drive to my country house and to a fitness center. […] I am a modern pensioner. […] I'm pretty skillful. I have a Bluetooth in my car which I've been using. I have an e-book, a tablet and two computers at home. I use computers a lot, sometimes I sit the whole day in front of a computer."* Based on the quote, Raisa, though retired, still distances herself from Russian pensioners and their lifestyle, calling herself 'a modern pensioner.'

Some younger cohort of Russian participants also discuss an 'older generation' in their interviews. Dmitry (52, Moscow) sees 'older' people in the following way: "*[These are] people over 60 years old with push-button telephones which they use for calls and SMS only."* Though Dmitry refers to a chronological age, he still names the practices attributed to being 'old': using an outdated phone with few functions.

In contrast, the older cohort of Finnish interviewees (60+) perceive their lifestyle as normal and similar to other Finns of their age. According to them, wearable devices have become so common among different age groups that it does not reveal anything about their owners. For instance, Kaisa (61, Helsinki) responds: *"Perhaps, two years ago it could show that you're sporty. But it's so common nowadays, like… nothing special."* Jussi (65, Helsinki) reasons in a similar way:

"Int.: Has anyone ever noticed your tracker on your wrist?

J: I don't think so. Many people have similar [devices – D.M.] now."

The findings suggest that the aged 50+ consumers are neither denying nor trying to combat their age through the practices with wearables. Meanwhile, Russian participants do distance themselves from what they call an 'average' pensioner, and the practices with their smartwatches and fitness trackers

help them distinguish themselves from this disadvantaged group. The youngest Russian interviewee portrays an older generation as disadvantaged and having very limited technological skills. These findings are in line with previous research that argues that whenever 'aged' is seen as subordinated and disadvantaged, people will try to distinguish themselves from this group (Calasanti et al., 2018), which might be the case in this study. The Finnish interviewees are also aware of their age, but they regard themselves largely as doing what peers of their age have been doing.

6.2.3. BRINGING UP THE BODY

Based on the interviews with aged 50+ users and the data from Finnish media platforms, I analyze how stigmatized bodies (Latner et al., 2005; Puhl and Heuer, 2010; Oró-Piqueras and Marques, 2017) emerge in the process of wearables' use. These insights are relevant to different forms of well-being, particularly physical and mental types, because stigma attached to body causes numerous psychological constraints and problems leading to isolation and frustration (Stone and Werner, 2012; Becker, 1981).

Discussion on the body's role in the practices with wearables, as well as how this body is woven with other elements within these practices, is crucial. On the one hand, wearables are attached directly to the body to be worn constantly – e.g. 'everywhere' (Gilmore, 2016), and they produce data that alter the way we define and understand the body (Lupton, 2017; Wissinger, 2017). On the other, Shove et al. (2012) define the body as the material element of the practice that, on the one hand, embodies skills necessary for carrying out practices; and, on the other, can undergo changes in the process of participation in practices (e.g. sports) (Shove et al., 2012, Røpke, 2009). Importantly, though different types of bodies are discussed separately, they can intersect (for example, aging and obese).

6.2.3.1. Aging Body

Oró-Piqueras and Marques (2017) point out that some representations portray aging people and their bodies as fragile, declining and old-fashioned. Additionally, visible devices designed to help control health can reinforce this stigma by drawing extra attention to one's physical condition (Schukat et al., 2016). Smartwatches and fitness trackers are a positive exception: designed in the form of a regular and well-known accessory, they are easily accepted in many social circumstances, as opposed to less conventional forms (Dainow, 2014)

For example, Vasiliy (69, Russia) has a mild medical condition that requires constant control over his blood pressure. This is how the user describes his experience before and after acquiring his fitness tracker: *'I used to carry a box [with a blood pressure device] to my office which was larger than my tracker. I had to find a secure place [to measure blood pressure], as it was inconvenient to do it in front of colleagues. Moreover, you have to be quiet [when measuring], but my colleagues would definitely start asking how I feel if they see me with it. . . . Even if the [wearable] tracker makes*

measurement errors, it is still possible to track dynamics and understand whether this is your normal blood pressure or if something is wrong.'

Previously, Vasiliy's health practice was complicated by the need to carry around a blood pressure meter with a small sleeve. As a result, he drew people's attention when carrying this practice in public. With a fitness tracker, Vasiliy can keep his blood pressure under control by pressing just one button to monitor it. Even though Vasiliy admits that the tracker's measurements might not be very precise, the advantage of controlling his body indicators discreetly in different social settings is highly valued. Overall, changes in Vasiliy's health practice illustrate how a challenge that has a negative impact on his physical and mental well-being (risk of high blood pressure, psychological discomfort related to publicly revealing his health condition) is resolved with the wearable (Dodge et al., 2012).

6.2.3.2. Body with Special Needs

The body with special needs features strongly in Yle and HS. Based on the articles studied, often dressed into a form of a story on how an ordinary day of such a person proceeds, wearables are presented as devices that can partially compensate for absent skills. For example, HS tells a story of a young man who communicates only with gestures, signs and noises, and needs several smart devices that ease interactions with his helpers. Recently, he has been using a smart ring that measures the level of stress and physical recovery based on the sweating levels of finger cells. The data provided by the ring revealed that *'social situations, such as residents' mutual dinners, caused strong positive emotional reactions'* (HS, Tammi, 2018). As a result, the helpers recognized that favorite hobbies, instead of causing stress, actually help their patient recover. Notably, the example demonstrates a bundle (Shove et al., 2012) between the practices of the young man and the work practices of his helpers. As mentioned, the ring can compensate for some skills, but *'(t)he smart ring only tells about the emotional reaction, not the reasons for it. It does not specify whether it is pleasure or resentment'* (HS, Tammi, 2018). Therefore, the helpers still need professional competences to interpret the data from the ring.

Meanwhile, this example resonates with Latour's (1987) vision, according to which know-hows are delegated from an individual to a device. However, as has been noted elsewhere (Morley, 2016), new technology should not be regarded only as a substitute for a human's effort in a practice, but also as an extension of 'capabilities of human bodies and the possibility for human action' (Morley, 2016: 86;). In another example from HS, a person whose lower body is paralyzed has been using an exoskeleton: *'(S)he can walk around the kitchen while baking an apple pie for her mother in a standing position, or leaning over the kitchen counter. She can reach for the sugar from the top shelf'* (Ala-Kivimäki, 2019). The quote illustrates how a wearable managed to extend the pool of practices available to the person with special needs by offering competences that otherwise would not be available. It is important to remark that the availability of a technological device should not be mistaken for actual access to healthcare (Elman, 2018). In this sense, relations between the bodies and wearables are directed towards a discussion on neoliberalism that is beyond the scope of this research, but has been brilliantly outlined before (Lupton, 2014; Moore and Robinson, 2016).

6.2.3.3. Obese Body

According to Mora (2013) 'a major problem facing modern societies is how to change lifestyle and habits, particularly in the older population.' Wearables can act as an instrument for self-coaching and self-optimization as they measure and visualize body-related data (Pantzar and Ruckenstein, 2015). An option of sending notifications if a user has not been moving sufficiently for some time, or has not been drinking enough water, might be one of the instruments for self-coaching and optimizing. Pantzar and Ruckenstein (2015: 100) cite a manager of the largest sport institute in Finland who compares a tracking device to a 'human coach'.

Nowadays, obesity rates have increased sharply along with risks associated with it (Dietz and Santos-Burgoa, 2020; Anekwe et al., 2020; Blue et al., 2020). Though it has become well accepted that weight-related issues stem from lifestyles (Wadden et al., 2007; Cameron et al., 2003), the concept of a 'lifestyle' remains somewhat obscure (see Jensen, 2008). Recently, Blue and colleagues (2020) call for approaching the obesity issue from the practice-based perspective, where the body is understood as a social entity located at an intersection of various practices that make up a society. As they argue: '(R)ather than documenting the history of eating or exercise – as separate phenomena – what is needed is an account of intersections and historical processes and of how living conjunctions of practices are enacted, reproduced, and transformed.' (Blue et al., 2020: 1055-56). For example, they refer to the practices of snacking that resumed to be a mere 'treat' and, instead, evolved into an eating practice that can occur at any time throughout the day. Additionally, it is necessary to account for how snacking bundles with other daily routines, like watching TV, or browsing on a laptop or smartphone (Blue et al., 2020).

In this respect, wearable technology can indeed become a tool to visualize these practices: for instance, one of the participants of this research - Mikhail (50, Russia) – sent me data produced by his wearable used purposefully for losing weight (for part of the pictures, see Figure 13). Based on the pictures, Mikhail has been tracing not just fluctuations in his weight, but also stress levels, water consumption and sleeping cycles. He also uploads the list of food that he consumes into a wearable app to calculate calories.

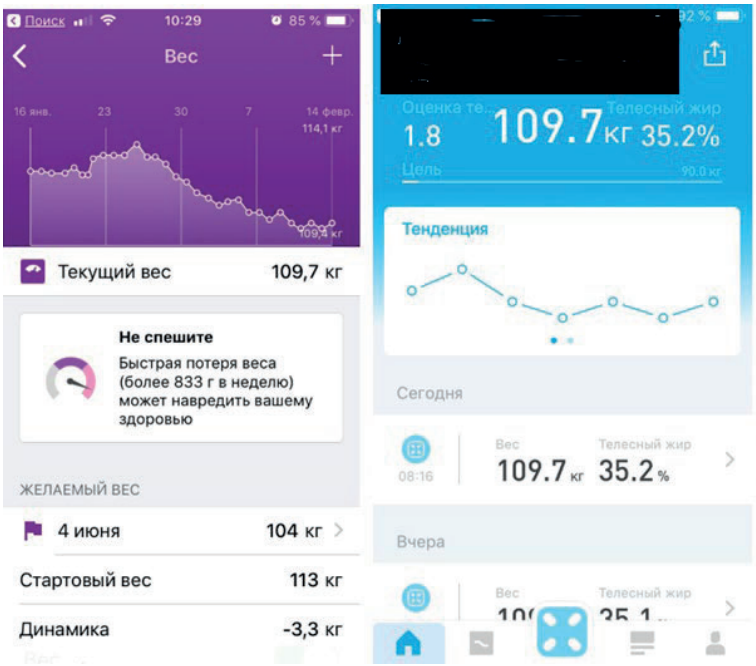

Figure 13. Weight-related indicators tracked by Mikhail (50, Russia). The interviewee voluntary shared his data with the researcher.

However, Mikhail admits that the results so far have been vague. Though his wearable collects a lot data, interpreting it and understanding what to do for losing weight remains unclear *'They [the fitness trackers of a specific brand] had this marketing motto: 'I will tell you what you eat', so I hooked on using it.* […] *There are, of course, very beautiful things in the app, everything is very colorful, a lot of graphs, everything's moving and flashing. But it's impossible to get if I'm moving in a right direction.'*

Similarly, the media data from Finland stresses the ambiguity regarding wearables' effect on losing weight. HS, for example, mentions:

> *'(R)esearchers found out that those without wearables had lost the most weight. Their weight decreased by an average of 5.9 pounds whereas those using the trackers reached a weight loss of 3.5 pounds. Researchers have tried to interpret the surprising outcome. It is possible that individuals who have a strong confidence into the wearable and its measurements will neglect other aspects of dieting.'* (Väliaho, 2016).

Among other reasons, listed in HS, are a false feeling of accomplishment given by wearables that might eventually result in more eating (HS, Väliaho, 2016). On the contrary, low performance, indicated by wearables, might discourage a user from continuous dieting as a goal seems unachievable. This discussion contradicts a basic assumption that, by informing users about their unhealthy behaviors, a wearable will shift their behavior towards healthier goals. This idea of a direct link between wearables and behavioral change has already been extensively criticized (Lupton, 2016;

Moore and Piwek, 2017), though the marketing discourse has been left somewhat over-optimistic (Schüll, 2016; Gorm and Shklovski, 2019).

Both the media data and the interviewees' narrative indicate that there is still lack of methodological support on what to do with the measured body indicators (Boillat et al., 2018). Furthermore, though the raw data produced by wearables can be considered sufficient for recognizing one's practices (Pantzar and Ruckenstein, 2015), they might not be enough for fundamentally transforming them. Overall, these findings suggest that relations between the body, wearables and weight control hold great potential for further research.

On the other hand, Mikhail (50, Russia) admits that he was missing his wearable once it went broken. He was used to discussing the results of the swimming sessions with his wife. Once the fitness tracker was under repair, and Mikhail had to spend a couple of weeks without a 'proof' of his accomplishment, he felt sorry: *"[I missed] the time when I was checking what I did during the day. Say, I was eating something, I was doing some exercise, and lost 300 cal. Then I was very happy about myself. "Hey, everyone! Praise me!"* Furthermore, previous research suggests that self-esteem and a body image of aging men are tightly connected, so feeling physically healthy and attractive are crucial for one's self-esteem while aging (Baker and Gringer, 2009).

6.2.4. SOCIAL WELL-BEING

Gilmore (2016) argues that 'the social capacity of these [wearable] technologies—the ability to share information and compete with friends by syncing devices online—turns the quantitative apprehension of movement into a fundamentally social and qualitative one' (p. 2531). Different brands of smartwatches and fitness trackers offer an option of sharing one's measurements with other users from the brands' community (Muniz and O'guinn, 2001). Specifically, it is possible to join different online training groups, based on one's preferences; and to compare one's daily activity with that of others. Interestingly, none of the participants of this study has ever used this option, though many interviewees are aware of it. Finding out why aged 50+ consumers might avoid this kind of online communication through their wearables could make a captivating topic for future inquiry.

Nonetheless, the consumers over 50 interviewed find other – less conventional – ways to connect with others though their smartwatches and fitness trackers. Dmitry (52, Moscow), for example, appreciates the possibility to better manage his communication practice: *'If somebody calls or messages, I see [on the smartwatch screen] if it's some nonsense or not.'* In other words, a quick look at the display of the wearable device helps decide on answering right away or postponing communication. Based on this, wearables can be used 'as technological filters' that manage otherwise complex daily interactions (De Souza e Silva and Frith, 2010: 505).

Another crucial detail is a relation between subjective well-being and social connectedness (see Kekäläinen et al., 2017). DeLeire and Kalil's (2010) study reveals that it is not leisure activity per se, but rather social connectedness in the process of leisure consumption that is associated with higher well-being. Accordingly, in this study, Galina (63, Russia) explains: *'I go for a walk with friends, and all of them know that I have a smartwatch. The first thing they tell me when we walk out is: "Record*

the steps [with your smartwatch]". We are all of approximately the same age, and… we all think that these walks have to bring some value. So, when we walk our 10,000 steps, we celebrate!' On the one hand, Galina is engaged into a leisure practice: walking. However, there is also a social element in it: she goes for a walk with her friends. Finally, the usual routine of walking is enhanced with 'value' that is measured and 'materialized' though Galina's smartwatch. This case also exemplifies how the practice of walking can be re-invented into a more exciting one with the wearable. This is crucial because old ties are extremely valuable for maintaining self-esteem in older individuals (Stevens, 2001: 184), especially given that social connections might become harder to sustain with aging (Stevens, 2001).

6.2.5. ECONOMIC WELL-BEING

In this thesis, economic or financial well-being is linked to a subjectively understood 'decent' life-quality (Aro and Wilska, 2014). Previous research addresses that subjective economic well-being hardly deals with a reflection on one's material conditions (Hayo and Seifert, 2003). Instead, people tend to compare their perceived material situation with that of others (Hayo and Seifert, 2003; Mau, 1996). In this sense, a quote by Mikko (65, Helsinki) reflects this stance: *'Well, I play tennis, and of course, others see that I have Apple Watch, and it's obvious it is expensive.'*

Other Apple Watch owners in this research are conscious about the brand as well. In the next quote, for instance, Dmitry (52, Russia) reflects upon how he might be perceived when using his Apple Watch: *'Once, I was making a promotion video for small-scale entrepreneurs… and the producer suggested putting my Apple watch on as this would look modern and trendy. I sometimes put my Apple Watch on when the battery is dead, just to have it on my hand as an expensive accessory. […] It just happens that a well-off person has an iPhone and Apple Watch.'*

In the account above, Dmitry (52, Moscow) reveals that he has been using Apple Watch in order to communicate a high social hierarchy among the entrepreneurs (Kastanakis and Balabanis, 2014). In this sense, it is possible to interpret Dmitry's practice in terms of conspicuous consumption (Veblen, 1899).

Similarly, Leo (73, Finland) admits that Apple Watch is a device that might present himself as being modern and reaps positive reaction from others: *'I've been using Apple Pay for 2 years almost everywhere. […] When I am paying with Apple Pay [on Apple Watch], someone always notices and there is this 'wow' effect.'*

It is high price and the attention it gets from others signify that Apple Watch might be regarded as a conspicuous good (Gierl and Huettl, 2010). However, the fact that the symbolic qualities of Apple Watch are more pronounced in the narratives of the Russian interviewees can be linked to previous arguments that conspicuous consumption for status signaling has been more salient in emerging economies, partially because it can improve one's subjective well-being (Jaikumar et al., 2018). This argument is discussed in a more detail in Article II.

Similarly, Amatulli et al. (2015) maintain that older consumers might be conscious of expensive brands because their use makes them feel younger, up-to-date and 'modern' (p. 1948). In this sense, these finding resonate with the quotes of the aged 50+ participants. Finally, Steverink et al. (2005)

stress that economic well-being, along with its other forms, may decrease with age due to retirement. In this sense, use of expensive gadget like Apple Watch (Gierl and Huettl, 2010) can contribute to the feeling of being well-off economically.

6.2.6. DATA SECURITY AND SITUATEDNESS OF PRACTICES

Controversy has risen around wearable technology and data security and misuse, particularly in connection to 'dataveillance' (Lupton, 2016; Van Dijck, 2014) and 'surveillance capitalism' (Zuboff, 2015). Associated with big data accumulation, these phenomena are linked to continuous surveillance as well as to new politics of predicting and modifying human behavior in order to exhibit market control (Zuboff, 2015: 75). By adhering to an image of 'effective life style' offered by multiple tools, apps, platforms and gadgets – including wearables – users come under constant pressure of following and conforming to this image (see Zuboff, 2015). Through these concepts, wearable technology has come to be associated with a 'gloom' perspective (Ouchchy et al., 2020) on how it influences peoples' well-being.

The issue of data security and data theft does not appear in the narratives of the aged 50+ participants of this study. Also, Kristensen and Ruckenstein (2018) admit that this issue is hardly voiced by their interviewees. However, data security issues are featured in the media data that I scraped. From the practice perspective, media discussion on this issue is inscribed into digital practices: for example, Yle provides a short guide on how to handle cookies and use iCloud, or to create a safe password (Yle, Jensen, 2016). In this way, Finnish media offers insights into how digital competences should be enhanced when being engaged into the practices with digital technology. Therefore, the problem of data theft is approached from the position of a lack of skills for the practices rather than wearables' failures per se.

Next, the use of wearables is contextualized in media accounts. On the one hand, it discusses how the risk of surveillance and data theft increases in specific contexts, like China where it can be used as a tool for political pressure (HS, Laine, 2018), or a post-COVID world where surveillance is levied due to health risks (HS, Halminen, 2020). HS also reports on an initiative to equip U.S. police officers with wearable cameras in order to decrease policemen's brutality:

> *'…within three years, 50,000 U.S. police will have a microcamera attached to their uniform. There has been a heated debate in the U.S. about the use of force by police […] Cameras have been previously tested in Rialto, California, where in 2012 half of the city's policemen were given cameras. […] (S)ince the cameras were introduced, police received 88 percent fewer complaints during the year than the previous year.'* (Nissinen, 2014)

In this example, increased control through wearable technology over police officers is presented as a way to decrease violence towards the Black minority in the country. Though there is still room for discussion on whether this is a fair initiative (see Maltseva, 2020 on use of wearable technology at a workplace), I suggest that looking at what is problematic about practices, rather than wearables, might allow for deeper insights. As the examples from Finnish digital media imply, use of the same

wearables in China and Europe might bear different results. Alternatively, training of certain competences – rather than changing wearables – can improve digital practices. Finally, dataveillance imposed in certain circumstances on certain groups (policemen) might empower those with less power (Black minority).

In this sub-study, I scrutinized how consumers aged 50+ have used smartwatches and fitness trackers, and how practices with these devices might contribute to higher well-being. The latter is understood as a constitutive part of social sustainability. Though the practices are similar across both contexts, the way Russian and Finnish participants position themselves through their wearables helps them re-negotiate their aging. For Russians, this means avoiding a stigmatized image of the 'average' pensioner, whereas Finns perceive themselves as 'normal' and doing what anyone of their age cohort does. Practices with wearables bear other implications for well-being, including handling of stigma, socializing, and the imagining one's body.

6.3. SUB-STUDY 3: FAMILY PRACTICES AND REIMAGO: SHAPING A LOYAL PRACTITIONER?

In this sub-section, I look at family practices with a newly acquired wearable device, ReimaGo. The details on ReimaGo can be found in Chapter 3 of this thesis. As mentioned above, I distributed a device among four families in Finland and four families in Russia. They agreed to record a diary in order to trace how their daily routines were adjusting to the new wearable device. In this sub-study, I rely on all the aspects of the practice-based sustainability concept presented in this thesis. However, my principal interest is the career of users (Shove and Pantzar, 2007): what paths the families would gradually follow while integrating ReimaGo into their established routines. Following Shove and Pantzar's assumptions (2007), I am interested in how users' loyalty is shaped in the process of practices' evolvement. I assume that loyalty towards the practice might contribute to longer use of the wearable, which is critical in sustainability terms (Evans and Cooper, 2016). Since the sub-study was carried out in two countries, the context in which the practices with ReimaGo evolve is a critical dimension that I consider.

Initially, as mentioned in the introduction, this sub-study was meant to be Article III. However, the fieldwork was seriously complicated by two factors. First, the COVID-19 pandemic changed the timetable: though travelling was restricted, both the families and I wanted to have at least one face-to-face meeting to get to know each other and make sure that we were on the same page. Therefore, we had to wait for lifting of the restrictions. Next, at some point, Reima decided to cease production of ReimaGo and maintenance of the application required for the use this wearable. Therefore, the whole idea behind this sub-study was jeopardized since I was not sure that I could find the needed amount of ReimaGo devices for the families, and that the families would be capable to use it without the application. Ultimately, Reima helped me with getting some of the devices and accessories for them. I also managed to adjust the timetable, so that the ReimaGo application would still be available. To conclude, I will re-develop this sub-study into a separate article in the future.

6.3.1. STUDY SET-UP

According to Shove and Pantzar (2007):

> For an individual, the pattern seems to be one in which positive experiences give rise to processes of repetition and reproduction through which the new entity, be that floorball, photography or whatever, becomes part of an individual's life. In this way people become the carriers of practice. Other parallel processes including those of resistance and defection are just as important in defining the contours of a practice (p. 164).

Drawing on this assumption, I trace the process of ReimaGo's adoption: what factors influence repetition and reproduction of the device's use; as well as what details account for resistance against this prolonged use. The process is conceptualized as the career of practitioners and practices (Shove et al., 2012; Røpke, 2009). Importantly, accumulation of users' experience might have irreversible consequences for the career of the practice and its carriers (Shove et al., 2012). Also, Keller et al. (2016) refer to 'rapture' moments that have an enduring effect on how a practice proceeds. Here, I

also attempt to identify these raptures in order to make claims regarding the factors that can either undermine or strengthen users' loyalty.

To begin, I outline the setting in which the use of ReimaGo occurred. As follows from the Appendix C, the participants were quite homogeneous in terms of age. Only one child in Russia was much younger than others (4 y.o.). Unfortunately, it was very hard to find extra families, so I made a compromise and invited a family with a young child found through the snowball technique (Bernard, 2005). All but one family could be described as 'traditional' (Valiquette-Tessier, 2018) with a working father and either stay-at-home or working mother. Only one family was single-parent, but data from this family were very scarce. Therefore, it is impossible to carry out any comparison across the family structures.

All the parents from Finland and three parents from Russia had previous experience with wearables. In general, the parents had positive experiences with their previous gadgets. This detail could influence the children's decision to try ReimaGo: as socializing consumers (Carlson and Grossbart, 1988; Moschis, 1987), children are influenced by their parents, and often borrow the meanings imposed by the family (Ironico, 2012). Actually, children learn consumer behavior through pretending, copying and imagining (McNeal, 2007), and several children (Families 1 and 2 from Finland) noted that they wanted to try out ReimaGo in order to be 'like their Mum/Dad' who had been using smartwatches.

The COVID-19 situation also needs further clarification, since it has had a profound impact on the family routines (Lebow, 2020), including less exercising and a higher risk of developing obesity as a result of the restrictions (Abbas et al., 2020). All Finnish families were living in private houses with gardens where they installed various equipment for exercising. Family 3 had a separate exercise room in their two-story house. Therefore, regardless of the lockdown, they managed to maintain a decent level of physical activity.

Russian families, however, were living in apartment blocks. Thus, in autumn 2020, when Moscow's government introduced strict measures to prevent the spread of coronavirus, the families felt quite limited in their options for exercise. Children in Family 1, for instance, used to attend only municipal sport sections free of charge. So, when physical attendance was restricted, and all the activity moved online, Family 1 felt cut off from their usual routines: *'The older boy used to go to hip-hop dancing, but now it's pending since all the municipal services are closed [for physical attendance]. […] Now they [sons] participate in more 'intellectual' activities that we've been paying for. This is why we [can afford] municipal sport clubs only, and they are closed now'* (mother, Family 1, Russia).

Gupta and Jawanda (2020) emphasize: 'One of the major consequences of lockdowns and school closures could be that some children will not be able to engage in outdoor physical activities, especially if they do not have access to outside space'. In a similar vein, the participants from Russia were cut off from the material equipment necessary to maintain their exercising practices when schools and kindergartens were closed, and limited apartment space was not suitable for proper exercising.

The diaries suggest that the parents are aware of the lockdown's negative consequences on their usual practices. Meanwhile, re-arrangement and adjustment of these practices can be hard due to stress (see Gupta and Jawanda, 2020). The Russian mother from Family 1 highlights: '*We would love to have*

some new type of a family routine, like an evening walk instead of watching TV. […] My older boy can go out by himself already, by the younger is not allowed. I would love to go for an evening walk with him, but I am usually so tired and worn out by the evening...' (mother, Family 1, Russia). This Russian mother (Family 1) hoped that ReimaGo would help in overcoming the challenges prompted by COVID-19 by recruiting the whole family into exercising through showing data on children's activity.

All children in the sub-study were familiar with online games. Taken that ReimaGo device is based on a principle of gamification – it offers an entertaining game-based format of tracing children's activity – the participants can borrow the competences acquired through playing digital games and apply them in ReimaGo's corresponding game (Shove et al., 2012).

However, some parents expressed concerns regarding how much time their children spend playing online, and are trying to impose certain limits: *'We have a 'Family link' that controls the time spent on the smartphone. At the moment, it is 1,5 hour [per day], I think. Use of specific applications is also controlled. […] Of course, during the lockdown when teaching occurred online, the son could use the computer much longer. But then the webpages available were also limited, like… he could, of course, google'* (mother, Family 2, Finland). This issue of control has been resurfacing though the whole fieldwork, and I will discuss it in detail in the next section.

Introduction of the set-up within which the careers of new users of ReimaGo and their practices emerge is crucial since they define, to a large degree, the way these careers develop (Shove et al., 2012: 63). To summarize, almost all of the families possessed at least some competences (Shove et al., 2012) necessary for handling ReimaGo: all but one child had a smartphone, and most of the parents had some experience with wearable devices. In terms of the material element (Shove et al., 2012), Finnish and Russian families differed in the form of their dwellings: while the Finns were living in private houses with greater possibilities for physical activity, the Russian families lived in smaller apartments. Due to COVID-19 and associated restrictions, the participants might have developed the meaning of staying healthy and keeping a decent level of exercising, taken that access to facilities for training and playing sports has been limited in both countries.

6.3.2. CONTROLLING VS CO-USING

Røpke (2009) introduces a notion of interplay within a practice. Specifically, she indicates that while some practices can be carried out individually, like reading a book or writing a letter, others require participation of several carriers simultaneously, though their roles might differ. Practices with ReimaGo indeed require an input from children and parents. Hence, I apply the notion of interplay in my research.

I argue that the roles between parents and children within the practices with ReimaGo are asymmetrical (Røpke, 2009): namely, the parts performed by the parents and children differ. While the child collects points though being physically active, their parents trace this activity, or offer challenges and rewards, depending on the child's progress and preferences. Though some might regard this as two different practices performed separately (see Røpke, 2009), I adhere to the view

that parents and children are engaged in the same practice through ReimaGo: first, their activity is mutually conditioned; second, use of ReimaGo can hardly be accomplished unless both are involved. Meanwhile, asymmetry between the roles assigned to different practitioners might result in power dynamics (Watson, 2016) within the practice. I will try to uncover this pattern through my data in the chapter on Discussion.

One parent (mother, Family 3, Finland) had concerns about her 9-year old daughter's weight. This is how she describes the situation:

> *'She is not really keen on physical activity. She does not like situations when she sweats, or her face gets red. But if there is a friend who takes part [in the activity], she agrees to exercise. Now she has a dancing class once a week, with her best friend. […] It has always been like this. We've started a lot of different hobbies, even football. She just does not feel good there. I've asked her why, but she tells that she does not like this feeling of being sweaty. So, this is sensitive. A situation when she is sweaty and red is very stressful for her. […] She also gets very easily irritated when she cannot learn doing something right away. And we have a lot of this cheer-up chats when I am telling that she'll learn quickly.'* (Family 3, Finland)

Subsequently, the mother paired the ReimaGo device with her own smartphone and created an account. However, it only resulted in resistance on her daughter's side, as the child preferred to follow her progress independently on her smartphone only. Though the mother and daughter tried to disconnect the device from the mother's phone and reconnect it to the daughter's one, both faced technological difficulties, and eventually left the study. However, the initial clash between the mother and daughter emerged over different meanings they attached to the practice of exercising with ReimaGo.

It is not unusual for parents to control their children's digital activity (Ghosh et al., 2018). Recently, children's opinion on the issue has been taken into consideration, and, predictably, children's attitude towards parental control is predominantly negative: as a rule, they feel their privacy is violated, and freedom restricted (Ghosh et al., 2018). Eventually, relationships with the parents suffer, especially if children's and parents' purposes for using a device diverge (Ghosh et al., 2018).

Reima has indeed developed a more subtle way to keep an eye on children's activity. First, even when paired with a child's smartphone, ReimaGo measurements can be accessed by the parent from their own gadget. This way, it is less intrusive. Second, parents can set a physical activity goal for a child and track its progress. When the goal (called a 'challenge' in ReimaGo app) is achieved, the child is offered by the parent a remuneration agreed on beforehand. In other words, the parental control has been re-defined into a 'co-use' that is more flexible and 'contingent on appropriate contexts of use' (Hiniker, 2016). This way, incorporation of ReimaGo into the practice of exercising might proceed smoother, especially if the reward for achieving the goal is tailored for a concrete child (Ghosh, 2018).

Though the dynamics between the mother and daughter in the previous example resulted in quick abandonment of ReimaGo, the diaries put forward other examples. A Russian mother (Family 1) explains that, at the beginning, both she and her elder son felt inspired by setting a task. As the first remuneration, the child wanted a small sum of money (equivalent to approximately 2,3 euro) to use in some online game: *'He achieved the goal quite quickly because I was still unfamiliar with*

ReimaGo, and did not realize how quickly he could fulfill the challenge. So, I set a longer distance [to cover with the steps], and the son again wanted money as a remuneration.' The mother proceeds by telling that, eventually, both of them lost interest in ReimaGo challenges because *'(a)fter all, these tasks might turn out quite expensive for me. I do not want to pay for an easy task, while he does not want to wait too long [if the challenge requires a lot of activity]. So, I am losing interest'* (mother, Family 1, Russia). These quotes demonstrate that the career of the practice took off quite smoothly, however, as it started to evolve, the interplay between the child and mother begin to clash. Specifically, for the child, the meaning of participation was associated with earning the material reward, which contradicted to the mother's expectations. Hence, the loyalty of the child was supported by mother's participation in the practice: by setting rewards and offering money, the mother could nurture this loyalty. As the practice started to require more material resources and more sophisticated skills (to calculate the balance between the reward and the level of activity), the mother's own loyalty started to erode. Due to this clash, the initially working practice began to fall apart.

Generally, the diaries of different families in this sub-study suggest that the co-use of ReimaGo by the parents and their children has different manifestations in terms of interplay (Røpke, 2009). On the one hand, previous research (Oygür et al., 2021) argues that parental involvement that goes beyond a mere tracking of results is crucial for a contentious use of wearables. Meanwhile, the example of Family 3 (Finland) demonstrates how subtle the border between the co-use and parental control might be. In this case, the mother's role can be interpreted as an attempt to exhibit power through directing or purposively influencing the actions of her child (Watson, 2016: 2).

A controversial issue I must touch upon is dataveillance of children (see Lupton and Williamson, 2017). I have already discussed dataveillance in the sub-chapter on wearable technology and social sustainability. In this sense, different aspects of sustainability overlap again. Indeed, use of ReimaGo might raise the question of digitalized surveillance over children's daily life undertaken not just by parents, but also other caregivers (for instance, in the next sub-section, I will be talking about the role of a day-care teacher). As a result, children are becoming increasingly datafied and are reduced to numerical information that speaks on their behalf (Lupton and Williamson, 2017). Though I will not go deeper into an ethical question that resurfaces in relation to ReimaGo (since the purpose of this sub-study is to shed light on why parents and children became engaged into and defected from the use of wearables), this is a promising prospect for future research.

6.3.3. CONTEXT: CONSTRAINING AND SUPPORTING

In their article on how practices recruit and retain new carriers, Shove and Pantzar (2007) note that while a practice trajectory unfolds more people, institutions and elements become entangled. These entanglements might bear supportive or corrosive consequences for the practice (Shove and Pantzar, 2007). In this section, I discuss how the institution of day-care in Russia and Finland becomes one of the pressure points that either complicates or supports the continuous use of ReiamaGo.

First, there is an intriguing episode in the diary of the Russian mother from Family 2: she explains that her 4-year son cannot use ReimaGo in the kindergarten because it could be disturbing to other children. This is how the mother describes the situation:

> *'We explained [to the child] why he needs the device, we showed the app. We talked about how heathy it is to exercise outdoors. He wanted to take ReimaGo to the kindergarten, but then the device was taken from him [by a nursery teacher] and kept in his personal shelf until I came. [It was taken away] because he had started to brag, to tell everyone what it was. He calls it 'a watch' that tracks his activity. […] The nursery teacher thinks such a gadget might create a tense atmosphere in the day-care group, and make other children jealous. Just one child stands out with the gadget. So, we were asked to use ReimaGo outside the day-care.'* (Mother, Family 2, Russia).

Eventually, the child was worried that he could not collect his activity points throughout the day: ultimately, he spends a large share of his daytime in the kindergarten, so he lost a lot of points when not tracking activity there. In practice-based terms, the novel gadget (material) does not link to the meaning element (see Shove et al., 2012) of the practice of going to a kindergarten. The nursery teacher explained that the institution tries to avoid situations that might be uncomfortable for other children: for example, jealousy over their peer's expensive 'toy'. However, from the position of the child-user, the excitement that had been accumulated through the repeated engagement with ReimaGo at an early stage bumped into a barrier that might have changed the direction of the practice (continuous use all day long) (see Shove and Pantzar, 2007).

Another child of a pre-school age from Family 1 (Russia) did not encounter the same restriction in his day-care. Interestingly, the mother reflects about physical activity there in the following way: *'It is forbidden to run [in the kindergarten]. Children should behave. […] They do have 3 hours of exercise per week, though. They go to some other place to have these physical exercise lessons. […] I do not request anything extra [from the day-care system], I am just happy they take care [of the child], so I can do my own things.*' (Mother, Family 1, Russia).

According to the mother's diary, there is a defined border between the practices of day-care and exercising: specifically, exercising is performed three times per week in a separate place, whereas physical activity during the day-care is limited. Hence, the exercising practice and the practice of going to kindergarten occur in different spaces and at different times (Shove et al., 2012; Higginson et al., 2014). Both situations contrast against an example from Finland that I will discuss next.

In the Finnish context, these two practices support each other, and together shape a friendly environment for the wearable that measures activity. To illustrate, I draw on the extensive data scraped from Finnish digital media. Especially state-owned Yle highlights the importance of children's physical activity and describes ReimaGo in particular as a positive endeavor (for example, Ronkanen, 2019; Krogeus, 2019; Niskanen, 2019). Finnish kindergartens adhere to a model, according to which a child needs to be physically active at least three hours[15] per day, and the day-care tries to guarantee at least 2 hours of activity: *'Kindergartens are responsible for certain things, and children's physical activity is one of them. This is one of the reasons to adopt the tracker'*

[15] Recommendations concerning children's physical activity by the Finnish Ministry of Education and Culture https://julkaisut.valtioneuvosto.fi/bitstream/handle/10024/75405/OKM21.pdf

(Ronkainen, 2019). In order to meet this goal, ReimaGo was introduced in several kindergartens with a special 'group mode' through which a nursery teacher could trace the activity progress of all the pupils. She could also set mutual goals (like 'cover 300 km distance') to which all the pupils contribute. Additionally, the teacher tries to ensure that all the students keep up with the goals. Parents also have access to the tracking activity of their children, if needed: *'This [the tracker] is a good way to show parents the amount of their child's physical activity during the day. […] (B)oth parents and staff have welcomed the use of activity bracelets, and there was no resistance'* (Ronkainen, 2019).

These examples raise the issue of power, and practice theory has been criticized for ignoring this issue (see Keller et al., 2016). As Rose and Miller (1992: 183-4) explain: 'Powers are stabilised in lasting networks only to the extent that the mechanisms of enrolment are materialised in various more or less persistent forms - machines, architecture, inscriptions, school curricula, books, obligations, techniques for documenting and calculating and so forth'. Thus, day-care rules and curricula can also underpin a kindergarten's capacity to govern certain practices (Watson, 2016), as Russian and Finnish cases illustrate.

In the Finnish context, the pre-school system and parents work together towards maintaining children's activity. As ReimaGo is well-compatible with this goal, there is a condition for a smooth integration of the device into the practice of day-care. Notably, each child in the kindergarten gets their own ReimaGo, so the issue of jealousy is irrelevant. Additionally, practices of day-care and exercising/playing sports occur at the same time and in the same space during the day. This detail might contribute to positive experiences regarding ReimaGo's use: specifically, in Finland children can easily accumulate the game points by carrying the wearable device around the whole day, as opposed to the Russian context.

On a larger scale, these examples might indicate that family practices – such as attending kindergarten, exercising, doing hobbies – are negotiated not only between the parents and children, but also in regard to many factors, such as the labor market, social policies and cultural values (Morgan, 2011; Eerola et al., 2020) defined by the context (Shove et al., 2012). These factors define, among others, gender roles, employment opportunities for mothers, or stereotypes about parents' roles, and eventually influence, for instance, how much time parents spend with their child, or the level of state childcare support.

6.3.4. EMERGING CONSUMERS AND CHANGING PRACTICES

As mentioned, children learn to consume by imitating, imagining and playing (Ironico, 2012), and parents are frequently the main point of reference for them (Bandura, 1986; Masse et al., 2017). Children in this sub-study, irrespective of the country, predominantly refer to ReimaGo as 'a smartwatch' (even though it does not have a screen and its functions are less numerous) since their parents use smartwatches. It was interesting to trace, based on the diaries, how children are recruited into the practice of a wearable's use: specifically, how some children already have their own perceptions of what is cool and trendy, while others are still directed by their parents.

The 4-year old participant of the study (Family 2, Russia) does not yet have his own smartphone and needs help with the ReimaGo application. As a result, the practices of his mother serve as a reference

point for his own practice with ReimaGo. First, the mother herself is an active activity-tracker. So, she created a separate ReimaGo account for herself that synchronizes with her cellphone step-counting application. This way, ReimaGo bundles the practices of the mother and the child into one family practice of exercising. The mother herself becomes a player, so *'We are travelling around the world together [with the child]'* (see pictures 13a and 13b). The mother explains how her active participation keeps her child engaged: *'He once forgot ReimaGo at [his] grandparents' and was left far behind [in the game]. He now has a goal to keep up with Mom.'* Furthermore, the mother and son set mutual challenges such as 'travel to the sea' (300 km) and 'travel to Paris' (30 km) (see Figure 14a and 14b) that bear a meaning primarily to the mother. However, since the practices of the 4-year old and his parent bundle so tightly, the child eagerly engages into them.

Figure 14a. (left). ReimaGo app and two accounts (mother and son) 'travelling around the world together' (Family 2, Russia). The 'comparison' option that tracks the progress of both players simultaneously is on.

Figure 14b. (right). Setting a mutual challenge '[travelling] to the sea' (300 km) (Family 2, Russia).

Next, there are two examples of children searching for their own meanings in the practice of ReimaGo use: some start to feel uncomfortable with ReimaGo because the brand is 'not cool'. A boy (Family 1, Finland) has been quite brand-conscious through the diary. In his video accounts, he tells about a stylish new haircut he just got, or pays attention to an expensive car that he saw on the street. His

mother in her diary explains[16] that her son prefers certain styles and brands. This is what she writes in relation to the Reima brand:

> *'There was this disposition that he would not wear ReimaGo as he thought Reima brand was not right for him: it didn't fit his style. However, he loved the quality of the bracelet as it felt absolutely fantastic, very tactile, he felt like he wanted to touch it. However, he hides ReimaGo under a long-sleeved sweater. I don't know if it works during the summer when he wears only short-sleeved T-shirts.'* (Mother, Family 1, Finland)

In another example from Russia, the mother (Family 4) tells in the video diary: *'The bracelet [for ReimaGo] is way too wide for her [the daughter]. Reima also offers clothes compatible with the device, but my daughter, of course, would not wear this type of clothes, she has a different style.'*

While a child grows, she enters other environments where the influence of friends, classmates or other adults increases (Pilgrim and Lawrence, 2001; Loucaides and Tsangaridou, 2017). According to Furnham and Gunter (1998), the influence of one's peer group grows as they 'learn about their peers' product favorites and take them into account when evaluating products on their own'. This is especially applicable to symbolic goods such as fashion-related items (Brittain, 1963).

In the practice-theory terms, the same examples evoke the notion of the 'career of practice' (Shove and Pantzar, 2007) that evolve over time. According to Shove and colleagues (2012), 'the careers of individual practitioners determine the fate and future of the practice itself' (p. 154). At the same time, children also become recruited into new practices (Shove and Pantzar, 2007) and become 'a unique crossing point' (Reckwitz 2002: 256) for an increasing number of routines. Hence, it is possible to assume that children – through development of their careers as practitioners – learn new competences and acquire new meanings that eventually became incompatible with the use of ReimaGo. These competences might be, among others, skills to choose clothes independently from parents, while newly acquired meanings can refer to images of dressing up in a cool way.

Another intriguing detail is that a practitioner moves from a novice to expert through a repeated performance of practices (Shove et al., 2012: 70-71; Shove and Pantzar, 2007). However, strong competences do not always predict the level of engagement into a practice (Warde, 2005). For example, in this sub-study, one of the girls (Family 1, Finland), though still quite engaged into ReimaGo use, starts to contemplate the purchase of a new 'adult' wearable. Particularly, she feels that she already reached a certain limit with ReimaGo. On a larger scale, it is necessary to consider that children are young consumers who are actively acquiring new skills and meanings while being introduced to newer practices and newer contexts. In this sense, their careers as practitioners might be particularly hectic, and, with arrival of a new element, they might quickly leave or join different practices.

[16] An obvious drawback is that I could not get comments on this from the children as they did not respond to my follow-up questions. Hence, these accounts are voiced by their parents who often act as a proxy (Oygür et al., 2020) for children's perceptions.

6.3.5. WEARABLES FOR LEARNING AND DISCOVERING

For all the children in this sub-study, gaining points and moving forward in the game remained important: higher points mean a higher sense of accomplishment (also Oygür et al., 2021, 2020). For example, the 6-year old girl (Family 2, Finland) informs me about moving up a level in the ReimaGo game. She also adds: *'As soon as I accomplish all the levels, I will start from the beginning!'* (Child, Family 2, Finland). Hence, at least at an early stage of use, accomplishment motivates users to remain engaged into the practice.

Meanwhile, previous studies indicate (see Oygür et al., 2021) that young children might struggle to understand a link between exercising, measurements and health. However, it does not necessarily imply that children learn nothing about their practices through ReimaGo. For instance, the girl from Family 1 (Finland) explains: *'I am interested in understanding how active I am, if I am enough active, and what I can do to improve [my physical activity].'* This quote illustrates that the 10-year old participant understands what kind of conclusions she can draw, based on the wearable's measurements. Next, the 10-year boy from Family 2 (Finland) compares his activity on a weekday and a weekend: *'Of course, this day [Saturday] my activity was higher as I played football. When at school, it depends. But usually it is lower than during the weekends.'* Hence, through a game-based visualization, the child learns to recognize his daily rhythms and to find a link between them and the practices (Pantzar and Ruckenstein, 2015).

With ReimaGo, the parents could also learn about their children's practices thanks to a co-use option (a ReimaGo account could be accessed from several phones). The mother from Russia (Family 3) wished to participate in this study because she knows little about her son's physical activity during the day: *'I have no idea what happens outside our apartment. He has no weight problems, but is he physically active during the day, at school? All I see is he sitting in front of a computer. […] Or, he might be extra active, literally running around, but what happens outside, when he's at school – no idea.'* Based on the measurements by ReimaGo, this mother recognized that she was quite satisfied about how active her son was: the number of steps and the level of activity seemed decent.

Another mother (Family 1, Finland) describes how ReimaGo might help the family make a tough decision concerning a new training group their daughter attends:

> *'She performs cheerleading and recently switched to a team with a more intense training. She also changed the role from a 'flyer' [those who are lifted] to a 'lifter', meaning she now needs more 'power' and does more of strength training. She describes this new workout as really tough compared to the previous ones. Maybe today we can make a final decision regarding her remaining in the group.'*

According to the mother, the parents are not allowed to attend the trainings due to the COVID-19 restrictions, so she cannot see what the training looks like and decide if it is bearable. However, in addition to the daughter's feedback, the mother intends to check the level of activity through ReimaGo, as this might provide at least partial picture of what happens in the gym. Accordingly, the wearable device might not just help one learn and appreciate their practices (Pantzar and Ruckenstein, 2015), but also disengage from a practice if it seems unnecessary, too hard or stressful.

Wrist-worn wearables for children have been, to a larger extend, explored as devices that facilitate knowledge about healthy habits and exercising (Saksono et al., 2020; Oygür et al., 2021, 2020). On the other hand, there is a stream that calls for approaching wearables as a tool to motivate children to learn science (see Garcia et al., 2018). One of the Russian mothers (Family 1) voiced the same expectations. In her opinion, the ReimaGo app does not enable 'discovery or educational moments' (Saksono et al., 2020), though it could have been implicitly or explicitly related to science (see Garcia et al., 2018):

> '*To tell the truth, there is little useful information for the older child who is 10. I would imagine, you know, that he completes the level and receives some [educational] material, from elementary school programme […] To my mind, the app could be improved. There might be separate sections for different age groups. The game has this idea of 'traveling around the globe', visiting different countries [the game animation replicates different countries and continents], but Reima could provide more information about the countries they 'travel' around. For instance, what endangered species live in Africa. If there is a 'forest' background [in the app game], then I would expect some information about the forests. Reima could have created some cartoons that pop up after each level…'*

The quote above addresses that, in addition to the practices related to physical activity and sports, ReimaGo was expected to become integrated into the practice of education. However, there is a risk (Oygür et al., 2021; Saksono et al., 2020) that children might not have enough skills to make sense of the data provided by wearables. In this study, there is an indication that older children possess certain competences that enable setting goals, comparing the measurements to these goals, and identifying the rhythm through the measured data. At the same time, the parents, though learning about their children's daily practices through ReimaGo, hardly ever initiate any health-oriented or educational activity: according to Saksono and colleagues (2020), wearables can enable 'discovery and educational moments', but still need mediation from the parents for these moments to crystallize.

In this section, I looked at family practices with the ReimaGo device. I was particularly interested in how careers of the users within the practices evolve over time, and what factors hamper or strengthen the loyalty of both children and parents. An interesting detail that resurfaced in the process of data analysis was an interplay between parents and children, and how different roles of these users contributed to eventual persistence of the practice. This latter detail might be conceptualized in terms of power in the practice, and I will develop this idea in the next chapter.

7. CHAPTER 7. DISCUSSION AND CONCLUSIONS

This thesis focuses on the connection between wearable technology and sustainability. The research question I pose is: 'Taken in practice-based terms, what implications for sustainability do the commercializing and use and of wearable technology bring?' In this chapter, I summarise the findings of the analysis that answer the research question.

In this thesis I suggest shifting attention from the devices and their physical qualities as determenent factors for implications for sustainability to practices with these devices. Hence, I approach wearables through practice theory, meaning that actual actions with wearable devices bear implications for sustainability. I regard a wearable device as an element within various daily practices (Shove et al., 2012), rather than a phenomenon in its own. Generally, I do not focus on the functions or design of the wearables, but, instead, I trace how the devices are incorporated into practices, for instance, how they connect with other elements. Further, sustainability is conceptualized as manifested through the process of practices' enactment, without any pre-given or pre-calculated indicators. In short, the definition of sustainability on which I rely is formulated as follows: a result of enactment, reproduction and disintegration of practices with wearable technology which sustain their economic endeavors, contribute to their carriers' well-being and life quality, and organize their daily life in such a way that the lifespan of goods is prolonged.

Next, I approach implications of wearables to sustainability by looking at its three pillars: business, society and environment (Purvis et al., 2019; Moldan et al., 2012). Previously, this popular concept has been mainly used in the context of a managerial approach to sustainability (Eikelenboom and de Jong, 2019; Dhahri and Omri, 2018). In contrast, I aim to shed light on the relations between sustainability and wearable technology, taken in practice-based terms (Shove et al., 2012; Schatzki, 1996). My purpose is to address a previous call for placing wearables within a wider picture of daily life (Lupton, 2016; Verbeek, 2011). Hence, this thesis is an attempt to enrich the existing scope of studies on wearable technology and sustainability in terms of demonstrating a dynamic interplay between the two that unfolds in the process of everyday activity. Overall, this study is built around the concepts originating from practice theory that let us capture how sustainability is re-interpreted in the process of practices' enactment, reproduction and eventual fading.

In order to comprehend implications for sustainability brought by wearable technology, I rely on four concepts derived from practice theory: the composition of elements of practices, the careers of practices, the bundles of practices and context. When addressing the question of how sustainability and the practice of commercializing of wearables are connected, I am primarily interested in what makes this practice come together, last and persist. Accordingly, when studying a link between wearables and sustainability, I first analyze a composition of the elements (Shove et al., 2012) of practices with wearables as well as how and when a practice becomes an established routine capable of being sustained long-term. Second, I trace how the careers (Shove et al., 2012) of wearables' users develop and evolve within the given practices over time. Based on the concept of the lifespan (Evans and Cooper, 2016), users' loyalty is interpreted as contriburting to a continuous use of a wearable. Third, the practices with wearable technology are located within a larger picture of daily life: namely, the way practices with wearables are linked to other practices (Shove et al., 2012). I am interested in what ways these bundles let the practices with wearables unfold and sustain. Fourth, the analysis of sustainability and practices with wearable devices includes contextual factors. The context is a broad

and important determining factor as it defines availability of the elements for a practice's emergence. I oppose the notion of fixing the wearables in order to improve sustainability, and, instead, I propose to identify 'rapture' (Keller et al., 2016) moments or situations within the practices that reinforce or hamper sustainability. I regard that identifying and explaining these situations within the practices with wearables helps capture implications for sustainability in a broader and more nuanced way.

Regarding the implications for sustainability, my research has shown that the use of wearable technology is not one-dimensional: in other words, it can either reinforce or undermine different aspects of sustainability. For example, the bundling of two different practices can, on the one hand, support the prolonged use of a wearable device, or, on the other, compete for users' time (Shove et al., 2012), so that they eventually disembark from the practice with the wearable. Next, based on the analysis, implications for sustainability imply that the use of a wearable can contribute to one's subjective well-being and, eventually, to social sustainability: specifically, mature users of smartwatches/trackers might feel psychologically comfortable because work and health practices bundle through the wearable in a more harmonious way. Additionally, a wearable technology can provoke a power conflict between the users involved in the same practice – as might be the case between a parent and a child – and, as a result, the device is abandoned. Hence, the wearable becomes a short-lived device that is considered unsustainable. Meanwhile, this happens not necesseraly because of its design or users' preferences, but due to the power dynamic inside the practices. These examples address that the complexity in the link between wearables and sustainability and the importance of considering power dynamics in the analysis of practices.

Noteworthy, this thesis pinpoints different carriers of practicers (Shove et al., 2012) whose role in the practices with wearables are paramount. As follows from the previous paragraph, I scrutinize the roles of entrepreneurs and different users. Additionally, I draw attention to the states, national markets, local institutions such as kindergartens, NGOs, and media. Therefore, this study benefits through practice theory's middle path between agency and structure (Shove et al., 2012; Warde, 2005; Schatzki, 2002): on the one hand, I shed light on the actions of individual agents; on the other, I rise to the higher level of institutions such as media or the state. Furthermore, I intend to emphasize the role of the media as a contributor to how wearable technology might be used. Though previous research has suggested that practitioners do borrow narratives from media into their practices (Keller and Halkier, 2014), this research maintains that there are whole templates of pracices that may be adopted by readers. Shortly, I argue that the analysis of practices with wearable technology, their perpetuation in our daily life and consequent implications of these routines for sustainability should be reinforced by an analysis of media data.

In order to include all these practitioners and to account for all the concepts related to the analysis of implications for sustainability, I had to rely on a set of different methods for data collection. When deciding on the methods, I considered the previous discussion on how to methodologically study practices (Smagacz-Poziemska et al., 2020; Trowler, 2013). In addition to interviews, which have been criticized as not sufficient enough for capturing practices (Warde, 2005; Martens, 2012; Hitchings, 2012; Keller et al., 2016), this thesis draws on the diaries of the users as a means to better comprehend the routinized character of practices. Through the diaries' accounts, I searched for repetitions or patterns in users' daily lives with the wearables. Next, a large corpus of digital media data was collected through data scraping (Saurkar et al., 2018). With this latter approach, I intend to widen the scope of methods applicable to practices' research. This was also necessary for zooming in and out (Nicolini, 2012) and shifting betwee the practices-as-performancies and practices-as-

entities (Shove et al., 2012) – in other words, for including both individual and more general manifestations of the practices with wearable devices.

In the first sub-study, I argue that implications for business sustainability, in the longer run, depend on the elements (materials, competences and meanings) (Shove et al., 2012) that shape the practice of commercializing, on other practices within which it interacts, and on the context where it is carried out. The examples that I analyze suggest that the practice of commercializing can be shaped by a combination of diverse elements: for instance, money proved to be an important material element whose absence prevents the pratice's formation. However, this thesis features empirical examples that demontstate that diverse sets of elements (not necesserily featuring money) may shape the practice: in James' case, for instance, the material element is comprised of simple and low-cost stuff available in a supermarket. Here, the practice of commercializing keeps being reproduced because the competences that James applies and acquires in the process, as well as the meaning he attaches to the practice (free recipe-book-like instructions to create wearables in a home environment) link harmoniously.

Further, the practice of commercializing depends on other practices if they share elements or occur at the same time for a practitioner. The practice of research is one of the examples that can either support or compete with the practice of commercializing. On the one hand, skills to organize fieldwork, to collect and analyze data, are beneficial for commercialzing such a research-intensive product as a wearable. On the other, the meaning of these practices might be extremely different, as Matti's example illustrates. Thus, the enduring and sustained practice of commercializing might be described as one that bundles with other practices in a supportive way: for example, by providing a needed element. Meanwhile, the status quo between the practices might be broken when they are competing for the time of their carriers: in this situation, one practice might be carried out at the expence of another. In this study, the practice of commercializing was overridden by the practice of researching, which offered its carrier a more appealing meaning. Overall, the sustainability of a practice needs to be addressed within a wider picture of daily life that consists of various competing and supportive activities.

The context of the practice of commercializing can also be decisive for its sustainability over time. The analysis points out that availability of certain crucial actors – such as large companies willing to outsource the local start-uppers, or state institutions that provide funding for wearable projects – depends on the context. Attention towards the context is important for analysis of sustainability of wearables' practice of commercializing because it brings forward possibilities rooted in the public sector of the market rather than limiting them to the private sector only.

When analyzing the failures of wearables' commercializing, exemplified by the disintegrated practices, this research puts the practice at the core, instead of stressing, for instance, consumers' dissatisfaction with the devices (Fadhil, 2019; Maher et al., 2017; Dunne, 2010). I agree that consumers' acceptance and satisfaction are paramount for a wearable to succeed in the market. However, with this study, I argue that implications for sustainability might depend on other factors: overall, my analysis on sustainability of the practice of wearables' commercializing demonstrates how the agency necessary for persistence of the practice is distributed between the practitioners (the entrepreneurs), materials (money, equipment for production, infrastructure) and the context (the eligible state institutions, cultural specificity) (Warde, 2005). The assemblage of these factors determines the implications for sustainability: specifically, whether the practice of commercializing would last in the longer run.

Implications for the social aspect of sustainability are studied through the practices with wearable technology undertaken by consumers aged 50+. In this sub-study, I refer to the more efficient management of different daily practices realized through smartwatches and fitness trackers as a major implication. This way, the devices are understood as a linking element that makes participation in certain practices smoother, easier, more comfortable, or even makes some practices newly available for the users in older age cohorts. Here, I rely on the concept of bundling practices (Shove et al., 2012), which a user manages through their wearable. Hence, it is through the process of efficient management of these numerous practices that social sustainability is manifested. Though this model is applicable to different age groups, I chose users over 50 years old because social sustainability might be a burning issue for them compared to younger age groups (Steverink et al., 2005; Liu et al., 2017).

In the beginning of this thesis, I mention that initially, wearable technology has been praised for offering lifestyle improvements (Ledger and McCaffrey, 2014). Yet, results on possible connection between the use of wearables and subsequent increase of life quality apper to be somewhat inconclusive (Ridgers et al., 2021; McCallum et al., 2018; Gal et al., 2018). For instance, there is still a lack of methodological agreement over what should be done about measured body indicators (Boillat et al., 2018), and even though the raw data produced by wearables can be enough for a user to recognize their practices (Pantzar and Ruckenstein, 2015), they might not be sufficient to transform them. However, the argunment about wearables' inefficiency often rests on quantitative indicators such as the number of lost kilos or reaching of certain quantitative scores (Strath and Rowley, 2018; Blackstone and Herrmann, 2020). The aim of this study is to link implications for social sustainability to subjective well-being (Kekäläinen et al., 2017) as a result of daily use of wearables. Hence, I support a shift in outlook towards a more subtle, qualitative character of relations between a wearable and its user.

A major positive implication for social sustainability that resurfaced in the digital media on wearables and in the participants' interviews is a balance between practices (for instance, between exercising and resting, or working and having leisure time). Instead of emphasizing a specific quantifiable 'achievenment' of a user, the focus shifts towards the way users balance and manage these practices agaist one another through the smartwatch/tracker. For example, the interviewees' narratives address that, even though they might not interpret their sleeping patterns calculated by the wearable precisely enough, the users are still able to understand if their sleeping is appropriately balanced agains exercising or work. Hence, they manage these practices in such a way that none of them is too overpowering. Another illustratve example is the elimination of stigma through a smoother bundling of health and work practices through a smartwatch/tracker. Compared to a more traditional health-related device, the wearable performs measurements less visibly – a quality that becomes especially appreciated by aging users as it eases stress and psychological discomfort. Here, the implication for social sustainability is sought in a better balancing between the practices achieved via the use of the smartwatches/trackers.

The second sub-study also demonstrates that implications for social sustainability can vary across the contexts. On the one hand, the practices with the wearable devices are similar among Russian and Finnish interviewees: they measure health-related indicators, connect their smartwatches/trackers to smartphones and use various applications to check messages/emails, read newspapaers, etc. Interestingly, the users from both countries interpret their age through the practices connected to their wearable devices. Additionally, previous research argues that putting a wearable on one's wrist can

communicate a certain status position (Lupton, 2016, 2017). However, these interpretations are tied to the images attached to age and aging in a specific country. Thus, the users of the smartwatches/fitness trackers from Finland see themselves as doing what anyone of their age does: tracking their health, doing some sports, measuring steps. In Finland, the public narrative on aging has recently been steered towards neo-liberalism with an enrepreneural, active and self-managing aging individual as a model (Pulkki and Tynkkynen 2016; Valokivi et al., 2021). Accordingly, this turn might be interpreted through the current social situations in Finland: on the one hand, the population is aging quickly (Pirhonen, 2020); on the other, episodes of mistreatment of older people have been uncovered in several private elderly houses in Finland, giving a rise to a debate on what decent aging currently means in the country (Care home scandals, 2019; Finland needs to spend, 2019). Specifically, in this study, the participants' arguments for using smartwatches/trackers resonate with the discourse on active aging, as the users accept the necessity for all aging individuals to look after themselves and their health. Further inquiry into a connection between the current discussions on aging and the decision of the Finnish consumers aged 50+ to use the wearables is a subject for prospective research.

Meanwhile, implications for social sustainability approached through the practices with wearable technology manifests differently in Russia. Though, as mentioned, practices are essentially the same in both countries, Russian users aged 50+ attach completely different meanings to these practices. Since a 'pensioner' is quite an insecure and unpriviledged category in Russia (Tchernina and Tchernin, 2002: 560; Varlamova et al., 2017), the interviewees' desire to signal their difference from this group through a wearable (Lupton, 2017) is understanble (Calasanti et al., 2018). Overall, Russian interviewees stress that wearing a smartwatch/tracker on their wrist can be a signifier of an active, healthy and relatively well-off lifestyle untypical for Russian pensioners. Both Finnish and Russian participants interpret their age through the practices with wearables and compare these practices with those of their peers. However, whereas the former portray their lifestyle as similar to other Finnish 50+ people, Russian interviewees contrast their practices against those of their peers. In both cases, these statemenets can be linked to the notion of social sustainability exemplified through a subjective well-being (Kekäläinen et al., 2017; Aro and Wilska, 2014). In other words, it is appealing to refer or relate to one's age group because it might provide a psychological comfort: either through belonging to this group (Kissane and McLaren, 2006), as in the Finnish case, or through signifying a better economic status (Hayo and Seifert, 2003; Amatulli et al., 2015) compared to them, as happens in the Russian case. These results are important since in previous research, wearable technology has been criticized for failing to produce a compelling change in the quality of life among their users (Ledger and McCaffrey, 2014; Ridgers et al., 2021; Gal et al., 2018; McCallum et al., 2018).

Overall, I argue that, in order to capture what implications for social sustainability might be achieved though the use of wearable devices, it is necessary: first, to look at the routinized use of the wearable devices; second, to consider the subjective side of its use, and, finally, to distinguish among different contexts. The approach to wearable technology that neglects the subjective experience of the users, including its psychological, social and economic sides, or overlooks the contexts' specificity, might leave behind a large corpus of implications manifested though enhanced social sustainability. Based on the analysis in this thesis, I suggest that the use of the wearable devices can have a positive effect on social sustainability, but not necesseraly in terms of higher physical activity or better diagnosing (though I do not reject these possibilities as well). Instead, the higher quality of life is achieved in the process of use of wearables thanks to enhancing of subjective feelings erased though the repetitive practices: for instance, a comfort of belonging to a certain group, stigma elimination, enhancement of social connections, or learning and harmonizing one's own routines. Placing the practices and their

effect on social sustainability within a concrete context is also important for determining the policy measures in a specific country. As the example of users aged 50+ in Russia and Finland clarifies, the meanings for being a part of the practices with wearable technology differ. Hence, in order to successfully develop and implement measures that address the needs of aging populations, the specificity of the context should be clarified.

To analyze implications for environmental sustainability, I draw on the concept of the career of a practitioner within the practices. Further, this concept is linked to the lifespan of a commodity (Evans and Cooper, 2016). The idea behind choosing these concepts is to look what happens right after acquiring a wearable: what pleasant and less pleasant encounters the users face in the process of practices enactment or adjustment to a new device – in this research, the ReimaGo activity tracker. I adhere to the idea that consumers might continue buying wearables, so a major emphasis should be placed on how to increase longevity of these wearables, or how to preserve the position of this wearable within the practices of its users. So far, quick abandonment of wearables has been one of the major problems voiced in relation to these devices (Ledger and McCaffrey, 2014; Attig and Franke, 2020; Fadhil, 2019). Increase of the lifespan is regarded as one of the most effective environmental implications: importantly, it can slow down both the production and consumption cycles as well as to reduce waste (Sjöberg and Andersson, 2019). It is possible to approach a lifespan as part of the nature of the product inscribed into it during the design stage; or as a nurture of consumers who continuously use the product (Sjöberg and Andersson, 2019). Here, I am interested in the latter factor, but with an emphasis on practices. The practice-based approach is beneficial because it implies that practices are social (Schatzki, 2002), and often require an input from several practitioners whose roles within a given practice vary (Røpke, 2009). Accordingly, these roles are not always symmetrical, and, eventually, an issue of power in the practice is raised (see Watson, 2016). Previously, practice theory has been criticized for the lack of explanation of the concept of power (Keller et al., 2016). Watson (2016), however, notes that the major challenge lies in 'the difficulty of analytically grasping what we take for power in a way that is consistent with the ontological commitments of practices' (p. 169)

In this thesis, I rely on Røpke's (2009) notion of an 'inteplay' that refers to the dynamic between the practitioners engaged into the same practice. Thus, I regard that power manifests in the form of an imbalance in the interplay between the practitioners in a given practice. More specifically, the interplay between the parents and children in the process of using ReimaGo is studied. The case of parents and children is illustrative in several aspects: on the one hand, parental decisions might overpower those of children because they depend on their parents in many aspects (Oygür et al., 2020); on the other, children nowadays do influence family consumption (Gram and Grønhøj, 2016), and might even be more technologically literate than their parents (Ekström, 2007). Therefore, it was interesting to see how these two groups of participants negotiate their power, and how the balance translates into a prolonged use of ReimaGo. On the contrary, imbalance in the interplay between a parent and a child jeopardizes the persistence of a practice as well as ReimaGo's position within it. For instance, a desire of the parent to control the excercising of their child along with their weight resulted in tensions that eventually brought the use of the wearable to an end.

To conclude, the use of wearable technology might have both positive and negative implications for sustainability. This thesis emphasizes that the implications could be understood through the practices – or the routinized use of wearable devices – rather than the focus on wearables' characteristics per se. By being aware of the context, skills that are needed to use a wearable, or meanings attached to

the use of such a device, along with how different practitioners bond around it, one avoids both too gloomy a view on wearable technology and overly optimistic expectations.

PRACTICAL IMPLICATIONS

In terms of practical implications, the findings of this study might be of interest to a wide range of professionals. Taken that both the producers' and consumers' sides are included, along with several users' groups and local contexts, such professional groups as designers, engineers, marketing professionals and policy makers might find this research insightful for their respective work.

Designers and engineers who plan to launch a wearable into the market, might benefit from concrete and first-hand examples on how the practice of commercializing evolves in different contexts: specifically, what materials and competences this activity requires, and how meanings of commercializing vary. Nowadays, many high-tech start-ups originate from universities (Minola et al., 2021), and young researchers are often directed towards a business path (Cabot et al., 2021). The concrete examples from this study shed light on many aspects of commercializing that inexperienced start-uppers might encounter. First, this study provides the examples from countries with different market structures, legal systems, business cultures and social norms. Importantly, the context is not limited to Europe and the USA, but also includes a post-Soviet country. Additionally, the study shows that wearables' commercializing can occur outside the private sector, and some states initiate and fund wearable projects. Second, the study might send a message to potential women-entrepreneurs who are still underrepresented in the tech industry (Ozkazanc-Pan and Clark Muntean, 2016): a large share of the interviewed experts are women. Third, in addition to success stories, this research considers failures (the proto- and ex-practices). Ultimately, potential wearable entrepreneurs who read this study might evaluate their circumstances and estimate their risks more carefully: for instance, what practices in their daily life might support their business activity.

Concerning marketing professionals, the part on consumers aged 50+ can open new prospects regarding advertisement campaigns (Sherman et al., 2001: 1087). Based on the first-hand experiences of this study's participants, it is possible to design such campaigns in accordance with expectations of the 50+ age group. It has been argued that marketers have generally failed to positively represent older consumers (Ylänne, 2015; Zurcher and Robinson, 2017), though their images in ads have somewhat improved (Chevalier and Moal-Ulvoas, 2018). Frequently, advertisements have depicted mature consumers as either too frail or 'remarkably youthful' (Hodgetts et al., 2003: 417). A more relevant campaign that emphasizes possibilities for socialization, balanced physical activity and stigma avoidance could better connect with potential consumers.

For policy makers, conclusions on implications for social sustainability, particularly in relation to individuals aged 50+, may lead to a new perspective for social policy design and implementation. For example, the findings suggest that there is an emerging group of aging people in Russia who maintain a lifestyle of what has been previously considered the privilege of younger generations, but has already become the norm in developed countries like Finland (Karisto and Haapola, 2015: 52). These aged 50+ Russian consumers enjoy physical activity, travel abroad, have a higher income and enough skills to use technological gadgets, and stay socially active. This could indicate that there is a lifestyle change around perceptions of what it means to be an aging person in today's Russia. Hence, it might be beneficial to uncover how this tendency can be reinforced, and what measures the state could undertake to promote these practices across the country.

The sub-study on ReimaGo might be particularly insightful for designers and engineers who develop wearables for children. Devices for children are frequently developed based on an adult's perspective, with an adult's understanding and purposes in mind (Guha et al., 2013). Though parents' perceptions about the wearable are also valuable, finding out how children use a specific device, how they feel about using it, and what they like about the new wearable opens up yet another perspective for those in charge of wearables' designs. Critically, this thesis sheds light on the internal dynamic of family practices, where children and parents play their specific parts, and influence each other's use of the device. By focusing on the possible tensions between a child and parent in the process of the use of wearables, this thesis helps in identifying prospective problems that can be noticed and eliminated in the design stage.

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APPENDICES

APPENDIX A. Overview of Interviewees: Experts

The table below provides an overview of the participants of the sub-study 1. Information provided includes anonymized names of the participants, countries where wearable projects have been carried out; education of the experts, a brief outline of each project and a type of the practice. 'Reproduced' refers to an integrated practice with the linked elements. 'Proto-practice' means that the elements between the elements have not yet emerged; whereas 'ex-practice' illustrates a situation when the elements are no longer linked. This classification is based on Shove et al. classification (2012: 24).

#	Name	Country	Education	Project	Stage of the practice of commercializing
1	Lena	Finland	53	Music producer, entrepreneur	Apple Watch
2	Christopher	Estonia	65	Retired	Unknown brand from Aliexpress
3	Rita	Russia	63	Managerial position in a bank	Samsung
4	Evgeniya	Russia	52	Entrepreneur	Apple Watch
5	Matti	Finland	69	Employed, but did not provide further information	Unknown brand from Aliexpress
6	Antti	Finland	64	Employed, but did not provide further information	SmartBand Talk SWR30
7	Mika	Finland	50	Managerial position in a bank	Garmin
8	Rita	Finland	D.Sc.	Research scientist in a state-funded project on wearable technology	Proto-practice (working together with n.6, 7 and 8)
9	Vera	Finland	Psychology, PhD	Specialist Research Scientist in a state-funded project on wearable technology	Proto-practice (working together with n.6, 7 and 8)
10	Nina	The Nitherlands	Designer, MA	Owns a start up that develops wearable projects for larger companies (outsourcing)	Reproduced practice
11	Lisa	Germany	Designer	Develops an online platform for selling wearables; and owns a start up that makes wearables	Reproduced practice

12	James	USA	Artist, PhD (studying)	Develops several artistic projects based on wearable technology; offers guidance on how to make wearables yourself and exhibits his works in the museums	Reproduced practice
13	Maggie	Germany	Fashion Designer	Owns a fashion startup with regular clothes line and a “smart” line of wearables	Reproduced practice

APPENDIX B. Overview of Interviewees: 50+ Consumers

Two tables below provide an overview of the interviewees from Russia and Finland, respectively. They are the participants of the sub-study 2. Information on gender, age, occupation of the participants as well the brand of their smartwatch/fitness tracker. In Russian case, several interviewees did not know the exact brand of their wearable they had purchased on AliExpress (Raisa and Vasiliy): I marks these cases as 'unknown from AliExpress'. I did not indicate the place of residence since all Russian interviewees were residing in Moscow, while all but one Finnish participants lived in Helsinki area. Lasse is living in Pori (a city on in Western Finland).

	#	Name	Gender	Age	Occupation	Brand of smartwatch/fitness tracker
RUSSIA	1	Alex	M	53	Music producer, entrepreneur	Apple Watch
	2	Raisa	F	65	Retired	Unknown brand from AliExpress
	3	Galina	F	63	Managerial position in a bank	Samsung
	4	Dmitry	M	52	Entrepreneur	Apple Watch
	5	Vasiliy	M	69	Employed, but did not provide further information	Unknown brand from AliExpress
	6	Marina	F	64	Employed, but did not provide further information	SmartBand Talk SWR30
	7	Mikhail	M	50	Managerial position in a bank	Garmin
	8	Vladimir	M	55	Deputy CEO in a bank	Apple Watch

	#	Name	Gender	Age	Occupation	Brand of smartwatch/fitness tracker
FINLAND	1	Emma	F	69	Professor at a university	Apple Watch
	2	Leo	M	73	Retired	Apple Watch and Samsung
	3	Kaisa	F	61	Personal assistant	Samsung
	4	Jussi	M	65	Retired	Garmin
	5	Minttu	F	68	Retired	Apple Watch
	6	Anne	F	>60 (did not clarify)	Retired	Polar
	7	Mikko	M	65	Retired	Apple Watch
	8	Pirjo	F	50	Employed, but did not provide further information	Polar

	9	Lasse	M	52	Employed in a company that works on sustainable solutions	Suunto

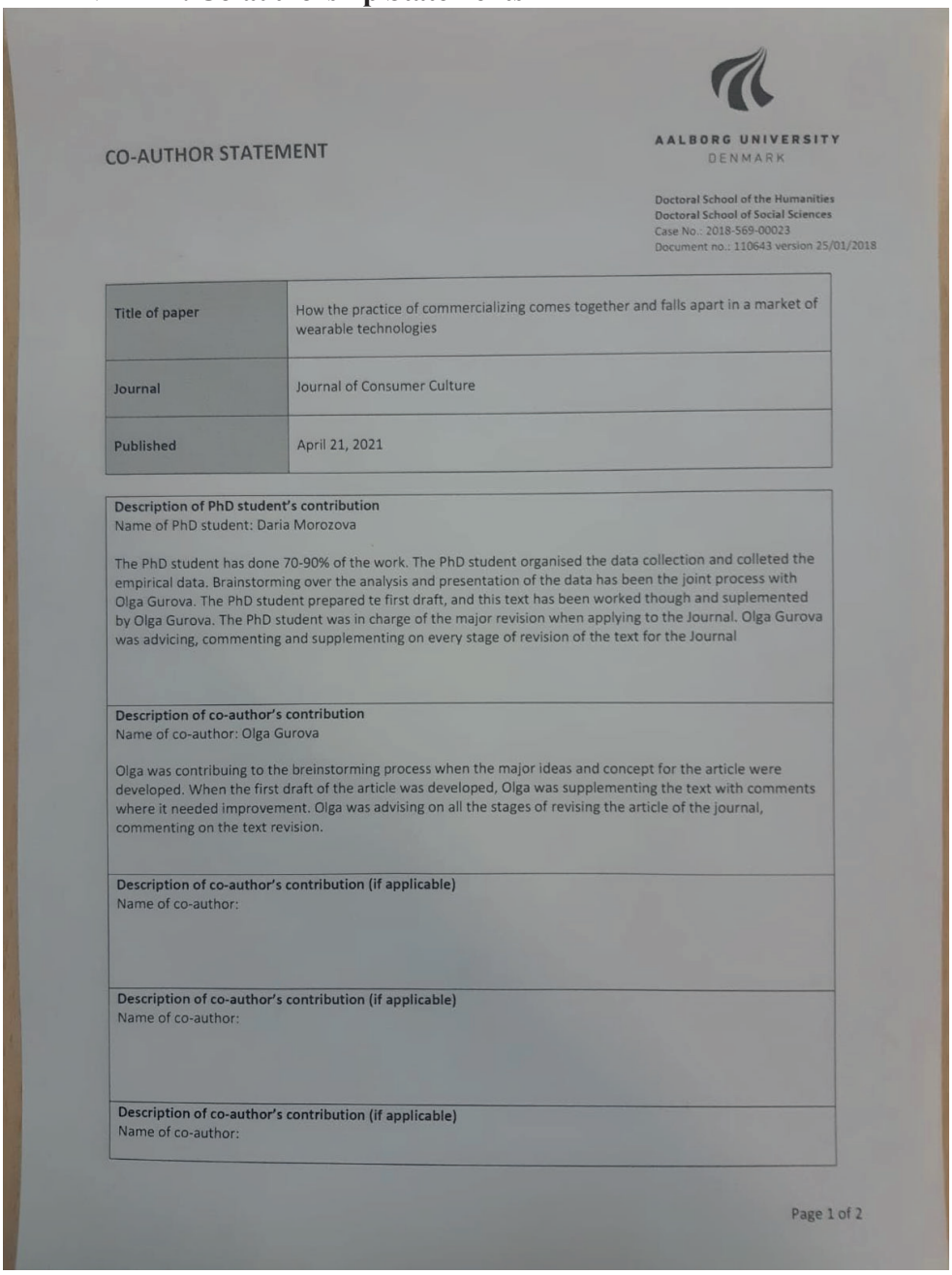
APPENDIX C. Overview of Informants: Families with Children

The table below summarizes basic characteristics of the families that participated in the sub-study 3. I outline the age of the children as well as employment of the parents. The last column 'duration of ReimaGo use' reports on how long I was receiving the diaries from the families.

	Family	Children	Parents	Duration of ReimaGo use
RUSSIA	Family 1	Two boys, 9 and 5 y.o.	Working parents, both have previous experience with wearables	3 weeks
	Family 2	Boy, 4 y.o.	Working parents, have experience with wearables	3 weeks
	Family 3	Boy, 9 y.o.	Working parents, no previous experience with wearables	2,5 weeks
	Family 4	Girl, 8 y.o.	Working single mother, has experience with wearables	1 week

	Family	Children	Parents	Duration of ReimaGo use
FINLAND	Family 1	Girl, 10 y.o. and boy, 7 y.o.	Working father, non-working mother, both have experience with wearables	4 weeks
	Family 2	Boy, 10 y.o. and girl, 6 y.o.	Working father, non-working mother, both have experience with wearables	3 weeks
	Family 3	Girl, 9 y.o., weight concerns	Working father, non-working mother, both have experience with wearables	Less than one week
	Family 4	Girl, 9 y.o. and boy 6 y.o.	Working father, non-working mother, both have experience with wearables	Did not start using

APPENDIX D. Co-authorship Statements



CO-AUTHOR STATEMENT

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Case No.: 2018-569-00023
Document no.: 110643 version 25/01/2018

Title of paper	How the practice of commercializing comes together and falls apart in a market of wearable technologies
Journal	Journal of Consumer Culture
Published	April 21, 2021

Description of PhD student's contribution
Name of PhD student: Daria Morozova

The PhD student has done 70-90% of the work. The PhD student organised the data collection and colleted the empirical data. Brainstorming over the analysis and presentation of the data has been the joint process with Olga Gurova. The PhD student prepared te first draft, and this text has been worked though and suplemented by Olga Gurova. The PhD student was in charge of the major revision when applying to the Journal. Olga Gurova was advicing, commenting and supplementing on every stage of revision of the text for the Journal

Description of co-author's contribution
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Olga was contribuing to the breinstorming process when the major ideas and concept for the article were developed. When the first draft of the article was developed, Olga was supplementing the text with comments where it needed improvement. Olga was advising on all the stages of revising the article of the journal, commenting on the text revision.

Description of co-author's contribution (if applicable)
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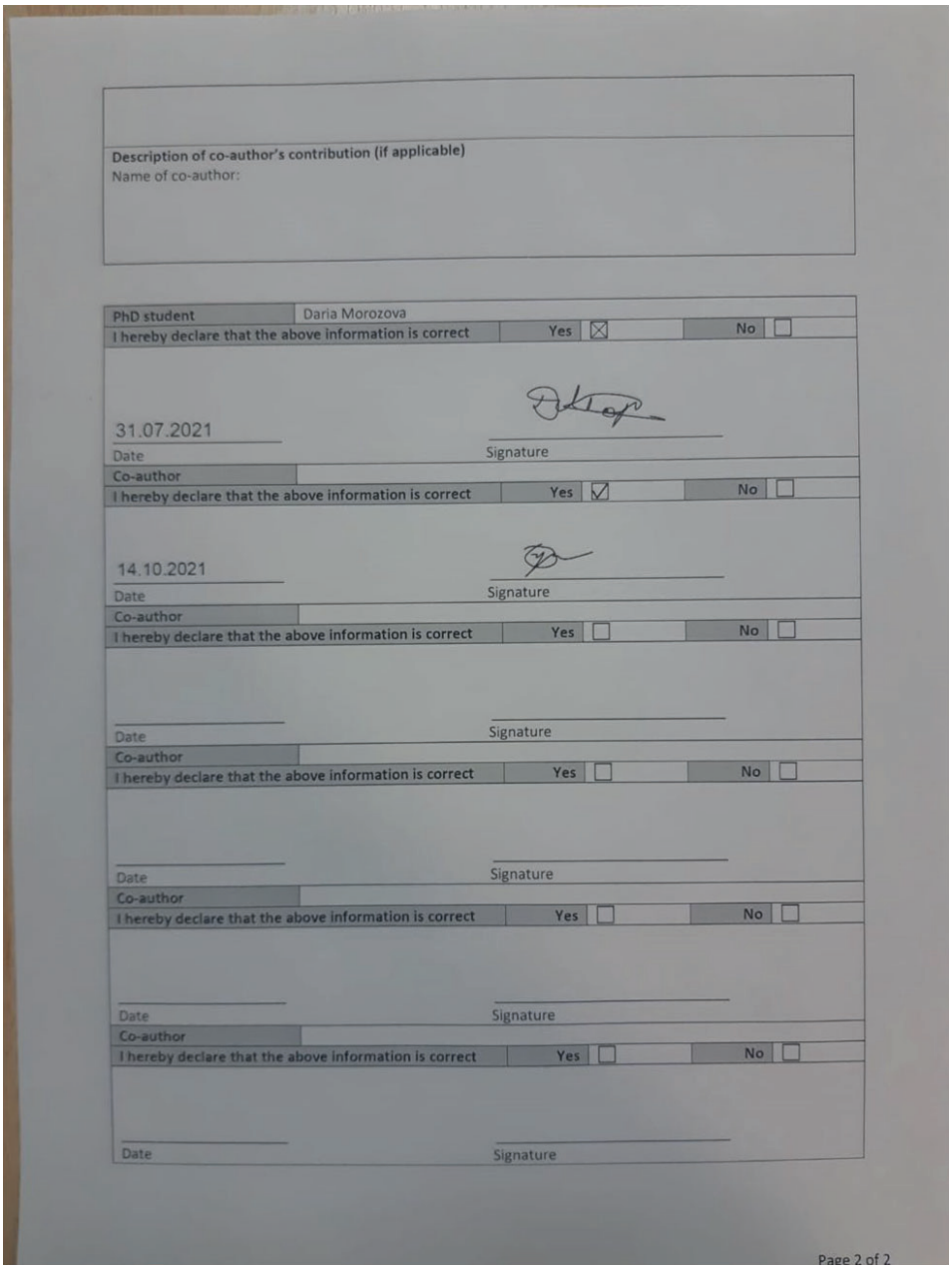

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Title of paper	Being like others vs. being different: Wearable technology and daily practices of 50+ consumers in Russia and Finland
Journal	International Journal of Consumer Studies
Published	January 26, 2021

Description of PhD student's contribution
Name of PhD student: Daria Morozova

The PhD student has done 70-90% of the work.The PhD student organised the data collection and colleted the empirical data. Brainstorming over the analysis and presentation of the data has been the joint process with Olga Gurova. The PhD student prepared te first draft, and this text has been worked though and suplemented by Olga Gurova. The PhD student was in charge of the major revision when applying to the Journal. Olga Gurova was advicing, commenting and supplementing on every stage of revision of the text for the Journal.

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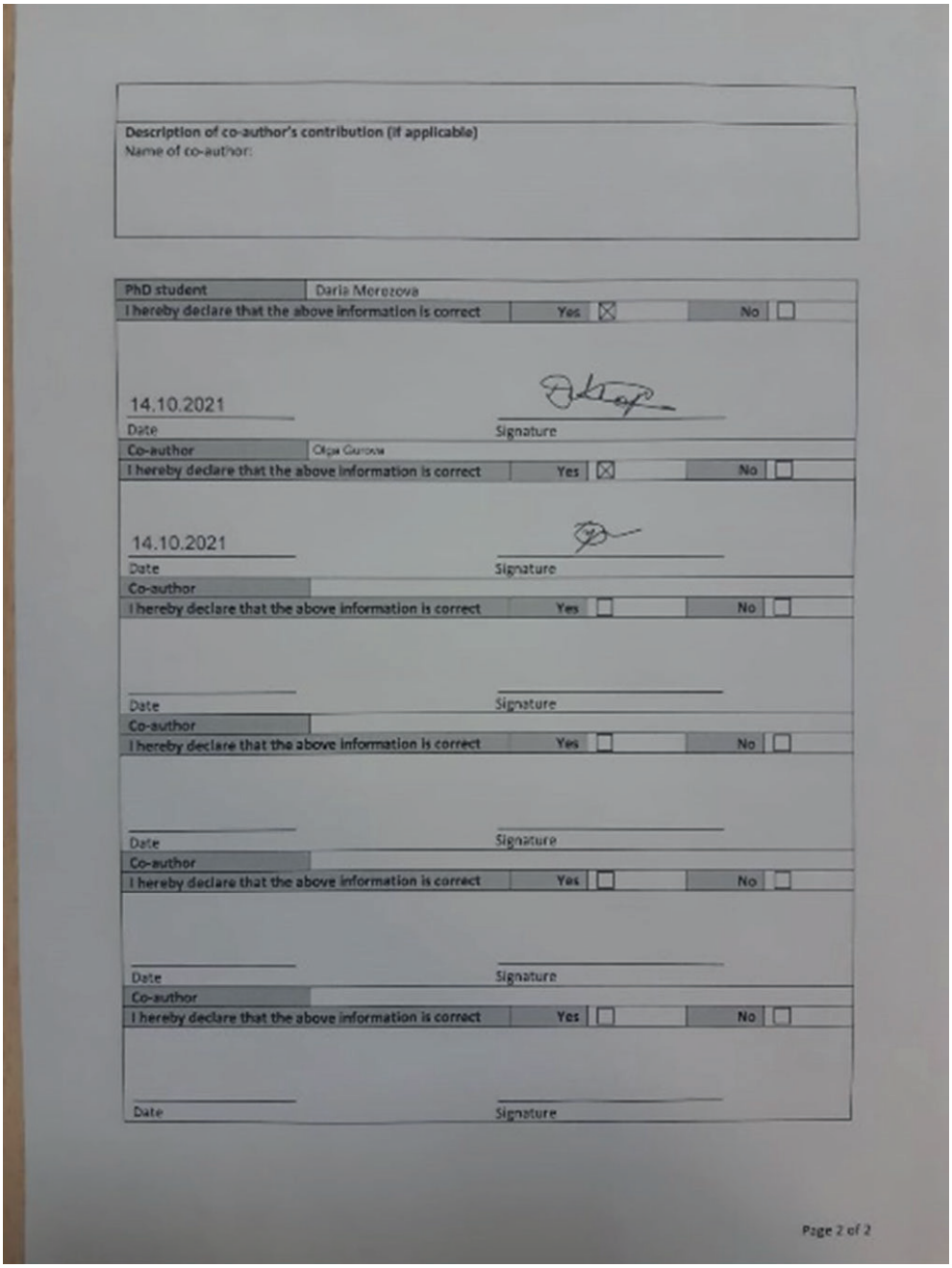

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PhD student	Daria Morozova				
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14.10.2021 Date		Signature			
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SUMMARY

Wearable technology is a combination of design and technological solutions that can be worn on one's body. Due to its functions, especially ones related to monitoring of health-related indicators, it has initially been met with enthusiasm. However, subsequent trends address that wearable devices have become yet another short-lived goods abandoned by their users within a couple of months after purchase. Additionally, in business terms, the market of wearables has been dominated by large corporations such as Apple and Xiaomi, with very few middle- and small-size businesses staying afloat. Because of these patterns, wearable technology has come under criticism of being unsustainable in various terms. This study looks at the problem through the practice theory lens. Drawing on a variety of concepts derived from practice theory (elements of practices, bundles and recruitment), this study departs from a popular argument of 'fixing' wearables, and, instead, focuses on daily activities with wearable technology. The study elucidates both consumers and producers' sides, and accounts for a contextual specificity of different countries.

Daria Morozova is part of the Department of Culture and Learning at Aalborg University. 'Practice Theory Approach to Wearable Technology. Implications for Sustainability' is her PhD Thesis.

SUMMARY

Wearable technology is a combination of design and technological solutions that can be worn on one's body. Due to its functions, especially ones related to monitoring of health-related indicators, it has initially been met with enthusiasm. However, subsequent trends address that wearable devices have become yet another short-lived goods abandoned by their users within a couple of months after purchase. Additionally, in business terms, the market of wearables has been dominated by large corporations such as Apple and Xiaomi, with very few middle- and small-size businesses staying afloat. Because of these patterns, wearable technology has come under criticism of being unsustainable in various terms. This study looks at the problem through the practice theory lens. Drawing on a variety of concepts derived from practice theory (elements of practices, bundles and recruitment), this study departs from a popular argument of 'fixing' wearables, and, instead, focuses on daily activities with wearable technology. The study elucidates both consumers and producers' sides, and accounts for a contextual specificity of different countries.

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ISSN (online): 2246-123X
ISBN (online): 978-87-7573-970-7

AALBORG UNIVERSITY PRESS