Mobile phone use and subjective well-being

An empirical study of Norwegian young adults

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"The best society [...] is one where the citizens are happiest. So the best public policy is that which produces the greatest happiness"

Jeremy Bentham (cited in Layard, 2011, p. 5)

Abstract

The digital transformation of today's society has significantly changed the daily lives of individuals. Information and communication technologies have gained pervasive roles in everyday life. Yet, little is known about how these technologies ultimately affect us, particularly when it comes to the effect they may have on individual well-being. This thesis contributes to the gap in research on the relationships between ICTs and well-being, by focusing in particular on the topic of mobile phone use.

Smartphones have become essential devices in individuals' lives, and provide features far beyond traditional communication applications. Today, the device enables social connectivity, provides entertainment and a wide range of Internet services. Still, there is a lot of skepticism surrounding mobile phone use, related to excessive use, addiction and the possible negative implications from social media use. How does mobile phone use affect individual's well-being? To answer this relevant question, this Master thesis presents an empirical study of mobile phone use of young adults in Norway. The empirical analysis is based on a new survey dataset that collects information about nearly 2,400 individuals in Norway. Using this novel data source, the thesis carries out a quantitative study of the relationships between mobile phone use and subjective well-being, and how such relationships differ for Norwegian young adults compared to the rest of the population.

Multivariate regression results indicate that the mere amount of time an individual spends on the mobile phone has no direct association to his or her subjective well-being. However, the study finds positive associations were found between the communication features of the mobile phone, e.g. making private phone calls and sending text messages, and subjective well-being. The results for young adults differ from other demographic groups in that younger individuals spend most time on social network and communication applications available on smartphones, and this is negatively associated with their subjective well-being. On the other hand, I also find that texting is also more strongly positively associated with the well-being of this sub-group compared to the rest of the population.

Based on these empirical results, the thesis concludes with a discussion of possible implications of these findings, in terms of the responsible research and innovation literature, which provides a framework and a set of recommendations on how to integrate ethical considerations in the development and use of ICTs. In short, the innovation process in ICT development should make sure that the technology's benefits for individuals' well-being will outweigh its disadvantages and possible risks. Hence, I argue that subjective well-being is an important dimension that can be used to assess and compare the positive and negative effects of ICTs at the individual level. Results from such assessments can be used to inform policy makers and industry actors on how to develop socially acceptable and desirable products, ensuring that the current process of digitalization will be combined with individual well-being and social welfare.

Acknowledgements

The final stages of writing this thesis have been quite unordinary, with a worldwide pandemic and a national lockdown. It has been challenging being restricted to home office, and not being able to meet classmates or take part in social gatherings. With self-isolation and the world coming to a near-halt, it has at times been challenging to keep up motivation and concentration. Luckily, the digital technologies of today made it possible to find alternative ways of connecting socially, and never before have I had such lengthy phone and video calls with friends and family. That, I can confidently say, has greatly contributed to my happiness and well-being in this period.

First and foremost, I would like to thank the HAPPY ICT research project at the TIK Centre for letting me use their research data. I am grateful for having had the opportunity to make use of a solid and representative study like this one. Furthermore, a huge thank you to my supervisor Fulvio Castellacci for guiding me, helping me through my analyses and providing valuable insights. Even though we have not been able to meet in-person in the final months but only through video meetings, I appreciate you taking the time to answer my questions and providing written guidance of great quality.

With this Master thesis, I am proud to conclude my master degree in Technology, Innovation and Knowledge at the University of Oslo.

Happy reading!

Oslo, May 2020
Alexandra Palm

List of abbreviations

RRI – Responsible Research and Innovation

ICT – Information and Communication Technology

SWB – Subjective well-being

R&I – Research and innovation

R&D – Research and development

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1.0 Introduction

Traditionally, innovation studies has investigated the relationships between innovation and economic performance (Martin, 2016). The Schumpeterian theory on economic growth which focuses on the role innovation plays in economic growth, competitiveness and development, is prominent in the field (Fagerberg, 2003). Innovation is seen as a driving force in the economy, where periods of radical innovation and technological development spur economic activity and thereby growth (Fagerberg, 2003).

However, innovation and new technologies may, in principle, have many other impacts beyond wealth creation. It has recently been argued that the social impacts of innovation on well-being are important, although these have been traditionally neglected in the research (Castellacci & Tveito, 2018). Scholars explain well-being as the attainment of pleasure and the avoidance of pain (Ryan & Deci, 2001). The subjective well-being of an individual is one's personal evaluations of his or her own life, both in terms of short-term feelings of happiness and long-term assessments of life satisfaction (Diener, 2012; Kahneman & Deaton, 2010). It has been assumed that more wealth and possessions results in improved well-being for individuals, and current policies have focused on economic growth (Martin, 2016). Well-being studies, on the other hand, show that this is only true up to a certain point (Layard, 2011; Binder, 2013; Martin, 2016). Individuals typically become saturated by consuming material things, and more does not necessarily mean better. Martin (2016, p. 436) therefore argues in his that "*innovation scholars will need to shift the focus of our empirical work from innovation for wealth to innovation for wellbeing.*" The importance of investigating the effects of innovation on the subjective well-being of individuals is the main motivation for and starting point of this thesis.

Innovation and technological development have been greatly beneficial for the humankind, improving living standards, extending life expectancies and prompting other types of advancements (OECD, 2019). However, the technology we have created has also had some major downsides and unintended consequences, such as emissions negatively affecting the climate, deforestation, changes in work life and negative effects on our mental health and quality of life (OECD, 2019). With the progression of science and technology comes many risks and societal

impacts that must be identified and addressed. Therefore, Martin (2016) also argues that innovation studies should focus on the social responsibility of researchers and developers to ensure that the world they are creating is socially acceptable and desirable. Even though technology enhance human well-being, it is usually not "the driving force shaping these technologies" (Dunn & Dwyer, 2018, p. 1).

The effects of innovation on individuals' well-being and quality of life are also related to a recent strand of research and academic debate on responsible research and innovation (RRI). The recent literature on RRI has a specific focus on information and communication technologies (ICT) (von Schomberg, 2013). The field shifts focus to the social responsibility of researchers and developers, as well as industry actors and policy makers (Stahl, et al., 2013). Ethical considerations are to be incorporated in the entire innovation process, so that the outcomes are socially desirable and acceptable (Owen, et al., 2013).

Technology is said to be a conscious expression of human values (Schatzberg, 2018). When designing innovations, it is therefore important to reflect upon the outcomes of the technology's use and whether or not they are socially acceptable and desirable (Eden, et al., 2013). For example, will the final product be ethically responsible, and will its benefits outweigh its disadvantages (Stahl & Wright, 2018)? Human well-being is one of the most basic and central values to individuals worldwide (Layard, 2011). The OECD (2019, p. 14) argues that "policy makers need to assess and monitor the various impacts of the digital transformation in order to ensure that the digital transformation ultimately comes with an improvement of people's well-being." In understanding the social consequences of innovation and technology, we can become better equipped to create more socially responsible and technologically advanced products in the future and to foresee the ethical implications that may result from emerging technologies (Stahl, 2011).

To study how technological advancement and innovation specifically affects individuals' well-being, and how RRI behaviors and policies may shape such relationships, the present thesis will focus on the theme of ICT, which is one of the most pervasive technological paradigms in today's society (OECD, 2019). The digital transformation has revolutionized our lives as much as the

revolutionary impacts development of electricity had on society a century ago (European Commission, 2010, p. 4). In Western societies it is almost unimaginable to leave home without a digital device. They provide constant connection and access to different Internet services. In fact, we can even live both digital and actual lives, and we have a wide range of platforms to express ourselves on. Most individuals today do use their digital devices several times every day, and seldom "log off." There are many benefits these technologies provide, such as access to information and communication despite physical distances. However, there can be a dark side to them as well, and use can lead to screen-addictions, cyberbullying, mental health implications, and manipulation of information and fake news.

More specifically, in this thesis I look at the use of mobile phones and how the intensity and purpose of use relates to individuals' subjective well-being. Mobile phones play an increasingly prominent role in our daily lives, as they are devices many of us keep within reach throughout most of the day (Lepp, et al., 2014). According to the Pew Research Center (2019), the smartphone is the technology that has been adopted the fastest in human history. The smartphone's use is no longer confined to communication purposes such as phone calls or text messages. It is used to communicate with family and friends through social medias, to listen to music and podcasts, and to surf the Internet; some people even make their livings through social medias accessed through mobile phones. What is special about the mobile phone, is that it is almost always on hand, and its use is not dependent on any specific time nor place (Lepp, et al., 2014). According to Smith (2005), 46 % of smartphone owners say they could not live without their phones. Because the device has such an active role in people's daily lives, it is interesting to examine how its use affects individuals' subjective well-being.

Both the amount of time spent on the mobile phone, and the type of activities performed on the mobile phone may have implications for individuals' well-being (David, et al., 2018). Therefore, this thesis investigates the following overarching research question:

RQ: Does mobile phone use affect subjective well-being?

Media debates and extant research often advise limiting screen time and warn people against the dangers of spending too much time on their mobile phones (Redmayne, et al., 2013). Excessive phone use has been found to negatively affect people's mental health, and this suggests that the amount of time one spends on a mobile phone has negative implications for his or her overall well-being. However, it is not only the time spent that may have implications for our well-being, but also *how* people spend their time on mobile phones (i.e., the type of activities mobile phones are used for) (David, et al., 2018). I therefore investigate both how the overall intensity of use affects the respondents' well-being, as well as the consequences of using smartphones for different activities. In short, the two specific research questions of this thesis are the following:

RQ1: Is the intensity of mobile phone use associated with subjective well-being?

RQ2: Which mobile phone activities are most associated with subjective well-being?

Further, we know that mobile phone use differs greatly between different age groups (Andone, et al., 2016). A 20-year-old and a 70-year-old typically have different mobile phone-use habits, and their use may affect them in different ways. It is therefore important to investigate how the effects of mobile phone use differs between different age groups. The age group that is proven to spend the most time on their phones is younger adults (Andone, et al., 2016); therefore, it is interesting to investigate the effects of mobile phone use for this specific age group and compare it to the others. In this thesis, the young adults age group is defined as those between the ages of 18 – 29 years old. Younger adults represent a relevant and potentially vulnerable age group because these individuals are undertaking their tertiary education and entering the labor market for the first time. Therefore, their mobile phone use, habits, and effects are important to understanding how these will continue in later life stages. In short, the third specific research question that I investigate is as follows:

RQ3: Does the relationship between mobile phone use and subjective well-being of young adults differ from other demographic groups?

This thesis investigates these research questions by means of an empirical study using a novel data source. It makes use of a new survey dataset for a large sample of the Norwegian population that was collected as part of a research project coordinated by the TIK Centre at the University of Oslo ("Happy-ICT project," 2016–2020, financed by the Research Council of Norway). The survey represents original primary data used to investigate the relationships between the mobile phone use and subjective well-being of Norwegian adults.

Overall, this thesis seeks to highlight happiness and well-being as significant social consequences of technology use by illustrating how an essential device, such as the mobile phone, may impact individuals' subjective well-being. Furthermore, the connection made to RRI contributes to a wider discussion that emphasizes that when designing and regulating ICTs, it is important to put individual users' well-being at the center of strategic and policy choices regarding the development of these new technologies.

Chapter 2 briefly reviews the relevant literature on RRI in ICT, and the relevant literature on happiness and subjective well-being. Chapter 3 then shift the case to the topic of the thesis, the relationship between well-being and mobile phone use; it also provides a summary of extant research and some descriptive statistics for Norway. Chapter 4 notes the empirical data and methods used to analyze the research questions. Chapter 5 presents the results of multivariate regression analyses used to investigate the relationship between mobile phone use and the subjective well-being of the respondents. Chapter 6 discusses the implications of these empirical results from the point of view of RRI in ICT. Finally, chapter 7 summarizes and concludes the thesis.

2.0 Literature

In this chapter I will present a review of the relevant theoretical frameworks and previous research about the relevant themes: responsible research and innovation in information and communication technologies, and happiness and subjective well-being.

2.1 Responsible Research and Innovation in Information and Communication Technology

The concept of Responsible research and innovation (hereafter abbreviated to RRI) is a relatively new one, setting focus to socially desirable and acceptable outcomes of research and innovation activities (Owen, et al., 2013; von Schomberg, 2013). RRI started gaining traction around 2010, being a key concept in the 8th Framework Programme for Research and Innovation of the European Commission, Horizon 2020 (Stahl, et al., 2016b). Since, the literature on RRI has grown and focused on specific technology fields, such as information and communication technologies (von Schomberg, 2013).

RRI researchers have yet to reach a consensus on a definition of RRI, however the general content of the concept is relatively agreed upon. RRI is about integrating ethics into the innovation process, thereby steering research and innovation towards socially desirable and acceptable outcomes, and minimizing the negative societal impacts of innovations (Owen, et al., 2013; Stilgoe, et al., 2013). The following definition of Responsible Research and Innovation is given by René von Schomberg, which seems to be the most cited one:

> Responsible Research and Innovation is a transparent, interactive process by which societal actors and innovators become mutually responsive to each other with a view on the (ethical) acceptability, sustainability and societal desirability of the innovation process and its marketable products (in order to allow a proper embedding of scientific and technological advances in our society) (von Schomberg, 2011, p. 9).

The anchor points in this definition is ethical acceptability, sustainability and societal desirability. Further, von Schomberg (2013, p. 65) argues novel "products should be evaluated and designed

with a view to these normative anchor points: with a high level of protection to the environment and human health, sustainability, and social desirability".

The European Commission emphasizes some key areas in their perspective on RRI; ethics, gender equality, open access, science education, public engagement and research governance (Stahl & Wright, 2018). A framework of RRI is presented by Stilgoe et al. (2013), based on four key components of RRI: *Anticipate* possible outcomes of research and innovation, *Reflect* on motivations, processes and products, *Engage* relevant stakeholders and *Act* accordingly to address issues revealed (acronym AREA).

How RRI concepts, tools and processes can be shaped in order to be adopted by the ICT community was researched by the FRRIICT research project (Jirotka, et al., 2017). Through interviews of ICT researchers, they could outline key concerns regarding implementation of RRI in the field of ICT, related to four core aspects of RRI – the four P's; product, process, people and purpose. These concerns can also be seen as specific features or characteristics of ICTs (Chatfield, et al., 2017b; Eden, et al., 2013; Stahl, et al., 2016b). These characteristics are unique and set ICTs apart from other technology fields (Stahl, et al., 2019). Simultaneously, these characteristics make the application of RRI in ICT even more challenging (Jirotka, et al., 2017).

Firstly, Jirotka et al. (2017) found that a great concern was the difficulty in predicting the different uses of ICT research. Logical malleability, interpretive flexibility and the social production of technology make anticipating consequences and various uses challenging. This means that the technologies are flexible, and can have many different uses and can be shaped and used within many different products. These issues are related to the product dimension. Secondly, the speed of innovation within the ICT industry is high. Things can "go viral" overnight, and precaution is therefore even more important. Issues related to this is within the process of research and innovation (R&I).

The third concern is related to the people dimension. The problem of many hands, a feature of ICTs that consists of the fact that many different people are involved with the research and development (R&D) activities. Additionally, open access leads to knowledge transfer beyond a

single organization, making accountability for possible consequences challenging. The final P is purpose. Convergence is a key characteristic of ICTs as the technology often has no single use, and there are no clear lines separating systems, features and functionality. The purpose becomes difficult to discern. (Jirotka, et al., 2017)

These features are then integrated with the core aspects of RRI into a holistic framework – the AREA Plus Framework (Jirotka, et al., 2017) (or the AREA 4P (ORBIT, 2020a; Stahl, et al., 2019)), see Figure 1. This contributes to specifying the RRI discourse to the field of ICTs. By reflecting upon the questions presented in the 4x4 framework, the idea is that the researchers and technologists will address ethical concerns in a responsible manner. Further, in the ORBIT website, the extended AREA framework can be found as an online tool, where each cell in the framework can be extended, providing more detailed questions and suggested literature. The process, product, purpose and people involved in the R&D project will be considered. It is meant to create a dialogue among researchers to identify both extant and novel forms of responsible ICT design. Jirotka et al. (2017) stress that this framework is not a panacea, it will not identify and solve all ethical problems and concerns. The framework is meant to stimulate ethical considerations and informed debates by individuals involved in ICT research projects. The framework is flexible and is to be adapted by researchers or stakeholders to the context they find themselves in.

	Process (rhythm of ICT)	Product (logical malleability & interpretive flexibility)	Purpose (convergence & pervasiveness)	People (problem of many hands)
Anticipate	Is the planned research methodology acceptable?	To what extent are we able to anticipate the final product, future uses and impacts? Will the products be socially desirable? How sustainable are the outcomes?	Why should this research be undertaken?	Have we included the right stakeholders?
Reflect	Which mechanisms are used to reflect on process? How could you do it differently?	How do you know what the consequences might be? What might be the potential use? What don't we know about? How can we ensure societal desirability? How could you do it differently?	Is the research controversial? How could you do it differently?	Who is affected? How could you do it differently?
Engage	How to engage a wide group of stakeholders?	What are viewpoints of a wide group of stakeholders?	Is the research agenda acceptable?	Who prioritises research? For whom is the research done?
Act	How can your research structure become flexible? What training is required? What infrastructure is required?	What needs to be done to ensure social desirability? What training is required? What infrastructure is required?	How do we ensure that the implied future is desirable? What training is required? What infrastructure is required?	Who matters? What training is required? What infrastructure is required?

Figure 1. The AREA Plus Framework (Jirotka, et al., 2017)

Although the concept of RRI is relatively new, the different aspects of RRI are not new in themselves, as RRI draw on many different discourses and previous research (Stahl, 2013). RRI consists of many already well-established activities, such as risk assessment, technology assessment, research ethics reviews and public engagement. Due to the fact that RRI draw on so many different discourses, it becomes unclear how these are all tied together, according to Stahl (2013). RRI seeks to align these types of activities towards broader social discussions and reflections with attention to the grand challenges of our time (Stahl, et al., 2014a).

Therefore, Stahl defines RRI as a meta-responsibility, and proposes the following definition:

> RRI is a higher level responsibility, or meta-responsibility, that aims to shape, maintain, develop, coordinate and align existing and novel research and innovation-related

> processes, actors and responsibilities with a view to ensuring desirable and acceptable outcomes (Stahl, 2013, p. 712).

The definition is supported by the notion that there is already an existing web of responsibilities in different processes and for different actors. Stahl et al. (2013) define responsibility as seeking to achieve desirable outcomes. To exemplify responsibilities related to ICTs, they mention privacy, data protection and intellectual property. However, these issues are not novel, and already well expressed and discussed in various fields of literature. RRI can therefore be seen as an umbrella term, "a responsibility for responsibilities" (Stahl, et al., 2013, p. 202), that seeks to align responsibilities and trajectories to achieve desirable outcomes. RRI is seen as a way to deal with the uncertainties associated with innovation, at the same time as emphasizing the social responsibility of science and innovation.

Furthermore, in order to make RRI seem more manageable to the ICT community, Eden et al. (2013) recommend looking at 'problem spaces' rather than 'responsibilities', so as RRI is not seen as a constraint, but as a resource. The 'problem space' would be the potential negative consequences of a technology, something to react to and find solutions to. For example, "privacy by design" is used to place privacy and data protection as an objective in the innovation process. By using misuse scenarios, they can exemplify bad outcomes and address risks. "What type of problems can this cause, and what solutions can be designed into the innovation to avoid this?"

As previously stated, ICTs such as the mobile phone have become an integrated part of our society and the way we live our lives, significantly changing our lifestyles (European Commission, 2010). It is therefore desirable to make sure these technologies impact our lives in positive ways, and to have our societal values reflected in the artefacts and the use of them. However, it is not always that easy to predict impacts prior to their use. Stahl (2011) refers to the *Collingridge dilemma* of how impacts of a technology becomes visible once the technology is already embedded in society and its use widespread. The "damage" might have already been done, and incentives to address these issues are implemented subsequently. By then the technological trajectory may be hard to change, as the technology may be too embedded in society and people's everyday lives. It is therefore valuable to be able to say something about

potential ethical issues of emerging, future technologies (Stahl, 2011). Von Schomberg (2011) argues that early engagement and alignment of innovation with societal needs and values in the innovation process can help better govern and/or exploit technologies' positive and negative impacts.

2.1.1 Ethical Issues of Emerging ICT Applications

The ETICA project was a technology foresight project that identified 11 emerging ICTs and their related, potential ethical issues. The reasoning behind doing the project was based on ICTs large ability to effect "human liberty, happiness, and people's ability to lead a good life" (Stahl, et al., 2010, p. 20). A better understanding of the consequences of emerging technologies, puts us and policy makers in a better position to handle them.

RRI is meant to steer research and innovation towards desirable outcomes, and towards the kinds of futures we want. Stahl et al. (2016b) argue that this requires some kind of knowledge about the possible outcomes and impacts this research and innovation can have. What is challenging about this, is that it is impossible to predict the future 100 %. Still, even though it is not possible to provide someone with a full prediction of the future, it is valuable to discuss it, and try to picture different outcomes and social and ethical issues related to these possible futures.

The emerging ICTs identified by the project are ones that are believed to have a significant impact on human lives in the years to come. The 11 emerging ICTs are: Affective Computing, which is a computerized way of identifying and expressing human emotion; Ambient Intelligence, which is making electronic environments sensitive to human presence, e.g. using sensors; Artificial Intelligence, which refers to machines having "human intelligence" and being able to "think" like humans; Bioelectronics, which combines biological materials and electronics such as the implementation of electronic devices in living organisms; Cloud Computing, which is digital, remote servers that store and process data; Future Internet, which refers to novel infrastructures of the Internet; Human-machine symbiosis, which is the combination of human and technological artefacts; Neuroelectronics, which is a combination of neuroscience and computing; Quantum Computing, which uses quantum theory to develop computer technology; Robotics, which is artificial agents that act somewhat autonomously; and lastly Virtual /

Augmented Reality which is a technological simulation of reality that one can e.g. see and hear through glasses and headsets. (Stahl, 2011; Stahl, et al., 2013; Stahl, et al., 2016b)

Possible ethical issues related to these technologies were also identified. Because it is impossible to predict impacts that have yet to happen, these possible ethical issues are based on extant literature on ICT, computer and information ethics. These were categorized in the following themes: Conceptual issues and ethical theories, Impact on individuals, Social consequences, Uncertainty of outcomes, Perceptions of technology, and Role of humans. Within these themes, more specific ethical issues were presented, such as privacy, autonomy, treatment of humans, collective human identity and the good life and cultural differences, to name just a few. ICTs have already begun to change the way in which we communicate with each other, and we are concerned about screen addiction of vulnerable groups such as children and young adults. This will be further explored in chapter 2.3. ICT-enabled interactions make it possible to treat other humans differently online than in real life as one can be one step removed from the situation. ICTs can also change our perception of what leading a good life entails. Assumptions about behavior are embedded in ICT applications and it questions what we expect technology to provide for us compared to what we expect from each other. (Stahl, 2011; Stahl, et al., 2013; Stahl, et al., 2016b)

Privacy and autonomy were highlighted as important aspects of ICT use, where privacy is the most discussed ethical issue of ICT use (Stahl & Wright, 2018). Some of the ethical issues are well known and not surprising, such as data protection, intellectual property and digital divides. It is however important not to let the most visible and dominant ethical issues such as privacy overlook other ethical concerns, that may be equally important. Rommetveit (2011, p. 80) argues that "Privacy and data protection are not sufficient tools for governance of ICTs." ICTs can have pervasive consequences for us as individuals and as a society as the presence of technology becomes as natural as anything else. Issues such as mental health effects of digital technology use, and happiness and well-being (values that will be further explained in chapter 2.2), should also be given attention to within the RRI in ICT discourse. Stahl (2011) argues that a lot of the current ethical issues we see in ICTs today are likely to persist in the new developments in the years to come as well.

The identification of these emerging ICTs and their potential social consequences are an asset in the sense that they can assist research and innovation processes address issues and concerns at an early stage, as well as focusing the attention to incorporating ethics into R&I. Stahl (2011) emphasizes that this discussion of ethical issues is not a blueprint of the kinds of consequences that will follow technology in the years to come, but rather an overview of potential ethical issues that might be worth taking into account by researchers and policy makers. It can be seen as an inspiration for reflecting upon ethical dilemmas regarding a technology. Further, and perhaps more importantly in this context, identification of beneficial and negative impacts of technologies today can be used to improve further developments of the technology, trying to enhance the positive impacts and limit the negative ones.

Stahl et al. (2016b) gives more attention to describing the ethical issues related to the emerging ICTs identified, and provides an outline of the main themes followed by a set of guiding questions researchers and developers can reflect upon dependent on the relevance to their own activities. For example, under the theme of 'consequences for society', the ethical issue of 'collective human identity and the good life' is presented, with the guiding questions "Does the technology replace established human activities or work?" and "Which view of culture or human society is the technology likely to promote?". Such questions can guide reflections of researchers and stakeholders.

Furthermore, Stahl et al. (2016b) argues that, related to the AREA (Anticipation, Reflection, Engagement and Action) framework of Stilgoe et al. (2013), this type of foresight activity the ETICA project presents fits with the "Anticipation" component of RRI. The following components all rely on this anticipatory reflection of possible futures and issues to be dealt with. This study of possible ethical issues related to emerging technologies can therefore be of value when deploying an RRI approach.

The ETICA project resulted in a list of recommendations both for policy makers and industry, researchers and civil society organizations, presented by Stahl (2011, pp. 29-31). Policy makers are argued to have a meta-responsibility for ethics in ICTs, and provide frameworks and infrastructure for ethical consideration. Companies, individual researchers and society at large are

more involved in the R&I process in itself, and thereby responsible for various aspects of specific technologies and their following consequences.

The regulatory framework for ethical consideration suggested for policy makers include the following recommendations (Stahl, 2011, pp. 29-31): 1) "provide regulatory framework which will support ethical impact assessment for ICTs", a framework that will help recognize responsibilities and identify and address ethical issues, 2) "establish an ICT ethics observatory" to create knowledge exchange on different aspects of ICT ethics to raise awareness on issues and approaches, and 3) "establish a forum for stakeholder involvement" where civil society, industry, NGOs and other stakeholders can share opinions and ideas. Recommendations for industry, researchers and civil society organizations are 1) "incorporate ethics into ICT research and development" to highlight the importance of ethical sensitivity in R&I for both users and providers and that this is realized in the technical work, and 2) "facilitate ethical reflexivity in ICT projects and practice" highlighting the fact that ethical issues are context-dependent and that reflections are required continuously throughout the project. In his concluding remarks, Stahl (2011) states that currently, there are no good ways of addressing the ethical issues presented. However, implementation of these recommendations will contribute to ethical technological development within and beyond the EU.

2.1.2 RRI in ICT industry

In order to make the RRI in ICT framework and concepts more relevant to industry actors, the Responsible-Industry project was developed, an EU-funded project on the ICT industry for an ageing society (Porcari, et al., 2015). As the ETICA and the FRRIICT project were mainly focused on the ICT research community, publicly funded research and implications for public policy, participants of the Responsible-Industry project found it valuable to gain more insight in the private industry perspective, and how RRI might impact industry actors. The project's motto was "Doing research and innovation responsibly benefits the company and contributes to making a better world".

Chatfield et al. (2017b) explored the drivers and obstacles on the implementation of RRI in the ICT industry. As the authors realized that the awareness and knowledge about RRI was low or

non-existent among their informants, they made the comparison of RRI to corporate social responsibility (CSR). There are several similar features to both concepts. By identifying different motives and obstacles for private companies to implement CSR, the authors transfer this knowledge to RRI, and gain insights in what might hamper the implementation of RRI in industry.

The results from the study showed that even though RRI was not a well-known concept among the companies, some of the activities included in RRI were not unfamiliar and used to a great extent, such as involving users and other stakeholders. When it came to the potential obstacles of implementing RRI, economic cost was seen as the primary obstacle, as well as the speed of the innovation process. RRI activities both cost money and take time. Slower innovation processes are of significant concern for the ICT industry, due to the speed of innovation and diffusion of ICTs. The competition is high, and RRI activities would slow them down, as well as have cost implications. However, money was also found to be the key driver for the implementation of RRI in industry. For example, involvement of users is good for profits as they can create better products that fit with consumer needs and thereby create more demand. In addition, it improves corporate image, and can help avoid problems in the future. (Chatfield, et al., 2017b)

Compared to high profile examples such as nuclear power and GMOs, the ethical risks of ICTs are not as obvious, Chatfield et al. (2017a) argue. However, ICTs are ubiquitous, and affect many different aspects of our personal lives as well as different aspects of society. This, together with other characteristics of ICTs; their speed of innovation, the problem of many hands, logical malleability and interpretive flexibility, makes up for a range of ethical and societal risks and concerns. These ethical and societal risks that end-users might end up facing, are also risks the companies are facing when introducing products and services to market. If the customers are too concerned about negative consequences, the rejection of the products affect the company's profits. It is therefore important, not just from an ethical perspective, but also from a profit-maximizing perspective, for a company to address potential ethical and societal issues following their R&I activities. (Chatfield, et al., 2017a)

All in all, the authors found three key components to strengthen the implementation of RRI in industry. 1) RRI should be imbedded in corporate culture as an overall value in the company, as an "ethical culture" 2) there is a need to educate and raise awareness of what RRI is and a create a specific framework for actors to follow, and 3) more clarity surrounding data protection and ethical codes, and a desire for guidelines to follow. (Chatfield, et al., 2017a; Chatfield, et al., 2017b)

In *International Handbook on Responsible Innovation*, Stahl et al. (2019) presents in part of their article a study on the role of RRI in the ICT industry for ageing, demographic change and well-being, the awareness of the concept and the perceived benefits from applying it. Similar to Chatfield et al. (2017a), the authors found that industry representatives had a relatively low awareness of the RRI concept. However, there was broad knowledge about the ethical and societal concerns involved in their work on ICTs. The perceived possible benefits from the implementation of RRI were also identified, where unlike Chatfield et al (2017a), they found non-economic benefits to be strongly highlighted. This may be a result from the fact that the industry is focused on ICT applications for the elderly with attention to improving their quality of life. However, benefits such as better corporate image and higher acceptability of their ICT products were also emphasized.

The study also identified which stakeholders should be involved in identifying, evaluating and assessing ethical and social concerns of ICTs, where ethics committees, civil society organizations and end users were at the top three. Identification of stakeholders that may contribute to ethical considerations in the innovation process is part of the *Engagement* component in the AREA framework. This points to the fact that RRI can be seen as a co-creation process, where companies should open up a dialogue with the broader public in order to become aware of, and address ethical issues related to their products. Engagement of relevant groups is a core component of RRI. Becoming responsible actors cannot be achieved in isolation. (Stahl, et al., 2019)

2.1.3 Practical applications

In order to illustrate a possible future where RRI in ICT is an integrated part of R&I activities and processes, Stahl, et al. (2014b) describes a future scenario of RRI in practice. The authors based the scenario on the findings from the ETICA project, where affective computing, robotics, artificial intelligence and ambient intelligence were identified as some of the emerging ICTs likely to substantially affect human lives in the years to come. The authors therefore present a vignette about an empathic care robot with the purpose of showing how anticipatory technology governance can ensure the social acceptability and desirability of technologies.

The fictional scenario reflects quite severe consequences of the use of the empathic care robot, such as matters of life and death and assisted suicide, but also changes in social relationships and human-computer interactions. This clearly illustrates that even though a technology might be developed to achieve something good, unforeseen and unexpected negative consequences might come from it. To illustrate the practical role RRI might have in the future, the vignette presents how the innovator of the robot has to undergo an RRI inspection with external actors, to evaluate whether the product is socially responsible enough to be released to the market. Such a responsibility review is just one way RRI might be realized as a legal action and a step that promotes ethical assessments of products. (Stahl, et al., 2014b)

Another contribution by Stahl and Coeckelbergh (2016) presents RRI as a way to identify and deal with the ethical concerns regarding healthcare robotics and technology. The authors list the key concerns of ethics of healthcare robots, some of which are how robotics have implications for labor as it replaces humans, implications for care, privacy and security when replacing humans with robots, and the rearrangement of tasks, roles and responsibilities that follows this replacement. RRI is then presented as a way to deal with issues and questions not addressed in the existing discourse on ethics of healthcare robotics. The authors present the AREA 4P framework for RRI in ICT constructed by the FRRIICT project as a communicative tool to allow for better informed, reflected and broader discussions of ethical issues among various stakeholders. This framework can be used to expand the dialogue about ethical issues in healthcare robotics, the authors argue. There is currently a large knowledge base on the ethical and social aspects of healthcare robotics, however the authors argue that the RRI in ICT

framework can promote further development of ethical aspects and additionally give attention to implications for research policy within this field.

An additional practical example of the use of RRI is given by a Norwegian research project, the Assisted Living project, focused on promoting RRI within the field of welfare technology. The project uses RRI insights and perspectives in order to research and develop assistive technologies (Thorstensen, 2019). In Forsberg and Thorstensen (2018), the authors describe how they integrated RRI principles in their project, such as a close collaboration with stakeholders like users and experts to understand needs, concerns and contexts of use and try to anticipate problems and issues that might follow their work. The project also compared different approaches to assess assistive technologies, in line with the central thinking of RRI (Thorstensen, 2019). 'Ethical Impact Assessment' was especially identified as having a particular emphasis on privacy and ICT innovation, making it a product assessment method well suited for RRI in ICT.

The Human Brain Project (HBP) also implemented RRI in their project and used foresight activities to look into possible outcomes and consequences from their work, as well as engaging different stakeholders and the general public in discussions of ethical issues and ways of dealing with them (Stahl & Wright, 2018). This proves the implementation of RRI principles to be possible. These examples show that RRI may be an asset to both ICT research projects and industry in defining and finding ways to deal with ethical issues and consequences of information and communication technologies in order to steer the technological development towards socially acceptable and desirable outcomes.

A further important consideration that has so far received less attention in this literature is however the following. The overall goal of the RRI framework is to steer innovation and technological development towards socially acceptable and desirable outcomes, and to ensure that the outcomes ultimately contribute positively to individuals and society at large. However, how can we assess whether an innovation is good or bad, and whether is leads to socially acceptable and desirable outcomes? This question is paramount, but it has not received explicit attention in the RRI literature yet. In this thesis, I posit that the assessment of the consequences of ICTs should be based on an evaluation of the impacts that is has on individual users of ICTs, and

particularly on individuals' well-being. Well-being is a measurement of how "well" an individual is doing, and considers together the positive and negative aspects of an individual's life. The well-being outcomes of an innovation can therefore be used to assess the positive and negative effects of said innovation, and may inform on whether or not an innovation is developing in a responsible trajectory. In the next section, we therefore shift the focus to the literature that studies subjective well-being and its main determinants.

2.2 Happiness and subjective well-being

The happiness literature distinguishes between two strands of research; subjective well-being (SWB) and objective well-being (OWB) (Castellacci & Tveito, 2018). SWB studies individuals' own perceptions of their lives and well-being (Diener, 2012), whereas OWB uses a set of objective characteristics to measure individuals' well-being (Gasper, 2005). The discourse on OWB focus on meaning, self-realization and psychological needs humans need to fulfill in order to be happy, such as autonomy, competence and relatedness (Ryan & Deci, 2001). However, as this thesis researches how the respondents perceive their individual well-being, the focus is on subjective well-being.

2.2.1 Subjective well-being and its determinants

Subjective well-being is individuals' own evaluations of their lives (Diener, 2012). Within this research tradition, a distinction between two concepts is made, *emotional* or *hedonic* well-being and *evaluative* well-being or *life satisfaction* (Kahneman & Deaton, 2010). The former assesses feelings about everyday experiences and more short-term assessment of feelings of happiness at the present (Diener, 2012; Kahneman & Deaton, 2010). The latter focuses on evaluations of life as a whole, and how satisfied people are with their lives, seen as a long-term assessment (Diener, 2012; Kahneman & Deaton, 2010). OECD (2013, p. 10) offers a broad definition of subjective well-being, seemingly including both emotional and evaluative well-being: "*Good mental states, including all of the various evaluations, positive and negative, that people make of their lives and the affective reactions of people to their experiences."* Here, the focus is on attainment of pleasure and the avoidance of pain (Ryan & Deci, 2001).

Much research has been conducted on the determinants of SWB (Binder, 2013). The OECD (2013) has created a set of guidelines for measuring subjective well-being and its main determinants. These determinants are demographics, material conditions, quality of life and psychological measures.

Demographics and personal characteristics

Demographic variables are often used to describe a population, and may affect measures of SWB (OECD, 2013). The individual's feeling of happiness may be affected by his/her age, and it is found that the relationship between age and SWB is U-shaped, where people are the happiest at the beginning and the end of their lives (Castellacci & Schwabe, 2018). There may be gender differences in relation to SWB of an individual, where it is often found that women are generally happier than men (Pénard, et al., 2013). Married people, or people in stable, long-term relationships often report higher levels of SWB than single, divorced or widowed people (Binder, 2013). Household size may also affect SWB, as well as geographic information about the individual (OECD, 2013)

Material conditions

Income is believed to have great impact on the individuals' SWB. An increase in household income is often found to lead to higher reports of SWB of the individuals in the household. Relative income is often highlighted as a mechanism underlying this association (Cheung & Lucas, 2016). Relative income is based on social comparisons, whether own income is perceived as high or low compared to others. Even though one's income may be high, a person can become unsatisfied if those around him or her have higher incomes, thereby negatively affecting subjective well-being. High income inequality has been found to increase relative income effects (Cheung & Lucas, 2016). Much focus has been given to the aspect of income, resulting in even more emphasis of economic growth in countries. Consumption habits may also impact SWB, as it says something about the individual's access to goods and services that may be of importance to them. (OECD, 2013)

Quality of life

Aspects of quality of life goes beyond material conditions in people's lives. Social connections greatly affect SWB, and are viewed as one of the most important determinants of SWB ((Binder, 2013; OECD, 2013). Employment status is found to have a large effect on SWB, where employed individuals report higher measures of SWB than unemployed individuals (Winkelmann & Winkelmann, 1998). Further, good physical and mental health are positively correlated with SWB. Education level may also impact SWB, usually measured in the highest completed

education level. Additionally, trust in others and in the government may also affect life evaluations, as well as personal security and perceived safety. Lastly, environmental quality may affect SWB, such as air pollution, noise pollution and access to green spaces. (OECD, 2013)

Psychological measures

What personality type you have may impact the way you respond to questions on SWB, for example whether you are an optimist or a pessimist. However, personality types are difficult to measure in cross-sectional surveys, and therefore often not included. Whom and what we use as a frame of reference may also impact how we answer questions about SWB, including our aspirations and expectations about the future and our lives and who we compare ourselves to. (OECD, 2013)

Layard (2011, p. 63) identifies "the big seven" factors that affect happiness and well-being (in order of importance); family relationships, financial situation, work, community and friends, health, personal freedom, and personal values. Though different factors in different "domains of life" affect SWB in different ways, the most discussed and researched topics are income, health, social domain and employment status (Binder, 2013), in tune with the five most important factors identified by Layard (2011), as well as the variables identified by the OECD (2013).

Even though increased income, good health, stable and long-term relationships, high social capital, and being employed has a positive effect on SWB, researchers have found that we adapt to our circumstances to a certain degree (Binder, 2013; Diener, 2012). Particularly regarding income, it is found that at a certain point, increased income no longer leads to higher feelings of well-being and happiness (Binder, 2013; Layard, 2011; Martin, 2016). We become saturated by material things, or we compare ourselves to those who are richer and have more than us (Binder, 2013; Diener, 2012; Layard, 2011). Additionally, major changes in life circumstances may have a negative effect on our well-being. In time, however, we are usually able to reach the same level of well-being and happiness as before the negative event occurred. Binder (2013) found male unemployment to be an exception of this. His findings indicate that men do not adapt to this life situation and do not reach the same level of happiness and satisfaction with life as when employed.

Further, Diener (2012) argues that antecedents of SWB may vary depending on societal condition and culture. Cultures differ in how they value certain characteristics and norms. An example of this is that extrovert people are happier in cultures that value extraversion rather than in cultures that value introversion. How we evaluate our lives may depend on which standards we use, our frame of reference (OECD, 2013). We measure our satisfaction with life based on either our own desires and aspirations, or we can compare ourselves to others. Diener (2012) argues that due to new ICTs, we have evolved from comparing ourselves to people close us, such as neighbors or colleagues, to comparing ourselves across nations, creating a world standard. We can easily get a glimpse of other people's lives from across the world through TV, the Internet, social media and so on. As a result, we are now able to compare ourselves to people with both worse and better life situations than us, which might have positive or negative effects. By comparing ourselves to people in worse life situations, we might come to appreciate our own lives more, whereas by comparing ourselves to people in better life situations, we might feel worse about our own lives.

2.2.2 Innovation and happiness

Few attempts have been made to combine insights from the happiness literature and the innovation literature (Binder, 2013; Dolan & Metcalfe, 2012; Engelbrecht, 2014). The relationship between innovation and well-being has been studied by looking at both how SWB impacts innovation, and how innovation impacts SWB. Dolan and Metcalfe (2012) find that high reports of SWB correlates with more creativity, by the measures of originality and imagination. Other studies have also found that positive moods enhance memory and performance. On the other side, innovation may impact SWB by the accumulation of goods, making new products and services more available to people. As innovation studies have often found, innovation leads to economic growth, and income may be seen as a factor predicting SWB. However, the issue of causality that is hard to prove once again. If happy people are more creative, then steps should be taken to improve happiness, as it improves innovativeness, which again can increase economic growth and productivity. (Dolan & Metcalfe, 2012)

On the other hand, the traditional thinking of "innovation for economic growth" within the innovation literature is starting to be challenged (Engelbrecht, 2014). Recently, new strands of

research have come forward going beyond this "economic impact thinking", and focusing on how innovation can contribute to solving the grand challenges of our time (e.g. innovation for sustainability). A growing trend now assesses innovation beyond the scope of economic performance, challenging the assumption that technological progress and development automatically leads to increased well-being (Engelbrecht, 2014; Martin, 2016). Even though a new technology may be beneficial to the economic system (e.g. increasing efficiency and profits for companies, etc.), it can increase societal unemployment, leading to decreased well-being in individuals (Binder, 2013).

2.2.3 Why does it matter?

"Personal happiness is generally held to be the most important goal in life" (Brooks, 2015, p. 29). We often think about happiness as a goal in life. We choose our partners, carriers and lifestyles based on what we think will make us happy. Aspiring to be happy is quite universal, and is an important and basic value in society, something everyone can relate to and wants to achieve (Layard, 2011). There is even an International Day of Happiness, created by the UN, that falls on the 20th of March and has been celebrated since 2013 (Day of Happiness, 2020). Happiness is by the UN recognized as a "fundamental human goal" (Day of Happiness, 2020).

The measurement of happiness can be used to assess the progress of societies (OECD, 2013). For a long time, economic dimensions have been used to measure happiness, such as Gross Domestic Product (GDP) per capita, poverty rates and income distribution (Guillén Royo, 2007). According to Bentham, "The best society […] is one where the citizens are happiest" (Bentham, cited in Layard 2011, p. 5). In order to improve lives of citizens, it is important for policy makers to have information on factors that make people's lives better. Therefore, "the best public policy is that which produces the greatest happiness" (Bentham, cited in Layard, 2011, p.5). In recent years, large, international studies have mapped the subjective well-being of nations, such as World Values Survey and Gallup World Poll, both including representative samples from diverse nations.

An example of such a report is The World happiness report, which is based on the Gallup World Poll, and has been published each year for the past 8 years (Helliwell, et al., 2020). The report provides lists of the happiest countries in the world. In 2019, Norway was ranked the third most happy country in the world, based on GDP per capita, social support, healthy life expectancy, freedom to make life choices, generosity, corruption and life evaluation (Helliwell, et al., 2019). The top three countries were Finland, Denmark and Norway. The Nordic countries, Finland, Denmark, Norway, Sweden and Iceland, have ranked the happiest countries for several years, and in the 2020 World Happiness Report, this is referred to as "The Nordic Exceptionalism" (Helliwell, et al., 2020). The welfare state, social cohesion and trust, equality and low corruption are among the most prominent explanations for the high levels of happiness in these countries (Helliwell, et al., 2020).

Not only is SWB an outcome in itself, but it can lead of other benefits as well. Several studies have found a positive association between mental and physical health (Ohrnberger, et al., 2017). Being happy is good for us. High SWB is a predictor of good health and longevity (Diener, 2012). It is found that being happy influences the immune system, where happy people are found to have more robust immune systems and have better recovery rates after major surgery (Layard, 2011). Being happy is also associated with lower stress levels and lower blood pressure and heart rate (Layard, 2011). Likewise, exercising causes the body to release endorphins (Harber & Sutton, 2012), proving that good physical health may also contribute to feeling good and being happy. SWB may also be connected to social behavior and good citizenship, and it is found that happy people are more likely to donate to charity and to donate blood (Diener, 2012).

However, we rarely stop to consider how our surroundings and the things we own affect our happiness and well-being (Layard, 2011). As noticed through the well-being literature presented above, technological innovation is usually not identified as one of the variables affecting and explaining well-being (Castellacci & Tveito, 2018), and few have tried to connect innovation and well-being, with the exceptions of the scant literature presented above. This is therefore an interesting and relevant gap that motivated this Master thesis.

3.0 Mobile phones and subjective well-being

We now shift the focus to the main topic of this thesis: the relationship between mobile phone use and subjective well-being. Mobile phones represent a crucial technological device that has increasingly been used in recent years, and even more so since it has integrated functions to access and use Internet and other digital services. In spite of the fact that we all use smartphones to an increasing extent, little is known about the effects that mobile phone use can have for individual users' subjective well-being. This does therefore represent a relevant and interesting case to study ICTs and well-being, and the related consequences for RRI.

Extant empirical research on the relationship between mobile phone use and well-being is two-sided, and there are different perspectives on the implications of mobile phone use. On one hand, studies have found that having access to information and communication technology such as a mobile phone is related to high reports of SWB (Chan, 2015; Graham & Nikolova, 2013; Kavetsos & Koutroumpis, 2011). On the other hand, studies have found a negative association between mobile phone use and SWB (Kushlev, et al., 2019; Lee, et al., 2014; Lepp, et al., 2014; Li, et al., 2015; Misra, et al., 2014; Rotondi, et al., 2017) and the negative side effects of mobile phone usage are often the ones that receive the most media attention (Hoffner, et al., 2016). It can be seen as a double-edged sword (Reddy, et al., 2019) that both support and subvert SWB (Dunn & Dwyer, 2018). Another way of phrasing this, is "The Paradox of Technology" (Mick & Fournier, 1998), where smartphones simultaneously frees up time and facilitates different activities, as well as enslaves people through the constant connectivity and the dependency it creates.

3.1 Mobile phone use may support SWB

A study on various ICTs by Graham and Nikolova (2013) found that having access to cell phones, TV and Internet have positive correlations with well-being. ICTs enables communication despite distance, a source of entertainment and enables access to information and financial services, among other things. Differences were found in country comparisons, where the differences lay between poorer and wealthier regions. Access to cell phones, TV and Internet correlated positively with well-being, with the strongest correlations in poorer regions, where the

technology is less common. The correlation was insignificant in wealthier regions. An explanation for this may be that in poorer countries the technologies can be a single source of information, media and communication. In wealthier countries, people can experience an overload of information and media on various platforms, which may be stress inducing. Additionally, the mobile phones today keep us constantly available, resulting in the experience of bringing "work worries" home. This suggests that in wealthier countries, ICTs can contribute to both well-being and be stress inducing. In general, the access to the technologies were positively related to well-being, however the effect diminishes where the technology is more widespread. (Graham & Nikolova, 2013)

Additionally, Kavetsos and Koutroumpis (2011) and Chan (2015) found a positive correlation between mobile phone use and SWB. The mobile phone can strengthen different social relationships in various ways, such as being able to stay in touch despite distances, sharing experiences with others, coordinating plans and events and sending funny anecdotes to friends, personalizing the communication between each other (Campbell, 2015; Ling, 2012). As happiness research show, social relationships and social interactions are important determinants of well-being and happiness (Binder, 2013; Layard, 2011). Not surprisingly, the most popular mobile apps today are meant to enable social connectivity, such as WhatsApp, Messenger, Facebook, Snapchat and Instagram (Dunn & Dwyer, 2018).

The mobile phone today additionally makes a lot of tasks easier for us. With Internet access, it provides easy access to information, and can be a source of learning on-the-go (Castellacci & Tveito, 2018). Further, it provides easy access to a wide range of services, such as online banking, online shopping, access to tickets, streaming music, and much more (Castellacci & Tveito, 2018). Dunn and Dwyer (2018) explain the large pull towards using the mobile phone for so many different purposes by "The Principal of Least Effort". As humans, we always try to find the easiest way of doing things. As mobile phones are portable devices that can be used at any time and place, the device enables us to accomplish tasks effortlessly by accessing different services. Instead of going to a ticket office, you can purchase tickets in various apps. Instead of going to the bank, or even sitting down by your computer, you can pay your bills while sitting on

the bus on your way home. The mobile phone simplifies our lives in many ways, and gives us easy access to information, services and communication tools.

3.2 Mobile phone use may hamper SWB

Previous research have found negative implications from the use of mobile phones, as well as studying the relationship between these implications and SWB. Misra et al. (2014) found that due to the mobile phone, we are increasingly multitasking, by answering messages and looking up various information at the same time as we are supposed to be doing something else. Constantly checking and replying to notifications from our phones creates a divided attention for the individual, and it causes a distraction from the task at hand. We put so much value into the technology and what is happening on our phones that it is difficult to "sign off" and not to for instance take part in conversations happening online. Our consciousness is split between the physical present and the virtual world, resulting in an absent presence. Misra et al. (2014, p. 16) explored how this distracting device impacts face-to-face social interactions, and found "unfavorable implications of the presence of mobile devices" on people in in-person interactions. They found that the mere presence of a mobile phone causes distraction and thereby lowers the quality of in-person conversations. The mobile phone is seen as a distracting stimuli that makes the current in-person conversation have lesser quality than if the mobile phone was absent. The presence and usage of the mobile phone while in an in-person conversation makes people feel less connected to each other, and people may feel that what they have to say is not as important or as interesting as what is happening on the phone of the other person. Absence of the mobile phone led to higher connectedness and empathic concern in the social interaction.

Rotondi et al.'s (2017) and Kushlev et al.'s (2019) research also confirmed these findings, as they through their research found that the use of smartphones was negatively associated with the quality of time spent with friends and family. Using the smartphone while in a face-to-face interaction reduced the quality of the interaction, which in turn has implications for individuals' well-being. Social interactions are positively associated with well-being, however, use of the mobile phone dampens this positive impact. Sbarra et al. (2019, p. 596) defines this as *technoference*, "the ways in which smartphone use may interfere with or intrude into everyday social interactions". The authors argue that the mobile phones pull individuals away from

interpersonal interactions and into online ones by providing such an easy access to social networking sites and near-instantaneous communication and responsiveness. Even though we may maintain some social relations through online communication, it may come at the expense of other interpersonal relationships.

In an ethnographic study on technology habits on high school students, Turkle (2011) found that the use of ICTs are changing the way in which we communicate and may thereby affect interpersonal relationships. The teenagers interviewed stated that they preferred online communication, and that even calling someone is seen as too intrusive or direct, so they prefer texting. This, affects the quality of communication, as the conversations we have online are not as deep and intimate, but more superficial, than in-person conversations. This type of communication is "not so good for opening a dialogue about complexity of feeling" (Turkle, 2011, p. 9). So even though technology may enable us to communicate more, the quality of those interactions may be lower than those in "real life", thus creating "*new solitudes*".

Hence, mobile phones may substitute in-person interactions, and especially so with strangers and acquaintances, Kushlev et al. (2019) finds. Studies have shown that short interactions and conversations with our weak ties can "contribute to day-to-day happiness and belonging" (Kushlev, et al., 2019, p. 349). E.g. by ordering food online and through apps, there is no need to physically interact or talk to anybody. Additionally, use of the mobile phone is often a time-passing activity, making us less inclined to make contact with those around us. It is found that we smile less to the people around us in public places, as our attention is on our phones, making us less connected to other people. Even though a mobile phone device, that may be meant to increase and enable social connectivity, may in fact decrease social connection (Dunn & Dwyer, 2018).

The fact that mobile phones divide our attention have also been found to have implications for task performance in the workplace. For many, having the mobile phone available during the workday is a requirement and a necessity. Turner and Reinsch (2007, p. 36) stated that "multitasking has become synonymous with the communication technology-infused workplace of today". However, multitasking may be distracting from the task at hand. With the mobile phone

constantly in reach and “signed on” it is easy to be distracted by notifications and messages of personal character, that is unrelated to your work, such as notifications from social medias. Such interruptions during the workday may affect task performance and productivity (Brooks, 2015). Checking notifications and responding to messages may have great implications, as it is found that it can take up to 25 minutes to return to the same level of concentration as before the interruption (Brooks, 2015). Brooks (2015) found that greater amounts of personal social media usage were associated with lower levels of task performance in the workplace.

Mobile phone usage may also have implications for sleep quality (Li, et al., 2015). It is often the first thing we check in the morning and the last thing we use before we go to sleep (Lee, et al., 2014). Li et al. (2015) found that using the mobile phone before bedtime has negative implications for sleep quality by e.g. not going to sleep at the aspired time and the exposure to the blue light making people feel more awake. Other studies, such as Redmayne et al. (2013) even found that many of their respondents were woken in the night by their cell phones, frequently interrupting their sleep. For several they found this to greatly impact their alertness during the daytime, affecting for instance academic performance.

3.3 Excessive use and addiction

Some individuals may find that excessive use of the mobile phone may lead to addiction, which may again have negative effects on mental health and well-being (Reddy, et al., 2019). Mobile phone addiction is defined by Reddy et al. (2019) as

> Constant dependency on one’s mobile phone, to cater to psychological needs and extraneous necessities, causing a constant attachment to one's gadget, leading to loss of productivity and developing chronic side effects such as depression, loneliness, lack of social behavior, loss of sound sleep and various health issues (Reddy, et al., 2019, p. 82)

The primary effects of mobile phone addiction were found by Reddy et al (2019) to be headaches and anger issues. Furthermore, other effects were also found, mostly consistent with the implications mentioned above. These were lack of concentration, low academic performance, anxiety, eye strain, sleeplessness, tiredness, body ache and pains in arms, hands and fingers,

skipping meals and more prone to accidents because the attention is on the phone instead of the person's surroundings. Similar findings were discovered by Deloitte, in their study on Nordic mobile consumer behavior (Deloitte, 2019). In their study they found that over half of their respondents experience negative side effects from smartphone use. Some of the reported negative side effects were "not going to sleep at the intended time" (20 %), "increased levels of distractions when I am trying to complete a task" (21 %), and "not communicating as much face-to-face with family and friends, when spending time with them" (17 %) (Deloitte, 2019, p. 38). Some additionally reported experiencing physical pain, such as headaches or sore fingers (8 %) as well as waking up during the night to check their phones (5 %).

"Nomophobia" is a term for the fear of being without one's phone (King, et al., 2013). Hoffner et al. (2016) found through their research on mobile phone attachment that two thirds of their sample said that they experienced negative emotions as a response to the loss of their phone. The main reasons for these negative emotions were that they felt disconnected from the world, lonely, lost, or isolated. The feature that they missed the most was communication, as this was their main activity conducted on the mobile phone. Some also felt anxiety, as the mobile phone was a device one could hide behind in awkward social situations, and some felt bored, as the mobile phone was a large source of entertainment.

A more direct linkage between higher amounts of mobile phone use and SWB has also been found. Volkmer and Lermer (2019) found that higher use of the mobile phone is associated to lower well-being and life satisfaction, as well as lower mindfulness scores. On a larger scale, the World Happiness Report from 2019 found that the rising use of digital technologies, and especially the use of social media through digital devices such as the mobile phone, is linked to falling happiness (Helliwell, et al., 2019). Twenge et al. (2018) even found links between increased screen time on technological devices such as the mobile phone and increases in depressive symptoms and suicide-related outcomes in US adolescents. According to their research, adolescents who spent more time on their smartphones were more likely to report mental health issues than those who spent their time on non-screen activities.

3.4 Mobile phone usage in young adults

Most of the recent literature reviewed above study general effects without linkages to specified demographic groups, and can therefore be generally applied to most people in the population. However, it is also found that use and effects of the mobile phone is found to differ among different age groups, where young adults is the age group that uses the mobile phone the most (Andone, et al., 2016). Extant research differs greatly when measuring the average time this age group uses their phones, where for example, Roberts et al. (2014) found that college students, fitting into the category of young adults aged 18 to 29, spend about 8,8 hours per day using their smartphones, whereas David et al. (2018) found an average of 3 hours per day in college students. Either way, this is a generation of today's adults that have been early adopters of digital technologies (Junco & Cotton, 2012), and argued to be "obsessed" with technology and especially with smartphones (David, et al., 2018). As they are a group with high mobile phone usage, is it interesting to further investigate the effects of such usage within this group.

One feature of mobile phone use that has been particularly studied in relation to young adults is the use of social networking applications, such as Facebook, Instagram, Snapchat and so on. This age group typically uses these applications more than older adults (Bell, et al., 2013), and studies have usually found this activity to have negative impacts on the well-being of young adults (Hunt, et al., 2018; Kross, et al., 2013; Lin, et al., 2016). Lin et al. (2016) found that in young adults, aged 19 to 32, those who spent the most time on social medias throughout the day had significantly increased odds of depression, compared to those who spent the least amount of time on social medias. Throughout an experiment of young adults, Kross et al. (2013) found that increased use of Facebook over time resulted in a decreased life satisfaction. Hunt et al. (2018) suggests that limiting time spent on social medias will result in declines in loneliness and depression in young adults. The World Happiness Report from 2019 further found an association between increased social media usage and lower reported levels of happiness in young generations (Helliwell, et al., 2019). Further, it is found that the use of online social networking sites is negatively associated with people's SWB, applying to all ages (Brooks, 2015; Sabatini & Sarracino, 2017), even though people's reason for joining is to connect with others and enjoy other benefits. Nevertheless, a study done by Berryman et al. (2017) found no associations

between social media usage and the mental health of young adults, which might suggest that the negativity around social media usage may not be suitable.

The fact that mobile phones divide our attention, as described in section 2.3.2, has also been found to have implications for academic performance in college students. Lepp et al. (2014) found that total mobile phone use and texting were negatively associated with the GPA of American college students (the measurement of academic performance) and positively associated with feelings of anxiety as well. In turn, GPA was positively associated with life satisfaction and anxiety negatively associated. Several other studies also found this negative association between mobile phone usage and academic performance, as the use of the mobile phone in class and while studying causes disruptions and multitasking, resulting in a lack of concentration and attention to academic tasks (Lepp, et al., 2014).

Similarly, Conner (2013) found that millennials were the age group that spent the most time at work on non-work activities, and Internet on the smartphone was found to be the largest distraction. Further, the study found that millennials have a desperate need to constantly stay connected, so much that 53 % stated that they would rather lose their sense of smell than lose their connection to their digital device (Conner, 2013). Adams and Kisler (2013) additionally found that in college students, 47 % of the respondents would awake during the night in order to answer texts, as well as 40 % awaking in order to answer calls.

Direct linkages between mobile phone use and subjective well-being in young adults have also been found, as by David et al (2018). They found that overall smartphone use was negatively associated with the subjective well-being of young adults. However, their findings also suggested that different usage, measured through different categories of apps, have different impacts on well-being. Noteworthy findings show that the use of Instagram, maps, messages and photo and video apps were associated with higher levels of depression and anxiety, whereas book apps were associated with lower levels of depression and anxiety. This suggests that simply looking at mobile phone use in itself is not enough to get a clear picture of well-being effects, but that how the time is spent is essential to understanding the more complex ways in which the mobile phone affects well-being.

3.5 Statistics on mobile phone use in Norway

The Norwegian media barometer (2019) shows that in 2018, 99 % of Norwegians (aged 9 to 79) have their own mobile phone and 95 % has access to a smartphone. Table 1 shows the use of smartphones by age, where we see a decline in the use as the respondents get older. The decline is most drastic in the age group 75 to 79 years old, where only 47 % of the respondents use smartphones, a halving from those ranging from 16 to 54 years old.

	Bruker smarttelefon til privat bruk
	2018
Begge kjønn	
16-24 år	99
25-34 år	99
35-44 år	98
45-54 år	96
55-64 år	88
65-74 år	74
75-79 år	47

Table 1. Percentage of Norwegians (both sexes) who used smartphones for private use by age in 2018 (SSB, 2018).

A study by Kantar TNS for Statnett supports these statistics, and found large contrasts between the younger generations' and the older generations' mobile phone usage (NTB, 2018). In Norway, people under the age of 30 spend the most time on their mobile phones, and those over 60 years old spend the least amount of time. 20 % of those under the age of 30 spend between five and eight hours per day on their mobile phones, whereas for those over 60, 60 % spend less than one hour per day on their mobile phones. Further, a study by the Norwegian School of Economics found that Norwegians on average check their phones about 150 times throughout the day, which is equivalent to once every six minutes (Folkestad, 2015).

The main activities conducted through the phone are private calls, use of Internet and texting (see Figure 2). Time spent on private phone calls has remained unchanged since 2013, time spent texting has increased slightly (from 73 % in 2013 to 82 % in 2018), but time spent using the

Internet on the mobile phone has increased more substantially, from 54 % in 2013 to 87 % in 2018.

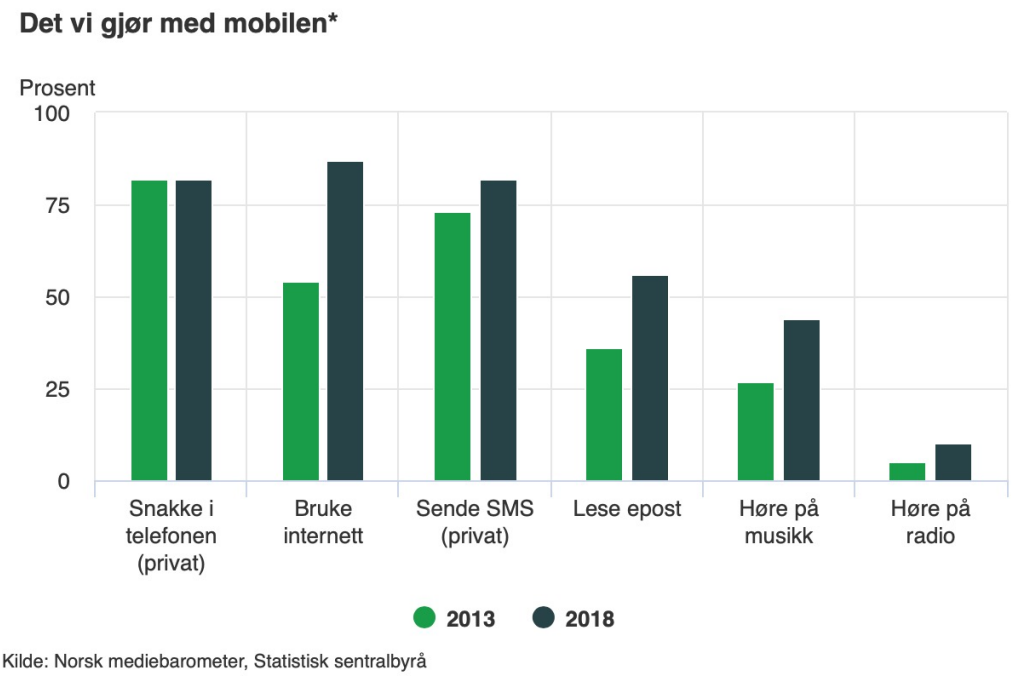

Figure 2. Activities (make private phone calls, use the Internet, send private text messages, read e-mail, listen to music and listen to radio) conducted on the mobile phone by Norwegians aged 9 to 79 in the years 2013 and 2018 (Norsk mediebarometer, 2019).

According to The Deloitte Global Mobile Consumer Survey of 2019, we are now increasingly using our phones to complete different tasks (Deloitte, 2019). It seems the mobile phone is gradually taking over as a preferred device for various activities. Their results show that the mobile phone was a preferred device for watching short videos, play games, check balances, check social networks, make voice calls using the Internet, read the news, take photos and record videos, and the preference for using the mobile phone for these activities had increased compared to results in 2017 and 2018. Additionally, the smartphone works as a complementary device for many other technologies, especially to Internet of Things (IoT) devices. To stay connected to various IoT devices, the smartphone usually works as a remote or display pad. The complementary markets for the smartphone is seemingly increasing, "reinforcing the importance of the smartphone" (Deloitte, 2019, p. 9).

3.5.1 Children and adolescents

Even though children and adolescents are not a part of the present study (due to lack of data on this demographic group in our survey dataset), it is interesting to get a picture of their mobile phone habits, as their use can affect how they grow up to be happy adults. A study by Medietilsynet from 2018 showed that in 2017 89 % of children between the ages 9 to 18 used their phone and 49 % spent two hours or more on their phones the day before. The time spent on the mobile phone had increased since 2016. Simultaneously, the respondents were critical to their own usage and 45 % of the respondents thought they spent too much time of their mobile phones. This percentage had also increased over the past few years. (Medietilsynet, 2018)

A fresh media study in Norway that mapped adolescent's social media use and habits, showed that in 2019 97 % of children between the ages of 9 to 18 have their own mobile phone, the results not varying much in the different age groups. 90 % of the respondents were active users of social media, using it to communicate with friends, and *liking* and sharing videos and photos. A disturbing aspect of the study showed that 43 % of children between the ages of 13 to 18 had seen scary or violent content online, 34 % had seen content that shows ways of becoming extremely thin and 30 % had seen content of ways of hurting oneself physically. Being exposed to this kind of negative and harmful content can be assumed to affect the well-being of these adolescents. (Medietilsynet, 2020)

4.0 Data and methods

This chapter presents the data and methodological approach adopted in the thesis. This thesis has a quantitative design, based on statistical analyzes of a new survey on ICT use and the subjective well-being of Norwegian adults. Firstly, I present the research design, thereafter the survey data and its variables, and then the methods used to analyze the data material. The results from the analyses are presented in chapter 5.

4.1 Research design

The overall motivation underlying this thesis is to explore the notion of subjective well-being and happiness as some of the social consequences of ICT use. More specifically, this thesis will analyze the relationship between the mobile phone use and the subjective well-being in a sample of 2383 Norwegians. Through regression analyses, I investigate the relationship between the intensity of use, as well as different activities performed on the mobile phone, and both the hedonic and evaluative well-being of the sample as a whole, as well as the specific age group of young adults (aged 18 to 29 years old). The purpose of the analyses is to shed light on the overarching research question: “Does mobile phone use affect subjective well-being?”

More specifically, I try to answer the following sub-questions:

RQ1: Is the intensity of use of mobile phones associated with subjective well-being?
RQ2: Which mobile phone activities are most associated with subjective well-being?
RQ3: Does the relationship between the mobile phone use and subjective well-being of young adults differ from other demographic groups?

4.2 Data collection method

The empirical analysis is based on a new survey dataset coordinated by the HAPPY ICT research project at the TIK Centre. This survey was carried out in 2017 by the company Opinion.no, and sent out to a large representative sample of Norwegian adults. The main purpose of the survey was to collect new data to measure individuals' subjective well-being and different aspects of their ICT use. The target respondents were Norwegian citizens aged between 18 and 99. In total 2383 people completed the survey. Because the respondents of the survey were Norwegian citizens, the survey was formulated in Norwegian. The data was anonymized, and no personally identifiable information is included in the dataset. The survey was notified to the Norwegian Centre for Research Data (NSD, 2019) prior to the data collection in 2017.

The questionnaire was developed by the project group at the TIK Centre. It has a cross-sectional design, where the questions are focused on a given point in time (at the point of time the survey was answered) (Ringdal, 2012). The same, standardized survey was sent out to all the respondents in order to make statistical measurements and generalize the data. The survey was distributed for the most part online, in addition to a few interviews conducted by phone calls. Still, the interviews followed the standardized form, not allowing answers beyond the standardized options. Given that the survey was primarily distributed online, the data collection method excluded people with no access to a computer/digital device and Internet. The sample therefore does not include this extremity of the scale, those who for different reasons have very low or no use of digital technologies.

Large sample sizes are important for being able to generalize the findings, as it can say something about the general trend of the society. Certain situations may impact individuals in certain ways, and be completely unrelated to what others may experience. Large samples thereby minimize the chances for random outcomes. (Ringdal, 2012)

There were 2383 respondents in the survey, ranging from ages 18 to 89. There was a 50,9 % female and 49,1 % male representation. The respondents live in various regions in Norway.

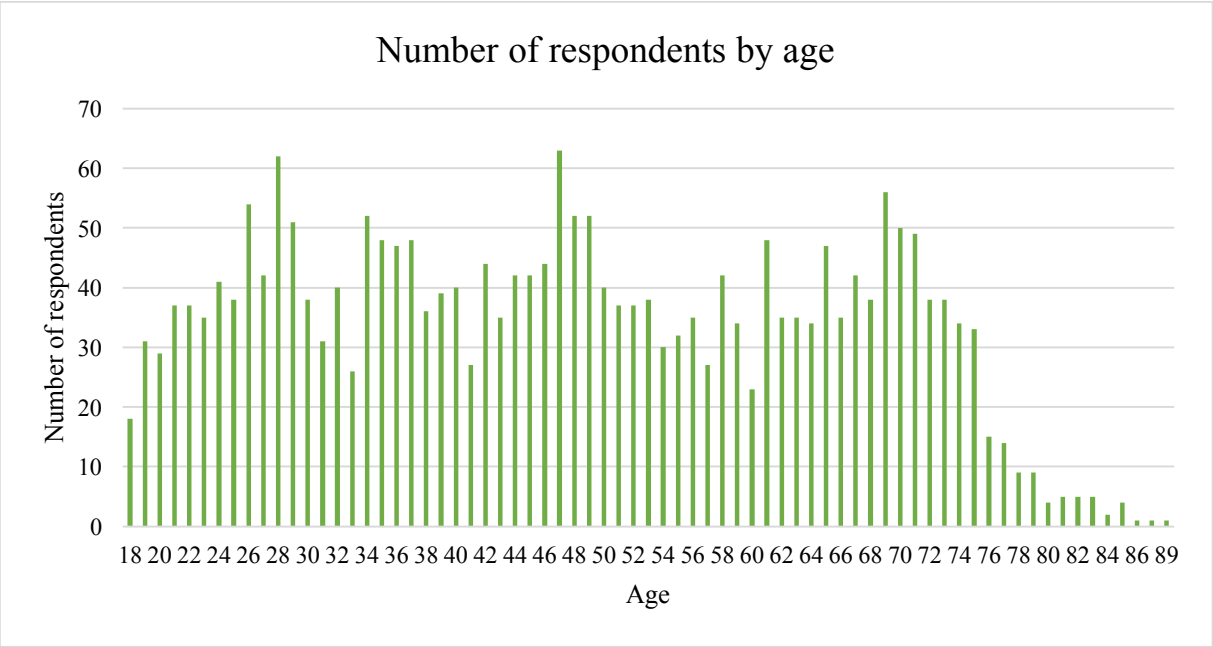

Figure 3. Number of respondents by age

As we can see from Figure 3, the number of respondents above the age of 80 has a relatively low representation. A possible reason for this is the fact that the survey as distributed online, and as explained above this may cause the exclusion of certain groups with lower digital skills and presence.

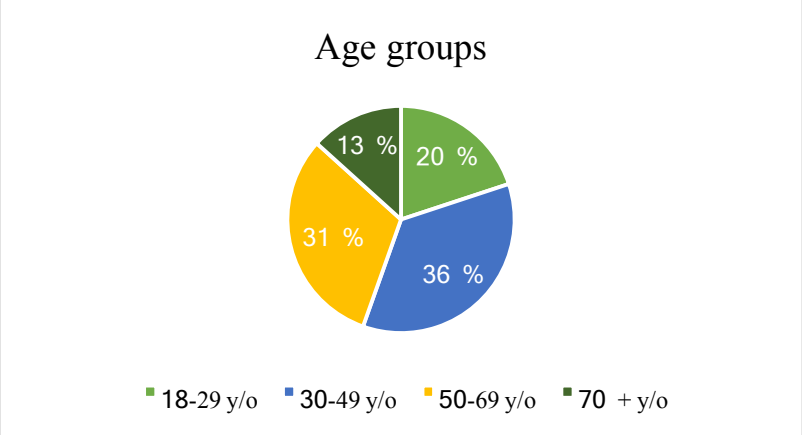

Figure 4. Respondents divided by age groups

In order to examine the mobile phone use habits of young adults, I divided the respondents into four age groups, young adults (18 – 29 year olds), middle aged 1 (30 – 49 years old), middle aged

2 (50 – 69 years old) and elderly (over 70 years old). Figure 4 shows the distribution of the age groups. The young adults age group has a little lower representation than the other groups, and make up for 20 % of the sample (N = 475).

January 1st 2020 there were 5 367 580 people living in Norway (SSB, 2020b). The male-female distribution in the population is close to 50/50, 50,4 % being male and 49,6 % being female. Out of these 77 % are considered adults. Figure 5 shows the number of adult Norwegian citizens by age.

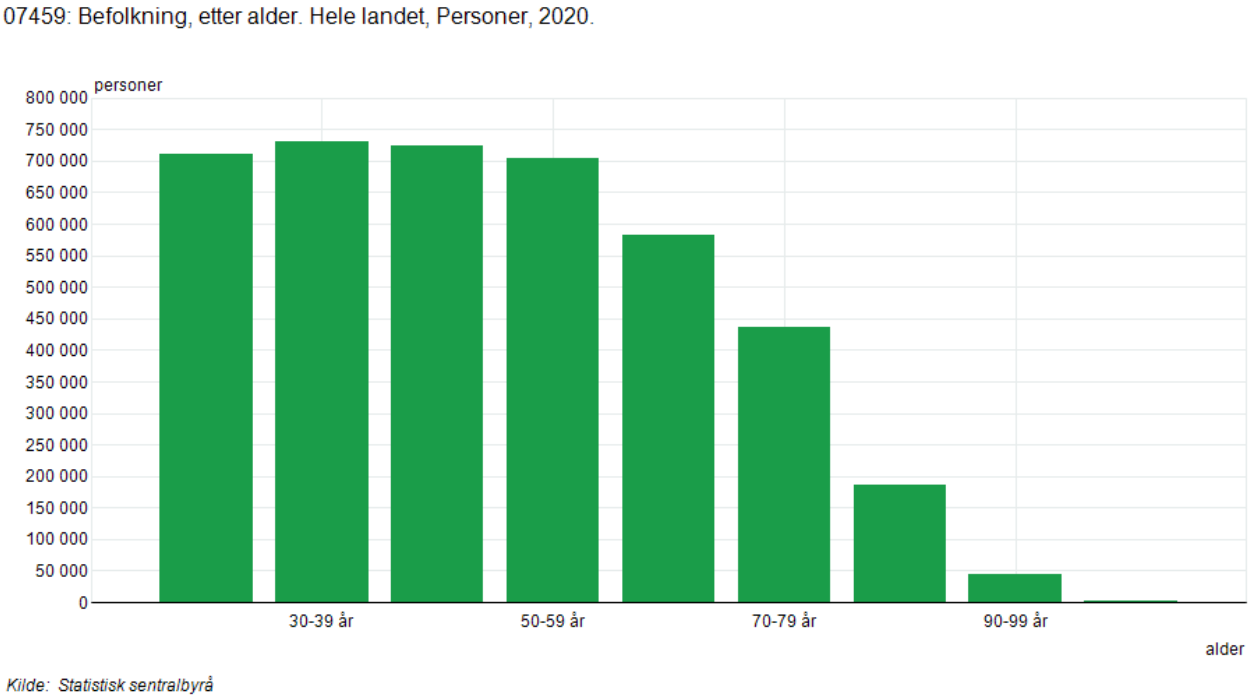

Figure 5. The adult Norwegian population divided by age, per January 1st 2020 (SSB, 2020b)

Divided into the same age groups as the respondents in this sample, the adult Norwegian population is distributed as followed:

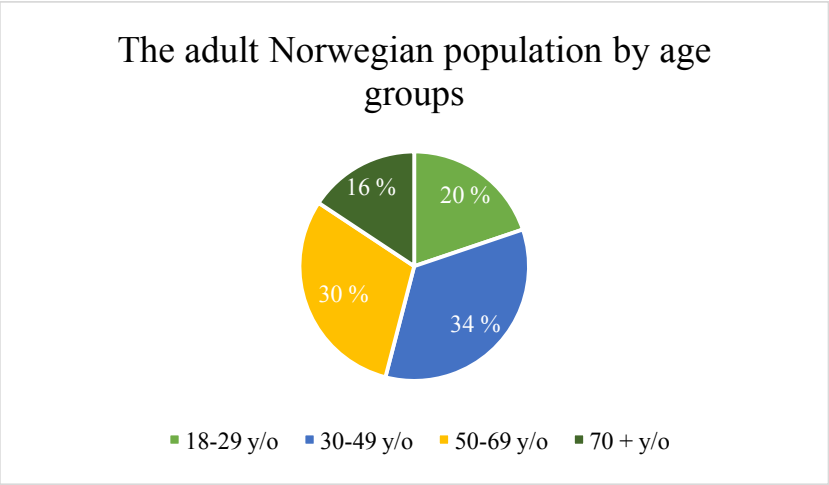

Figure 6. Norwegian adults by age groups, based on statistics from SSB (2020b)

As we can see from figure 6, the demographic structure of the Norwegian population is similar to the distribution of the respondents when it comes to age. The young adults age group (18 – 29 years old) is the exact same (20 %) in the Norwegian population and in this survey. The distribution of the other age groups is close to the same as well.

4.3 The indicators

Different aspects of ICT use were included in the survey, as well as measurements of subjective well-being. However, to delineate this thesis I chose to focus my analysis on the intensity of mobile phone use of the ICT aspects, as well as the activities performed by using the mobile phone. The survey as a whole is attached in the appendix.

4.3.1 Dependent variable

The dependent variable in the study is *subjective well-being*. However, since the well-being literature distinguishes between two measures of SWB, this analysis will use two separate dependent variables measuring SWB; hedonic well-being and evaluative well-being. These two variables were measured through the following questions (here translated to English, the original version in Norwegian is attached in appendix 1).

Question measuring hedonic well-being:
"Overall, how happy are you?" followed by response options ranging from 0-10 where 0 is "Very unhappy" and 10 is "Very happy"

Question measuring evaluative well-being:
"Below are five statements about overall life satisfaction. How well does these fit for you and your life?" followed by response options ranging from 1 to 7 where 1 is "Fits badly" and 7 is "Fits perfectly".

a. *In most ways, my life is close to my ideal.*
b. *My living conditions are excellent.*
c. *I am satisfied with my life*
d. *So far, I have received the most important things I want in life*
e. *If I could live my life over, I would change almost nothing*

4.3.2 Explanatory variables

The main independent variables are related to mobile phone use. To measure the intensity of mobile phone use, the following questions were asked, with scaled answer options:

"Overall, how much time do you spend on your mobile phone on a normal weekday?" followed by the response options "No time", "Less than 1 hour", "1 – 2 hours", "2 – 3 hours", "3 – 4 hours", "4 – 5 hours", "5 – 6 hours", and "More than 6 hours".

"How often do you use your mobile phone on a normal weekday? (Counting all times you execute an activity with your phone)" followed by the response options "Not ever", "Less than 1 time per hour", "1 – 2 times per hour", "2 – 4 times per hour", 4 – 6 times per hour", "6 – 8 times per hour" and "More than 8 times per hour".

To measure which features of the mobile phone the respondents spend the most time on, the following questions are asked, with scaled answer options:

"How much of the time you spend on your mobile phone do you spend on the following activities?" followed by the response options "None of the time", "A little of the time", "Much of the time" and "Most of the time".

a. *Private phone calls*
b. *Texting*
c. *Listening to radio/podcast*
d. *Listening to music (not radio, but from files and streaming)*
e. *Watching TV*
f. *Surfing the Internet*
g. *Playing games*
h. *Network and communication apps (for example Facebook, Twitter, Instagram, Snapchat, WhatsApp, Google Hangouts, Skype or the like)*

4.3.3 Control variables

According to OECD's guidelines for measuring subjective well-being (2013), and in line with the literature reviewed in chapter 2.2 above, the following co-variates should be considered when measuring subjective well-being: personal characteristics (such as age, gender, marital status and geographic information), material and economic conditions (such as income, employment status and education), and psychological characteristics that measures the participants' aspirations about the future, a frame of reference when evaluating current lives. Based on this, I include age, gender, employment status, education level, income, geographic location in Norway and self-assessment of overall health as control variables in the analysis.

The survey collected information about the employment status of the respondents. The response options were not simply employed or unemployed, but specified why the respondents were possibly not employed. Reasons for not being employed included military service, retirement, long-term sick, handicapped, student or simply not employed at the moment. These categories were gathered into a dummy variable "not employed". Because this variable then included so many different life circumstances, the "employed" variable is used as a control variable in the analyses.

The measurement of education level was presented to the respondents by asking them to enter their highest level of completed education. The response options given to the respondents range from basic education only to 5+ years in higher education. A dummy variable is here created to separate those with higher education (university/college degree) and basic education (primary-, middle- and high school level only).

The income level of the respondents is measured both in terms of personal income and household income. Additionally, satisfaction with household income is measured. Both the measurement of personal and household income has some "missing values", as a response option was "Don't want to answer". Therefore, the variable of income satisfaction is used as the income variable. This variable was measured by the question "In general, how satisfied are you with the income

level of your household?" followed by the response options ranging from "Completely unsatisfied" to "Completely satisfied" on a 0 – 4–point scale.

The geographic location is measured by the region in Norway in which the respondent lives. The different categories here are "Nord-Norge", "Midt-Norge", "Vestlandet", "Østlandet", "Sørlandet inkludert Telemark", and "Oslo".

To measure the respondents' health, a self-assessment measurement is used. *"All in all, how would you describe your own health?"* followed by response options ranging from "Very bad" to "Very good" on a 1 – 5–point scale.

4.4 Methods of analysis

The statistical analyses for this thesis were performed in IBM SPSS Statistics version 26. This part will present the different statistical analyses used. In order to explore the relationship between the dependent variables and the independent variables, I test the association between the variables through regression analyses, which are the central analyses in this thesis.

4.4.1 Descriptive statistics

Descriptive analyses will be presented with the variables in order to present a picture of the main trends in the dataset. The central tendency of the variable is measured using mean, with the standard deviation (SD) reported along with it. The standard deviation measures the concentration of the values around the mean, and when the SD is low, the values are close to the mean (Ringdal, 2012).

4.4.2 Factor analysis

As presented above, the question measuring evaluative well-being is a set of statements the respondents were to evaluate. These different statements are treated as separate variables in the data set. In order to create a composite variable of evaluative well-being, a factor analysis must first be completed, based on these statement variables. A factor analysis is used to measure if the correlation between the variables is a result of the influence of an underlying latent dimension (Ringdal, 2012). The variables' factor loadings determine how well the variables measure the underlying dimension, where the values vary between -1 and 1. It is common to use a value limit of 0,5, which means that the factor loading should be higher than 0,5 or lower than -0,5 in order to create a factor (Ringdal, 2012).

4.4.3 Multivariate regression analysis

A regression analysis describes the correlation between one or more independent variables and one dependent variable, and gives a thorough examination of the drivers of subjective well-being. The analysis assumes a linear relationship between the dependent and independent variable.

Multiple independent variables are to be considered in this analysis, thereby the multivariate regression analysis, that assesses the impact of several independent variables simultaneously. Not only does the analysis examine the association between the dependent and independent variables, but also the strength of the association. The advantage with this analysis is that we can control for other factors that may affect our variables, hence testing the correlation between the variables in more detail. (Ringdal, 2012)

The regression equation with three independent variables (X-variables) can be formulated as such:

$$Y_i = b_0 + b_1X_{1i} + b_2X_{2i} + b_3X_{3i} + e_i$$

where b_0 is the regression constant and b_1 is the regression coefficient. The analysis shows us the multiple correlation coefficient, R^2, which is the total variety in Y explained by X, and varies from 0 to 1. Adjusted R^2 adjusts this for the number of variables that are included in the model, and shows us the variance in Y explained by all the X's, adjusted by the number of X's. If X does not explain any of the variance in Y, $R^2 = 0$, and the regression model is of limited value. The significance level (p-value) of each estimated coefficient tells us the likelihood of the results having occurred by chance. The significance level is best at p=,000, but acceptable at p<,050. The unstandardized regression coefficient B shows the change in Y when X increases with one, controlled for the third variables. It measures how strongly the independent variable affects the dependent variable, and hence how the independent variables contribute to the explained variance or not. Because the independent variables to be compared have the same unit of measure, the unstandardized regression coefficient is used to define the strength of the relationship. (Ringdal, 2012)

In the regression analysis, there is a possibility that the independent variables correlate with each other, which may obscure their relationship with the dependent variable (OECD, 2013). This is called multicollinearity (Eikemo & Clausen, 2012). A solution to this could be to omit some of these variables. However, this solution is not suitable here, because I am interested in exploring the effects of all the explanatory variables. Therefore, separate regressions will be performed with each explanatory variable, whilst keeping all the control variables in each regression. In this way, the effects of each of the explanatory variables can be assessed. Further, the regressions are

performed for different sample groups. First, regressions are performed including the whole sample, followed by the regressions for the young adults age group. In doing this, we can compare the results for adults as a whole, and the results limited to the sub-group younger adults.

Even though the regression analysis will reveal the possible associations and correlations between the variables, it does not necessarily capture the direction of causality of these associations. This may be a possible limitation of the study. The cross-sectional regression analysis that I employ in this thesis will uncover relationships and correlations between explanatory and dependent variables, but will not be able to prove the existence of causal relationships among these variables. As noted further below, it is important to keep this limitation in mind when assessing the empirical results.

5.0 Empirical results

This chapter presents the results of the statistical analyses. I first present the baseline results for the whole sample, followed by the results for the sub-sample of the young adults age group. I begin by presenting some descriptive statistics of the dependent and independent variables, in order to provide an overview of the main trends of the data set. Further, I present the results from the regression analyses, revealing the associations between the dependent and independent variables.

5.1 Descriptive statistics of the variables

First, I present some descriptive statistics based on the sample as a whole. Second, I present the statistics for the sub-sample that is defined as young adults, those aged 18 – 29 years old.

5.1.1 Whole sample

The baseline results are the results from the analyses performed for the sample as a whole (N=2383).

Dependent variables

	N	Mean	SD
Overall, how happy are you?	2383	7,03	1,86

Table 2. Descriptive statistics for variable "Overall, how happy are you?"

This variable measures hedonic well-being of the respondents. On average, all the respondents taken together view themselves to be quite happy, with a mean of 7 (SD=1,86) on a 0-10-point scale.

	N	Mean	SD
In most ways, my life is close to my ideal.	2383	4,63	1,35
My living conditions are excellent	2383	4,98	1,32
I am satisfied with my life	2383	5,13	1,32
So far, I have received the most important things I want in life	2383	5,10	1,42
If I could live my life over, I would change almost nothing	2383	4,31	1,66

Table 3. Descriptive statistics for statements about overall life satisfaction

On a 1-7-point scale, the mean of the statements about overall life satisfaction is around 5 (4,31 – 5,13) (SD=1,32 – 1,66), which is also on the higher end of the scale, indicating that the respondents are overall quite satisfied with their lives. This question was gathered to a composite measure of life satisfaction, or evaluative well-being, through a factor analysis. All the variable's factor loadings valued >0,5 (see Table 4), meaning they are suited to form a composite factor, measuring the latent dimension of evaluative well-being.

Factor Matrix

	Factor 1
In most ways, my life is close to my ideal.	.895
My living conditions are excellent.	.862
I am satisfied with my life	.919
So far, I have received the most important things I want in life	.783
If I could live my life over, I would change almost nothing	.665

Table 4. Factor matrix of latent dimension evaluative well-being

As Norway is a country that has been ranked as one of the happiest countries in the world for several years in a row by the World Happiness Report (Helliwell, et al., 2019), the patterns found here in this new survey are in line with expectations. Both in terms of hedonic and evaluative well-being, the respondents have ranked themselves on the higher end of the scale, indicating a relatively high subjective well-being, both hedonic and evaluative well-being taken together.

Explanatory variables

	N	Mean	SD
Overall, how much time do you spend on your mobile phone on a normal weekday?	2383	3,51	10,126

Table 5. Descriptive statistics for variable "Overall, how much time do you spend on your mobile phone on a normal weekday?"

The descriptive statistics show that the mean of the variable for all of the respondents is 3,51 (SD=10,126), which is equivalent to between 1-3 hours a day (between the answer options 1-2 hours and 2-3 hours). 10 % of the respondents reported using their phones for more than 4 hours per day.

	N	Mean	SD
How often do you use your mobile phone on a normal weekday?	2383	3,92	11,747

Table 6. Descriptive statistics for variable "How often do you use your mobile phone on a normal weekday?"

The average times per hour all of the respondents use their mobile phones is around 2-4 times per hour (mean ≈ 4, SD = 11,75). This is equivalent to once or twice every half hour. 18 % of the respondents reported using their phones 4 times or more per hour. Compared to the study by the Norwegian School of Economics (Folkestad, 2015), who found that Norwegians check their phones every six minutes, this is quite low. However, as previous studies have found, mobile phone usage differs greatly based on age, and therefore a combined measure of this aspect for the whole sample of respondents may not be representative. Young respondents may contribute to increasing the average, and the older respondents may contribute to lowering the average (as it will be shown in the next section).

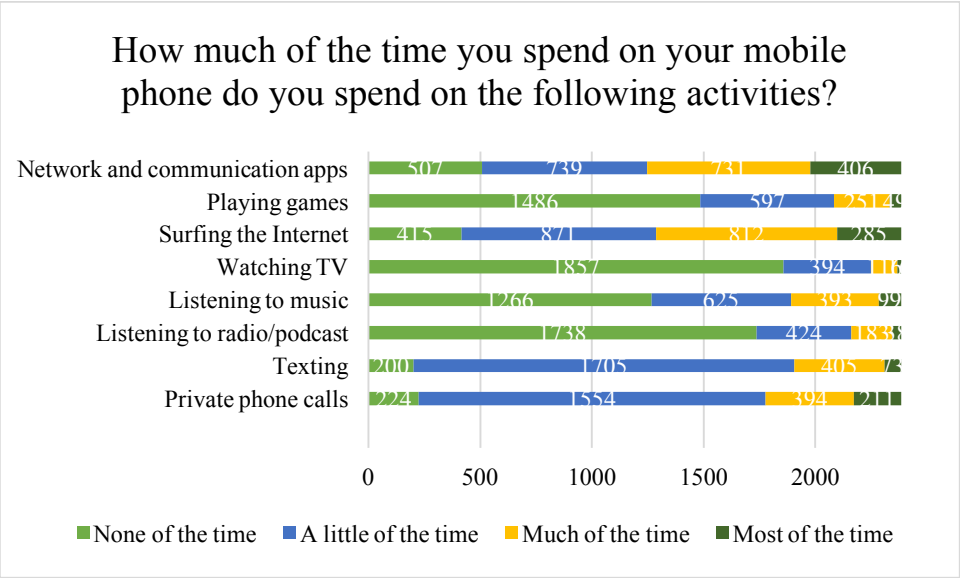

Figure 7. Frequency diagram of variable "How much of the time you spend on your mobile phone do you spend on the following activities?"

From the descriptive statistics on the activities conducted on the mobile phone (Figure 7), we can see that the most used features of the mobile phone are network and communication apps, surfing the Internet, texting and making private phone calls. Of all the respondents, about 48 % uses network and communication apps much or most of the time of the time spent on their mobile phones. 46 % uses the mobile phone to surf the Internet much or most of the time spent on the device. 20 % uses the mobile phone for texting, and 25 % uses the mobile phone to make private phone calls much or most of the time of the time spent on their mobile phones.

These descriptive analyses complement the findings from the Norwegian media barometer (2019), which found private phone calls, texting and using the Internet to be the most used mobile phone features by Norwegians. This indicates that the more traditional uses of the mobile phone (phone calls and texting) are still widely used and important aspects of mobile phone use, but that social networking and Internet applications are starting to become more important features of mobile phones today.

Control variables

Control variable	N	Percent	Min	Max	Mean
Gender					
Male	2383	49,1 %	–	–	–
Female	2383	50,9 %	–	–	–
Employment status					
Employed	2383	55,9 %	–	–	–
Not employed	2383	44,1 %	–	–	–
Education level					
Basic education	2383	33,5 %	–	–	–
Higher education	2383	66,5 %	–	–	–
Income satisfaction	2383	–	0	4	2,3 (SD=0,9)
Geographic location					
Nord-Norge	2383	9,4 %	–	–	–
Midt-Norge	2383	13,8 %	–	–	–
Vestlandet	2383	20,6 %	–	–	–
Østlandet	2383	34,5 %	–	–	–
Sørlandet inkludert Telemark	2383	8,7 %	–	–	–
Oslo	2383	13 %	–	–	–
Health	2383	–	1	5	3,64 (SD=0,88)

Table 7. Descriptive statistics of the control variables

Table 7 presents some descriptive statistics of the control variables to be used in the regression analyses. As previously stated, the gender distribution is close to 50/50, which is representative to the Norwegian population. Table 7 further shows that when it comes to employment status, the not employed category is very high, at 44 %. As of February 2020, Norway had an unemployment rate at 3,4 % (SSB, 2020a). The reason behind the high percentage in this study, is that the not employed category includes many different life circumstances, as explained in section 4.4.3. Students, military service, retirement, and long-term sick or handicapped are included in this category, making the "unemployed" rate unrealistically high.

Further, the education level among the respondents reveal that 66 % have some form of higher education. This is quite high compared to the Norwegian population, where 34,1 % have some form of higher education from university or college (SSB, 2019). The income satisfaction of the respondents has a mean of 2,3 (SD=0,9), which on a 0-4-point scale indicates that the respondents are on average neither satisfied nor unsatisfied with their income. The majority of the respondents live in Østlandet and Vestlandet, which are quite large regions in Norway, and it therefore makes sense that these regions have the largest representations. Of the overall assessment of own health, the respondents view themselves to be somewhat healthy, with an average of 3,64 (SD=0,88) on a 1-5-point scale.

5.1.2 Young adults

This section presents some descriptive analyses for the sub-group of young adults, respondents aged 18 to 29 years old (N = 475), which will be the main focus of the regression analysis presented in the next sections.

Dependent variables

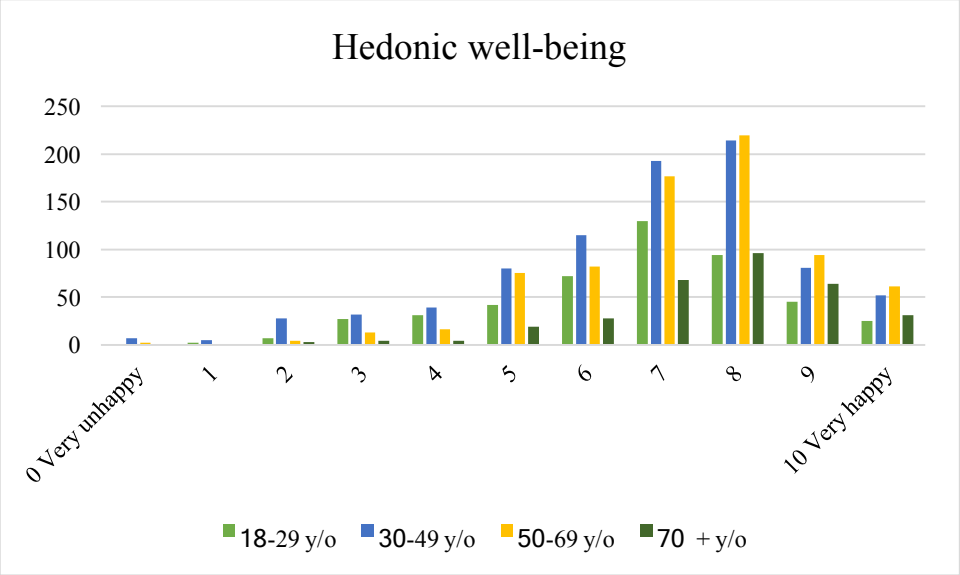

Figure 8. Hedonic well-being by age groups

Figure 8 shows an overview of the hedonic well-being of the different age groups. On average, the hedonic well-being for the different age groups were for young adults 6,7 (SD=1,8), for middle aged 1 6,7 (SD=2), for middle aged 2 7,2 (1,6) and for the elderly 7,6 (SD=1,5). On average we see that the oldest two age groups have a slightly higher evaluation of their hedonic well-being than the two younger age groups.

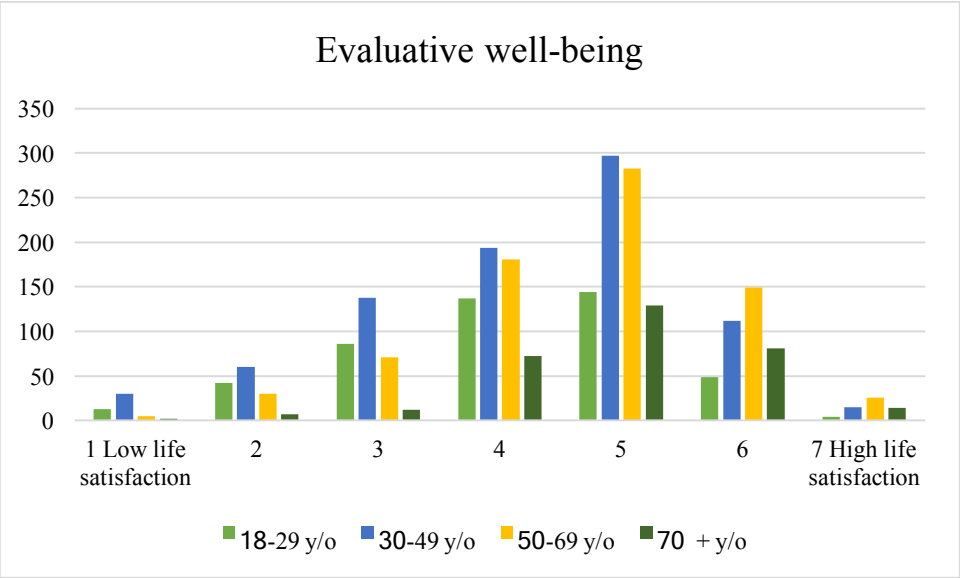

Figure 9. Evaluative well-being by age groups

Figure 9 shows the composite variable of evaluative well-being of the respondents by age groups. The mean of the evaluative well-being of the different age groups are for young adults 4,5 (SD=1,2), for middle aged 1 4,6 (SD=1,3), for middle aged 2 5 (SD=1) and for the elderly 5,3 (SD=0,9). Similar to the hedonic well-being, the two older age groups report a somewhat higher life satisfaction than the two younger groups. For a broader analysis and discussion of the reasons why younger adults generally report lower subjective well-being than older individuals, see for example the recent PhD thesis of Schwabe (2020).

Explanatory variables

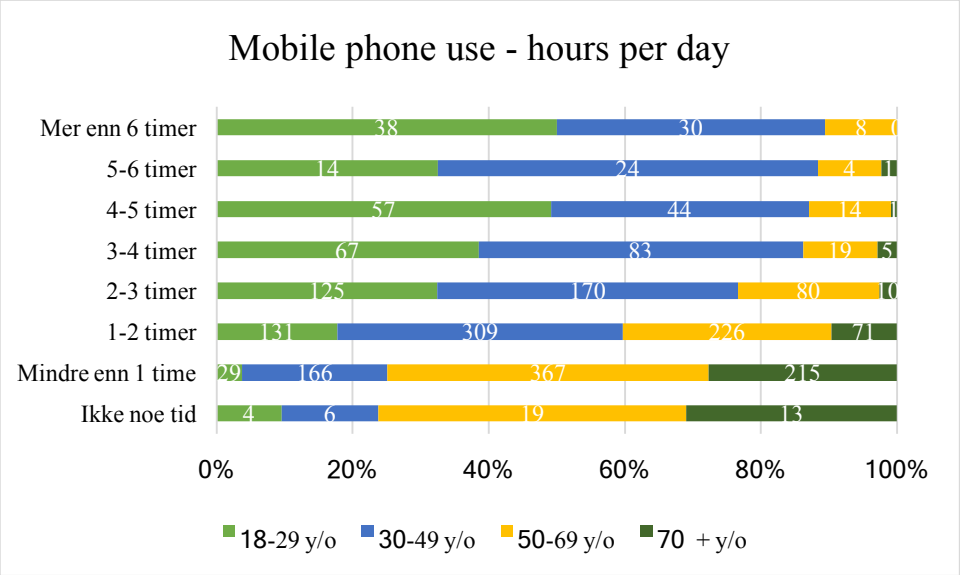

Figure 10. Mobile phone use by hour for the different age groups

Figure 10 shows how many hours per day each of the age groups use the mobile phone. The diagram shows that the amount of mobile phone use per day declines with age: the young adults use the mobile phone the most, and the elderly use the mobile phone the least. The average young adult spends between 3 – 4 hours per day (SD=12) on their mobile phones. About 23 % (about 1 out of 5) of young adults use their mobile phones for more than 4 hours per day. This is twice as many as for the sample as a whole. At the same time, we can see that the majority of all age groups have answered on the lower end of the scale, reporting relatively low mobile phone use.

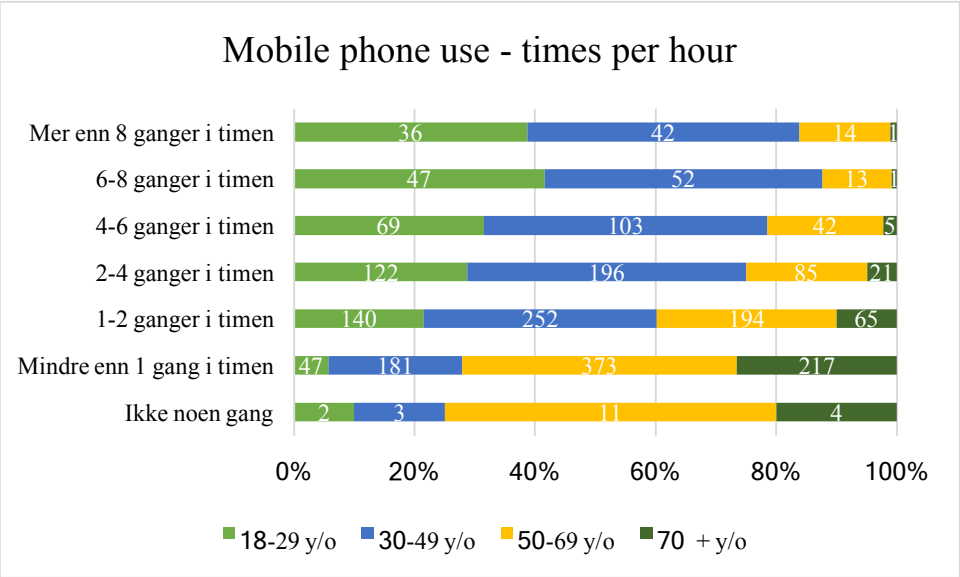

Figure 11. Mobile phone use by times per hour for the different age groups

Similar to the measurement of hours per day, the times per hour spent on the mobile phone declines with age, and we can see from Figure 11, the two younger age groups use their mobile phones most times per hour. The average young adult uses their mobile phone about 4 – 6 times per hour (SD=13,4), which is about once every 10 to 15 minutes. About 32 % (1 out of 3) of young adults use their mobile phones 4 times or more per hour, more than once every 15 minutes. However, we can see that the respondents have typically answered on the lower end of the scale, indicating that the majority of the respondents use their phones relatively little per hour.

The descriptive statistics indicate that young adults have a higher intensity of mobile phone use compared to the other age groups. This is in line with the findings of Kantar TNS who found that in Norwegians, those under the age of 30 spend the most time on their mobile phones. These patterns differ slightly from some of the studies presented in chapter 3. Compared to Roberts et al. (2014), where the average amount of time young adults spend on their mobile phones were 8,8 hours per day, the results found here are not very high. However, other studies such as David et al. (2018), who found an average of 3 hours per day for young adults, and Kantar TNS who found that in Norway, 20 % of young adults spend 5 to 8 hours per day on their mobile phones, are more similar to the findings here.

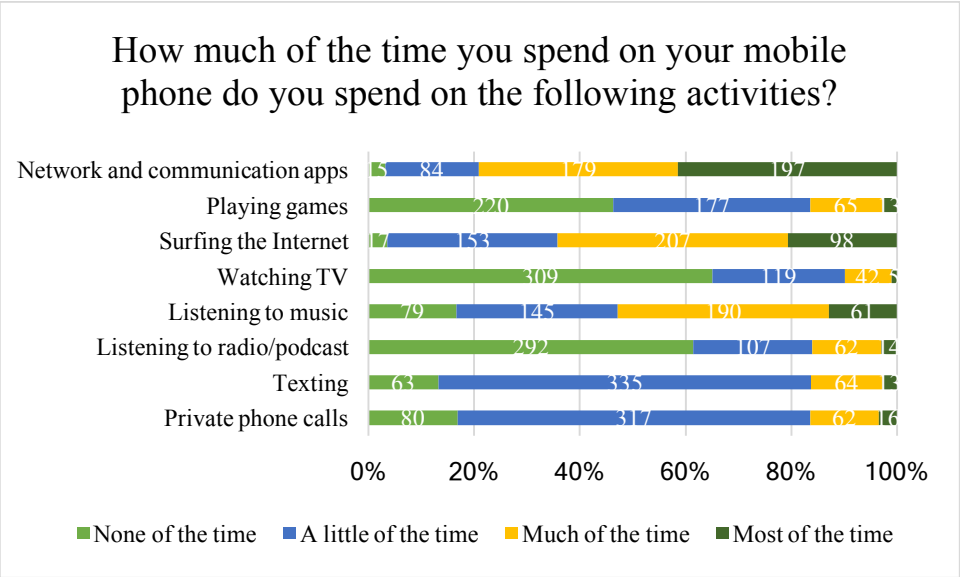

Figure 12. Frequency diagram of variable "How much of the time you spend on your mobile phone do you spend on the following activities?" for young adults

Out of all the different features of the mobile phone, network and communication apps is the activity young adults spend most time on, where 79,2 % spend much or most of the time of their mobile phone use on this. Only 3,2 % spend no time on network and communication apps. The second most used feature by young adults is surfing the Internet, where 64,2 % of young adults spend much or most of time of their mobile phone use on this. The third most used feature is listening to music, being the top activity of 52,8 % of young adults. The communication features are of special interest in this thesis, however, only 16,2 % of young adults state that they use much or most of their time on their mobile phones texting. The majority used their phones for texting and private phone calls only a little of the time. 13 % state that they don't use texting at all, and 17 % never uses their mobile phones to make private phone calls.

What characterizes the mobile phone use of young adults then, is that they spend the most time on network and communication and Internet applications. This clearly supports the findings of previous research, such as by Bell et al. (2013), identifying young adults as heavy social media users. This is also the feature that has received the most attention when investigating the effects of mobile phone usage in young adults (Bell, et al., 2013). The communication features, private phone calls and texting, are not activities young adults spent the most time on, revealing that

young adults uses their mobile phones mostly for non-traditional activities. They do still use the traditional features, but they are not the main features of their interest.

Control variables

Control variable	N	Percent	Min	Max	Mean
Gender					
Male	2383	49,5 %	–	–	–
Female	2383	50,5 %	–	–	–
Employment status					
Employed	2383	45,3 %	–	–	–
Not employed	2383	54,7 %	–	–	–
Education level					
Basic education	2383	56 %	–	–	–
Higher education	2383	44 %	–	–	–
Income satisfaction	2383	–	0	4	2 (SD=0,9)
Geographic location					
Nord-Norge	2383	9,7 %	–	–	–
Midt-Norge	2383	15,4 %	–	–	–
Vestlandet	2383	21,3 %	–	–	–
Østlandet	2383	29,9 %	–	–	–
Sørlandet inkludert Telemark	2383	8 %	–	–	–
Oslo	2383	15,8 %	–	–	–
Health	2383	–	1	5	3,68 (SD=0,88)

Table 8. Descriptive statistics for control variables of sub-group young adults

Table 8 gives an overview of the background information about the young adults in the sample. As for the whole sample, the gender distribution is about 50/50, in tune with the distribution of the Norwegian population. In young adults however, the rate of people that is not employed (i.e. outside of the job market) is even higher than what is was for the whole sample. An explanation for this is that within the age group of young adults, many are students, and they have not started their working careers yet. A similar explanation may be relevant to explain the lower percentage

of people with higher education in the young adults age group. Because this age group also includes those aged down to 18 years old, many respondents of this groups may not have started their course of education yet.

The income satisfaction, distribution of geographic locations and the self-assessment of overall health of the young adults age group are approximately the same as results from the whole sample. This age group therefore does not stand out in any particular way in their demographic information except for a little higher unemployed rate and a little lower percentage of people with higher education.

5.2 Multivariate regression analysis

A simple correlation analysis shows that the various independent variables are correlated to each other, and particularly the variables measuring the intensity of mobile phone use, and those measuring the different mobile phone use activities. Therefore, in the multivariate regression analysis, I performed separate regressions for each of the independent variables, in order to make sure that the results for the main variables of interest are not affected by multicollinearity issues.

I have here gathered the results from the separate regression analyses into combined tables in order to give an easier overview of the results. The separate regressions were performed including the dependent variable (either hedonic or evaluative well-being) and the independent variables: one measurement of intensity of use, one measurement of a mobile phone use activity and control variables. E.g. hedonic well-being as dependent variable + mobile phone use in hours (MPU_hours) + private phone calls + control variables.

5.2.1 Whole sample

The results presented below are from regression analyses performed for the sample as a whole (N=2383). In the first two tables presented below, table 9 and 10, hedonic well-being is the dependent variable. The two following tables, 11 and 12, have evaluative well-being as the dependent variable.

The tables present a simplified version of the outputs from SPSS, with the reported values of the unstandardized regression coefficient B, along with the significance level (p-value). The significant p-values are reported as "*" or "**", where:
* = $p < 0.050$ i.e. significant
** = $p < 0.010$ i.e. significant

Table 9. Results from regressions with hedonic well-being as dependent variable and MPU_hours as the measurement of intensity of use for the whole sample

Independent variables	**Unstandardized correlation B**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
MPU_hours	.002	.011	.002	.001	.002	.001	.002	.001	.002	.001
(MPU_hours)^2		.000								
Private phone calls			.170**							
Texting				.172**						
Listening to radio /podcast					-.026					
Listening to music						.029				
Watching TV							-.019			
Surfing the Internet								.010		
Playing games									-.064	
Network and communication apps										.014
Age	.015**	.016**	.013**	.015**	.015**	.016**	.015**	.015**	.014**	.016**
Male	-.047	-.045	-.061	-.024	-.044	-.048	-.045	-.047	-.052	-.044
Employed	-.010	-.010	.014	.002	-.009	-.006	-.011	-.012	-.007	-.010
Basic education	.033	.032	.026	.039	.031	.032	.033	.034	.037	.033
Income satisfaction	.434**	.434**	.425**	.430**	.433**	.433**	.434**	.434**	.435**	.434**
Nord-Norge	.229	.231	.202	.228	.227	.232	.200	.230	.229	.229
Midt-Norge	.121	.122	.109	.129	.121	.119	.093	.121	.123	.120
Vestlandet	.030	.031	-.019	.032	.030	.031	-.029	.030	.032	.031
Sørlandet	.027	.029	-.005	.039	.025	.032	-.004	.027	.025	.029
Oslo	.014	.013	-.008	.002	.017	.012	-.015	.012	.012	.014
Health	.716**	.715**	.723**	.716**	.716**	.716**	.716**	.716**	.711**	.716**
Adjusted R^2	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23
Number of observations	12	13	13	13	13	13	13	13	13	13

Dependent variable: hedonic well-being

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

Table 10. Results from regressions with hedonic well-being as dependent variable and MPU_often as the measurement of intensity of use for the whole sample

Independent variables	**Unstandardized correlation B**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
MPU_often	.003	.019	.003	.003	.003	.003	.003	.003	.002	.003
(MPU_often)^2		.000								
Private phone calls			.170**							
Texting				.170**						
Listening to radio /podcast					-.025					
Listening to music						.028				
Watching TV							-.019			
Surfing the Internet								-.063		
Playing games									-.016	
Network and communication apps										.014
Age	.015**	.016**	.013**	.015**	.015**	.016**	.015**	.015**	.015**	.016**
Male	-.047	-.046	-.061	-.024	-.044	-.048	-.045	-.047	-.052	-.044
Employed	-.011	-.013	.014	-.002	-.010	-.007	-.011	-.013	-.008	-.011
Basic education	.033	.033	.026	.039	.030	.031	.033	.034	.037	.033
Income satisfaction	.434**	.433**	.425**	.430**	.433**	.433**	.434**	.434**	.435**	.434**
Nord-Norge	.227	.229	.201	.227	.225	.230	.226	.228	.226	.227
Midt-Norge	.118	.120	.107	.126	.118	.116	.018	.118	.120	.117
Vestlandet	.029	.032	-.018	.030	.029	.029	.027	.028	.030	.029
Sørlandet	.021	.024	-.010	.033	.019	.025	.019	.021	.020	.023
Oslo	.018	.018	-.003	.006	.020	.016	.018	.016	.016	.018
Health	.715**	.715**	.723**	.715**	.716**	.715**	.715**	.715**	.710**	.715**
Adjusted R^2	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,23
Number of observations	12	13	13	13	13	13	13	13	13	13

Dependent variable: hedonic well-being

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

The regressions presented above in tables 9 and 10 are separate regressions combined into each tables, both with hedonic well-being as the dependent variable. Table 9 presents the regressions with mobile phone use in hours, and table 10 presents the regressions with mobile phone use in times used per hour (MPU_often). In both tables, we can read that the first regression only has the intensity of use measurement (MPU_hours and MPU_often) as the independent variable, plus control variables. In the second regression, the squared variable of MPU_hours and MPU_often is added to the model. Thereafter, each of the different mobile phone activities are added in different regressions along with one measurement of intensity of use.

Table 11. Results from regressions with evaluative well-being as dependent variable and MPU_hours as the measurement of intensity of use for the whole sample

Independent variables	**Unstandardized correlation B**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
MPU_hours	.001	-.005	.001	.001	.001	.001	.001	.001	.001	.001
(MPU_hours)^2		.000								
Private phone calls			.100**							
Texting				.076**						
Listening to radio /podcast					-.013					
Listening to music						-.007				
Watching TV							.025			
Surfing the Internet								.010		
Playing games									-.017	
Network and communication apps										-.000
Age	.013**	.013**	.012**	.013**	.013**	.013**	.013**	.013**	.013**	.013**
Male	-.083	-.084	-.092	-.073	-.082	-.083	-.085	-.084	-.085	-.083
Employed	.064	.064	.078	.067	.064	.063	.065	.062	.065	.064
Basic education	-.024	-.024	-.028	-.021	-.025	-.024	-.024	-.023	-.023	-.024
Income satisfaction	.379**	.379**	.374**	.377**	.379**	.379**	.379**	.379**	.379**	.379**
Nord-Norge	.109	.108	.100	.108	.108	.108	.099	.109	.108	.109
Midt-Norge	.072	.072	.072	.075	.072	.072	.060	.071	.072	.072
Vestlandet	.010	.009	-.003	.011	.010	.010	-.012	.009	.010	.010
Sørlandet	-.056	-.058	-.067	-.051	-.057	-.058	-.066	-.056	-.057	-.056
Oslo	.020	.020	.014	.014	.021	.020	.008	.018	.019	.020
Health	.452**	.452**	.457**	.452**	.453**	.452**	.452**	.452**	.451**	.452**
Adjusted R^2	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30
Number of observations	12	13	13	13	13	13	13	13	13	13

Dependent variable: evaluative well-being

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

Table 12. Results from regressions with evaluative well-being as dependent variable and MPU_often as the measurement of intensity of use for the whole sample

Independent variables	**Unstandardized correlation B**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
MPU_often	.002	-.017	.002	.002	.002	.002	.002	.002	.002	.002
(MPU_often)^2		.000								
Private phone calls			.100**							
Texting				.075**						
Listening to radio /podcast					-.013					
Listening to music						-.008				
Watching TV							.025			
Surfing the Internet								.011		
Playing games									-.016	
Network and communication apps										-.001
Age	.013**	.012**	.012**	.013**	.013**	.013**	.013**	.013**	.013**	.013**
Male	-.083*	-.084*	-.092*	-.073*	-.082*	-.083*	-.085*	-.084*	-.084*	-.083*
Employed	.064	.067	.078	.067	.064	.063	.064	.062	.064	.064
Basic education	-.024	-.025	-.028	-.022	-.025	-.024	-.025	-.023	-.023	-.024
Income satisfaction	.379**	.379**	.373**	.377**	.378**	.379**	.379**	.379**	.379**	.379**
Nord-Norge	.107	.105	.100	.107	.106	.107	.109	.108	.107	.107
Midt-Norge	.070	.068	.071	.073	.070	.070	.070	.069	.070	.070
Vestlandet	.009	.005	-.003	.010	.009	.009	.011	.009	.009	.009
Sørlandet	-.061	-.065	-.071	-.055	-.062	-.062	-.059	-.060	-.061	-.061
Oslo	.022	.021	.017	.016	.023	.022	.022	.020	.021	.022
Health	.452**	.452**	.456**	.452**	.452**	.452**	.452**	.452**	.451**	.452**
Adjusted R^2	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30	0,30
Number of observations	12	13	13	13	13	13	13	13	13	13

Dependent variable: evaluative well-being

** Correlation is significant at the 0.01 level

* Correlation is significant at the 0.05 level

As with the previous tables presented, table 11 and 12 are combined tables that present separate regressions, here with evaluative well-being as the dependent variable. The regressions were performed in the same manner as the previous ones, with one measurement of intensity of use included in each regression, in addition to one other explanatory variable.

From tables 9, 10, 11 and 12 (in column 1) we can read that the intensity of use variables had no associations with the dependent variables, hedonic or evaluative well-being. Because of this, I tested to see if there could be a non-linear relationship between the intensity of use and SWB, that could explain why no effect was found. I therefore included the squared variables of the intensity of use in the regressions, together with the intensity of use variables (e.g. MPU_hours^2 + MPU_hours + control variables). However, as tables 9, 10, 11 and 12 show (in column 2), the coefficients of the squared variables were not significant, and a non-linear relationship could not be proven.

Based on these results, I can therefore not conclude that the amount of time spent on the mobile phone *per se* is significantly related people's hedonic or evaluative well-being. Other studies have found relationships suggesting increased mobile phone usage predicts lower well-being, such as those by Volkmer and Lermer (2019), Helliwell et al. (2019) and Twenge et al (2018). However, the present study could not confirm these previous findings.

Media debates and previous academic research often view high mobile phone use as problematic, and focus largely on the negative effects of its use and the implications of excessive use and addiction. It paints a picture that the use of the mobile phone in itself is bad for us. However, just looking at the intensity of use, creates a very simplistic view of how mobile phones affect us, and may undermine the positive aspects people may experience from the technology. Just as David et al. (2018) suggested, how one spends the time on the mobile phone may have more impact on well-being than simply the amount of time. Investigating the effects of the different features of the mobile phone may reveal a more nuanced picture than what is often presented.

From tables 9, 10, 11 and 12 we can see that out of all the activities performed by the mobile phone, the activities that are significantly associated with the dependent variables are making private phone calls (column 3) and texting (column 4).

Making private phone calls (B = .170**) and texting (B = .170** / B = .172**) are positively and significantly associated with hedonic well-being (adjusted R^2 = 23 %), after controlling for age, gender, employment, education level, income, geographic location and health. According to these regressions, an increase by one percent in the amount of time spent both for making private phone calls and for texting with the mobile phone, increases hedonic well-being by 0,17 percentage points.

Using the mobile phone for private phone calls (B = .100**) and texting (B = .076* / .075*) is also positively and significantly associated with evaluative well-being (adjusted R^2 = 30 %), controlled for age, gender, employment, education level, income, geographic location and health. This means that an increase by one percent in the time spent using the mobile phone for private phone calls, increases the evaluative well-being of the respondents by 0,10 percentage points. For texting, the corresponding increase is 0,075 percentage points. The regression coefficients are not very high, the values for both activities being < 0,2. These activities can therefore only be said to have a small correlation with subjective well-being.

Even though the values are not high, the regressions found that communication features of the mobile phone are positively associated with both hedonic and evaluative well-being. This indicates that higher amounts of private phone calls and texting leads to higher subjective well-being. These findings match previous research as well, such as by Campbell (2015), Chan (2015), Kavestos and Koutroumpis (2011) and Ling (2012). The communication features enable people to stay connected despite distances and could potentially increase communication and social connectedness. Binder (2013) and Layard (2011) found social domain, family and friends to be part of what effects individuals' well-being the most, and it therefore makes sense that the features that enable more social connectedness are positively associated with SWB. Hence, the finding that social communication through the mobile phone is correlated with subjective well-being is in line with extant research, showing that social communication in general is one of the major factors explaining subjective well-being. Thus, the use of mobile phones for social communication should be interpreted as part of the general phenomenon previously investigated in happiness research.

As a concrete and recent illustration of this finding, communication through the mobile phone has proven to be of even more importance for social connectivity during the last two months

(March-May 2020). As the worldwide pandemic caused by the COVID-19 virus have resulted in national lockdowns and mandatory social distancing and quarantine, most people have not been able to physically meet friends and family. In a time like this, being able to communicate and maintain social connectivity through the use of the mobile phone and other online applications have been essential. According to one of the largest telecommunication network providers in Norway, Telenor, Norway experienced during this period an increase of 25 % in the use of mobile data (Telenor, 2020). In a time of social distancing and isolation, mobile communication has thus enabled individuals to maintain social relationships that are important for well-being.

However, it is also important to interpret this result with the due caution, and without claiming the existence of causality effects, which we are not able to prove with the data at hand. Individuals with higher subjective well-being may spend more time making private phone calls and texting using the mobile phone. Happier people have on average higher social capital, and thereby have more friends and family to communicate with. Happier people may also be more eager to communicate with others, and more eager to call or text someone to share aspects of their lives and build stronger social connections to other people. Those less happy and satisfied with their lives may not share the same willingness to reach out and share aspects of their day with other people, or may not have the same social capital as happy people. For whatever reason, being happy may make you more inclined to use the communication features of the mobile phone. In short, the correlation between mobile phone use and subjective well-being may potentially run both ways, and that is why it is important to interpret these regression results with due caution.

Through the descriptive statistics presented in section 5.1.1 and table 7, we could see that surfing the Internet was one of the most used activities on the mobile phone. However, no associations are found between the independent variable surfing the Internet and either of the dependent variables hedonic or evaluative well-being. Using the mobile phone for surfing the Internet can therefore not be proven to have any effect on the well-being of the respondents in this study.

Regarding the control variables, good health (hedonic: $B \approx .716^{**}$, evaluative: $B \approx .452^{**}$) and higher income satisfaction (hedonic: $B \approx .430^{**}$, evaluative: $B \approx .379^{**}$) are positively

associated with both hedonic and evaluative well-being for the whole sample. These regression coefficients are higher compared to private phone calls and texting, which indicates that these variables contribute more to the explained effect on the dependent variables. Good physical health is commonly found to be positively correlated with SWB (OECD, 2013). The regression analysis does not imply directionality of the association, and health and well-being is often found to have a mutual influence on each other. Good health is found to be predictive of happiness and well-being, and being happy is found to increase the immune system, longevity and lower stress levels. As for the income variable, this finding is also supported by the literature (OECD, 2013), as higher income is often associated with higher well-being. However, this variable measures income satisfaction, and not actual income level. Still, relative income, how individuals view their own income compared to others, if often found to be of importance in the association to well-being (Cheung & Lucas, 2016). It does make sense that increased income satisfaction increases happiness and overall life satisfaction, or that increased happiness and life satisfaction increases satisfaction with various aspects of life, including income.

The regressions additionally found that compared to females, males were associated with a little lower evaluative well-being (B ≈ -.085*). This supports the findings of Pénard et al. (2013) who similarly found women to be generally happier than men. A very small positive association were additionally found between age and both hedonic (B ≈ .015**) and evaluative (B ≈ .013**) well-being. The descriptive analyses showed that the two older age groups were somewhat happier, both in terms of hedonic and evaluative well-being, than the two younger age groups. Previous studies have found age to have a U-shaped relationship with subjective well-being (Castellacci & Schwabe, 2018). This study does not have data to measure the subjective well-being of people younger than 18 years old, and can therefore not support this. However, the small association found here indicates that people may be a little happier at the end of their lives (Schwabe, 2020).

5.2.2 Young adults

In the regressions for the sub-sample of young adults, the same independent variables and control variables (except from age) are used as in the regressions for the whole sample. All of the regressions are performed in the same manner, where separate regressions are performed with one measurement of intensity of use and one activity, including all control variables.

The first two tables, 13 and 14, present the regressions with hedonic well-being as the dependent variable, and tables 15 and 16 with evaluative well-being as the dependent variable. Similar to the regression tables for the whole sample, the tables present a simplified version of the outputs from SPSS, with the reported values of the unstandardized regression coefficient B, along with the significance level (p-value). The p-value is reported as "*" or "**", where:
* = $p < 0.050$ i.e. significant
** = $p < 0.010$ i.e. significant

Table 13. Results from regressions with hedonic well-being as dependent variable and MPU_hours as the intensity of use measurement in young adults.

Independent variables	**Unstandardized correlation B**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
MPU_hours	.002	.022	.001	.000	.002	.002	.002	.002	.002	.002
(MPU_hours)^2		.000								
Private phone calls			.153							
Texting				.400**						
Listening to radio /podcast					-.092					
Listening to music						-.045				
Watching TV							-.073			
Surfing the Internet								-.048		
Playing games									-.003	
Network and communication apps										-.170*
Male	-.119	-.112	-.132	-.123	-.017	-.126	-.110	-.112	-.119	-.169
Employed	.295	.297	.290	.298	.307	.294	.302	.297	.295	.280
Basic education	.114	.108	.124	.112	.102	.131	.121	.115	.114	.141
Income satisfaction	.116	.116	.118	.097	.114	.118	.116	.115	.116	.116
Nord-Norge	.137	.151	.135	.079	.125	.137	.123	.133	.137	.132
Midt-Norge	.116	.124	.112	.075	.126	.128	.128	.115	.115	.126
Vestlandet	-.254	-.244	-.271	-.290	-.245	-.255	-.1268	-.260	-.254	-.283
Sørlandet	-.493	-.479	-.508	-.507	-.498	-.500	-.509	-.501	-.494	-.533
Oslo	-.237	-.232	-.237	-.309	-.222	-.231	-.241	-.240	-.237	-.262
Health	.811**	.813**	.814**	.825**	.814**	.811**	.812**	.811**	.811**	.819**
Adjusted R^2	0,155	0,155	0,155	0,170	0,155	0,155	0,155	0,155	0,155	0,160
Number of observations	11	12	12	12	12	12	12	12	12	12
Dependent variable: hedonic well-being										
** Correlation is significant at the 0.01 level										
* Correlation is significant at the 0.05 level										

Table 14. Results from regressions with hedonic well-being as dependent variable and MPU_often as the intensity of use measurement in young adults

Independent variables	**Unstandardized correlation B**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
MPU_often	.009	-.006	.009	.007	.009	.009	.009	.009	.010	.002
(MPU_often)^2		.001								
Private phone calls			.150							
Texting				.378**						
Listening to radio /podcast					-.096					
Listening to music						-.058				
Watching TV							-.077			
Surfing the Internet								-.050		
Playing games									.000	
Network and communication apps										-.117*
Male	-.126	-.156	-.137	-.126	-.113	-.134	-.116	-.118	-.126	-.177
Employed	.311	.308	.306	.310	.323	.310	.318	.313	.311	.296
Basic education	.114	.125	.124	.112	.101	.136	.121	.115	.114	.143
Income satisfaction	.111	.110	.113	.094	.109	.113	.111	.110	.111	.111
Nord-Norge	.161	.130	.160	.104	.149	.162	.146	.157	.161	.158
Midt-Norge	.115	.087	.112	.007	.126	.131	.127	.114	.115	.126
Vestlandet	-.231	-.264	-.248	-.271	-.222	-.232	-.246	-.237	-.231	-.260
Sørlandet	-.506	-.553	-.519	-.511	-.512	-.515	-.523	-.514	-.506	-.547
Oslo	-.221	-.248	-.221	-.291	-.204	-.213	-.225	-.224	-.221	-.247
Health	.817**	.811**	.819**	.829**	.819**	.817**	.818**	.817**	.817**	.825**
Adjusted R^2	0,155	0,155	0,155	0,170	0,155	0,155	0,155	0,155	0,155	0,160
Number of observations	11	12	12	12	12	12	12	12	12	12
Dependent variable: hedonic well-being										
** Correlation is significant at the 0.01 level										
* Correlation is significant at the 0.05 level										

The regressions for the sub-sample of young adults were performed in the exact same manner as for the whole sample. One measurement of intensity of use is included in the regressions, together with one other explanatory variable, plus control variables. Table 13 and 14 present the regressions with hedonic well-being as the dependent variable.

Table 15. Results from regressions with evaluative well-being as dependent variable and MPU_hours as the intensity of use measurement in young adults.

Independent variables	**Unstandardized correlation B**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
MPU_hours	-.002	-.045	-.002	-.003	-.001	-.001	-.002	-.002	-.002	-.002
(MPU_hours)^2		.000								
Private phone calls			.176*							
Texting				.260**						
Listening to radio /podcast					-.006					
Listening to music						-.075				
Watching TV							.064			
Surfing the Internet								-.017		
Playing games									.072	
Network and communication apps										-.114*
Male	-.181	-.196	-.196	-.184	-.081	-.192	-.190	-.179	-.194	-.215*
Employed	.093	.089	.087	.094	.093	.090	.087	.093	.100	.082
Basic education	-.018	-.005	-.007	-.020	-.019	.010	-.024	-.018	-.022	.000
Income satisfaction	.195**	.195**	.197**	.183**	.195**	.198**	.195**	.195**	.195**	.195**
Nord-Norge	.066	.036	.063	.028	.065	.065	.078	.062	.062	.062
Midt-Norge	.063	.045	.059	.036	.063	.083	.052	.062	.082	.070
Vestlandet	-.152	-.172	-.173	-.176	-.152	-.155	-.139	-.154	-.133	-.172
Sørlandet	-.149	-.179	-.166	-.158	-.149	-.160	-.135	-.152	-.138	-.175
Oslo	-.111	-.121	-.111	-.158	-.110	-.102	-.107	-.112	-.099	-.128
Health	.525**	.522**	.528**	.534**	.525**	.525**	.525**	.525**	.531**	.530**
Adjusted R^2	0,180	0,180	0,187	0,195	0,180	0,180	0,180	0,180	0,180	0,184
Number of observations	11	12	12	12	12	12	12	12	12	12
Dependent variable: evaluative well-being										
** Correlation is significant at the 0.01 level										
* Correlation is significant at the 0.05 level										

Table 16. Results from regressions with evaluative well-being as dependent variable and MPU_often as the intensity of use measurement in young adults.

Independent variables	**Unstandardized correlation B**									
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
MPU_often	.002	-.019	.002	.000	.002	.003	.002	.002	.002	.002
(MPU_often)^2		.001								
Private phone calls			.172*							
Texting				.253**						
Listening to radio /podcast					-.007					
Listening to music						-.079				
Watching TV							.062			
Surfing the Internet								-.017		
Playing games									.069	
Network and communication apps										-.116*
Male	-.181	-.229*	-.194	-.181	-.180	-.193	-.189	-.178	-.192	-.215*
Employed	.097	.093	.091	.096	.098	.095	.091	.098	.104	.087
Basic education	-.018	-.001	-.006	-.019	-.019	.012	-.023	-.017	-.022	.001
Income satisfaction	.194**	.191**	.196**	.182**	.194**	.197**	.194**	.193**	.194**	.193**
Nord-Norge	.077	.032	.075	.039	.076	.078	.089	.075	.077	.075
Midt-Norge	.063	.023	0,06	.038	.064	.085	.053	.063	.082	.070
Vestlandet	-.147	-.196	-.167	-.174	-.146	-.149	-.135	-.149	-.128	-.166
Sørlandet	-.146	-.216	-.160	-.149	-.146	-.158	-.132	-.149	-.134	-.172
Oslo	-.104	-.145	-.104	-.152	-.103	-.094	-.101	-.105	-.093	-.121
Health	.528**	.519**	.530**	.536**	.528**	.527**	.527**	.528**	.534**	.533**
Adjusted R^2	0,180	0,180	0,187	0,195	0,180	0,180	0,180	0,180	0,180	0,184
Number of observations	11	12	12	12	12	12	12	12	12	12
Dependent variable: evaluative well-being										
** Correlation is significant at the 0.01 level										
* Correlation is significant at the 0.05 level										

Table 15 and 16 present the regressions with evaluative well-being as the dependent variable.

For the age group of young adults, the regression analyses show no statistically significant association between the intensity of mobile phone use and either hedonic or evaluative well-being (column 1 in tables 13, 14, 15 and 16). Again, I tested to see if a non-linear relationship could be the cause of the non-existing effect, and included the squared variables of intensity of use in the regression. However, as tables 13, 14, 15 and 16 show (in column 2), the coefficients of the squared variables were not significant either, and a non-linear relationship could not be proven. In short, the amount of time spent on the mobile phone, both in terms of hours per day and times per hour, is not significantly related to the subjective well-being of young adults in this study.

Within the age group of young adults, the regressions reveal an association between communication features of the mobile phone and the dependent variables, as in the regressions for the whole sample. However, what differentiates the results is that using the mobile phone to make private phone calls is only associated with the evaluative well-being of young adults. Additionally, a statistically significant association is found between network and communication apps and the subjective well-being of young adults.

Using the mobile phone for private phone calls is positively associated (B = .176* / .172*) with evaluative well-being in young adults (adjusted R2 = 18,7%), after controlling for gender, employment, education level, income, geographic location and health. The estimated correlation coefficient is slightly higher than the one for the whole sample (B = .100**). However, even though the regressions revealed an association between private phone calls and hedonic well-being in the whole sample, no associations were found for the young adults age group. This means that an increase by one percent in the amount of time spent on the mobile phone making private phone calls, results in an increase of ≈ 0,17 percentage points on the 1-7-point scale measuring the life satisfaction of young adults.

Further, the regression analyses revealed an association between using the mobile phone for texting and the dependent variables hedonic and evaluative well-being. Using the mobile phone for texting (B = .400** / B = .378**) is positively associated with hedonic well-being in young adults (adjusted R^2 = 17 %). Additionally, texting is positively associated (B =

.260** / .253**) with evaluative well-being in young adults (adjusted R^2 = 19,5%). These regression coefficients are higher than those for the whole sample, indicating that texting is more strongly correlated with the subjective well-being of young adults than for the whole sample. The effects of texting are also stronger than the effects of private phone calls to the dependent variable evaluative well-being, indicating that young adults are impacted more by texting than by phone calls. This finding can further be supported by the adjusted R^2 values, which is slightly higher in the regressions with texting as explanatory variable (hedonic: adjusted R^2 = 17 %, evaluative: adjusted R^2 = 19,5 %) than in the others (hedonic: adjusted R^2 = 15,5 %, evaluative: adjusted R^2 = 18 %), indicating that this variable contributes to explaining slightly more of the variety in the dependent variables than the other explanatory variables.

A reason behind this finding may be explained through the use of Turkle's (2011) research on teenagers. This is a generation that would now be in the age group of young adults. In her research, Turkle found that texting was a preferred way of communicating, compared to making phone calls. It could be argued that the generation who grew up using mobile phones in their teenage years has the perception that the use of written communication is better and preferable than voice communication, thereby possibly explaining the stronger positive correlation coefficient of texting than of phone calls. Even though Turkle (2011) argued that the quality of such written communication is lower than those in-person, it is still here proven to have a positive effect.

The final explanatory variable associated with the subjective well-being of young adults is the use of network and communication apps. Using the mobile phone for network and communication apps is negatively associated with hedonic well-being (B = -.170* / B = -.177*) in young adults (adjusted R^2 = 16 %), and also with evaluative well-being (B = -.114* / -.116*) in young adults (adjusted R^2 = 18,4 %), after controlling for gender, employment, education level, income, geographic location and health. However, the regression coefficients are relatively low, and network and communication apps seem therefore only to have a small correlation with subjective well-being of young adults.

As young adults were the age group with the highest use of network and communication apps, it is interesting to see that this feature of the mobile phone is negatively associated with both

hedonic and evaluative well-being. This is however, in agreement with existing research on the negative effects of social media usage on young adults (Hunt, et al., 2018; Kross, et al., 2013; Lin, et al., 2016). The World Happiness Report from 2019 similarly found that the rising use of social media through digital devices was associated to declining happiness (Helliwell, et al., 2019). This is a somewhat troubling finding, that the most used feature of young adults affects them negatively, and at the same time, this usage is found to be rising. Network and communication apps such as Facebook, Instagram, Snapchat, WhatsApp etc. are initially meant to increase and enable social connectivity and expand social networks. Even though this may be the intended purpose of such applications, this study finds that they do not have the same positive impacts as phone calls or texts, for young adults. This suggests that there are other aspects of these applications that may diminish the positive effects of social connectivity.

A reason behind this negative impact could be that through social media we can compare ourselves to people way beyond our normal reference group, as we can get glimpses of lives from people all over the world, with different lifestyles than us (Diener, 2012). Social media is often a place where people share the positive and proud moments of their lives, which in turn may make others feel worse or disappointed in their own lives. Other unfavorable content may also be a reason behind this negative impact. The study from Medietilsynet presented in section 3.5.1 revealed that in adolescents, a large percentage had been exposed to harmful content online and through different social medias. It is not unreasonable to assume that young adults may be exposed to negative content as well, such as content that glorifies certain body types and diets, violent videos, fake news that contribute to concern or confusion or increased purchasing pressure. Even though young adults is not as sensitive of an age group as adolescents and children, many may still experience negative effects from being exposed to negative content, and everyone may not be as good at blocking or criticizing such content.

Further, the negative association may be caused by the distracting effect of accessing network and communication apps through the mobile phone. This *technoference* may distract young adults from real-life situations, such as in-person social interactions, work or academic tasks. This may in turn negatively affect their well-being. The mobile phone provides a very easy access to these applications, as many carry their mobile phones with them all day.

Still, as the regression analysis does not imply causal direction, it may also be that young adults who are less happy spend more time on network and communication apps on their mobile phones. Mobile phone usage may be seen as a time spending activity, and it may be that individuals who are unhappier have less activities to occupy them and thereby spend more time scrolling through different social medias. At the same time, it may be that young adults who are less satisfied with their own lives spend more time on these applications, as they may be more satisfied with their online lives and online presence. Social medias may thus be an escape from their "real lives", making them more inclined to use these applications.

Even though surfing the Internet were one of the most used features of the mobile phone for young adults, the regressions showed no associations to either the hedonic or the evaluative well-being of the young adults in the sample. This feature can therefore not be proven to have any effect when it comes to the subjective well-being of the respondents.

As for the control variables, health is strongly associated to both hedonic and evaluative well-being in young adults. The variable is positively associated to hedonic well-being (B ≈ .819**), and evaluative well-being (B ≈ .525**) in young adults. Compared to the baseline results, these regression coefficients are slightly stronger, indicating that health is an even stronger predicator for the well-being of young adults, than adults seen as a whole.

In the whole sample, income satisfaction was also associated with both hedonic and evaluative well-being, but not in young adults. In the sub-sample of young adults, income satisfaction is only associated with evaluative well-being (B ≈ .196**) This could indicate that income is not as important for the hedonic well-being of this age group. The reason behind this might be that within the age group of 18 to 29 years old, many people may be students or just starting their working career, making it more acceptable to have lower income, than if one might be in the middle of their career. As the variable measures income satisfaction, and not actual income, it might be reasonable to assume that young adults are less concerned with their income, as they might expect it to rise as they get older. It might therefore not be as predictive to their well-being.

In the regression with network and communication apps as the explanatory variable (column 10 in tables 15 and 16), males compared to females were associated with lower evaluative

well-being (B = -.215*). This is similar to the results from the regressions for the whole sample, however in young adults the association is stronger. This means that compared to young adult females, young adult males are associated with lower life satisfaction.

5.3 Limitations

Quantitative measurements and analysis can provide a simplified picture of more complex problems, and so there are some limitations as to how these results can be used as generalized facts about the population.

As noted previously, one limitation of the results presented is the possible issue of endogeneity, i.e. that our analysis is not able to identify the existence of causal relationships between mobile phone use and subjective well-being. The regression analyses find out correlations between some variables, but this does not imply a given direction of causality. As mentioned above, the results cannot determine whether the communication features of the mobile phone contribute to increasing the well-being of individuals, or if happier individuals are more inclined to use the communication features of the mobile phone. Likewise, the study cannot determine whether network and communication apps has a negative effect on young adults' well-being, or if unhappier young adults are more inclined to spend time on network and communication apps on the mobile phone. This is a more general limitation in the literature on well-being and mobile phone use presented in chapter 3. It is therefore essential that future research will further investigate the directionality of these associations, and the underlying causal relationships.

Quantitative studies can provide opportunities for generalization, as long as the sample is representative of the population. As shown in the descriptive statistics, the characteristics of sample match well with the characteristics of the Norwegian population when it comes to demographics such as age, gender and geographic location, even though the sample might have a higher representation of highly educated individuals than the rest of the population. However, it is important to remember that the generalization of findings and associations is a simplification of reality, and that possible underlying causal relationships may be much more complex. The findings of this study may not be true for everyone, but highlights certain trends and patterns within the population.

Further, in quantitative studies where surveys are used, there is a risk that the respondents' answers do not perfectly represent the reality. In some situations, respondents may answer what they think will be most socially acceptable (Ringdal, 2012). Even though the survey is anonymous, some respondents may feel the need to present themselves in a better light, such as reporting higher measures of subjective well-being. Because happiness is often seen as a goal in life, unhappy or depressed people may report higher levels of happiness, in order to look like they did not "fail" at something, or because it may be embarrassing or difficult to admit that they are not happy. The majority of the respondents in the survey used here, reported relatively high subjective well-being. It could well be that these responses are truthful, however, it is still possible that some respondents may have exaggerated their responses.

Likewise, some respondents may understate other answers, such as time spent on the mobile phone. In the media, we often hear about the dangers of excessive mobile phone usage and the benefits of screen time limitations. Low mobile phone use may be seen as a socially acceptable behavior, and there is a possibility that the respondents have reported lower use of the mobile phone than what they actually have. A study from 2015, testing the validity of self-reported estimates of smartphone use, found deviations from what people reported to be their time spent on their mobile phones to their actual usage (Andrews, et al., 2015). It was found that the self-reported phone use of the respondents was lower than their actual use, especially when it came to number of uses per day (Andrews, et al., 2015). David et al. (2018) additionally found self-reported data on smartphone usage to be unreliable compared to actual usage. Again, the actual usage was higher than what the respondents believed it to be. Either the respondents were not aware of their own usage, or they were embarrassed to admit their actual use.

Either way, this shows that people may not self-report their phone use correctly. The respondents in the survey used in this thesis reported relatively low amounts of mobile phone usage, and there is a possibility that people, for different reasons, have underreported their usage, thus not reflecting a clear picture of the reality. This could have implications for the results of the analyses. I found no associations between intensity of use and well-being in this

study, but there is a possibility that the use of self-reported mobile phone use may have obscured the actual relationship, and the reason that no associations were found.

6.0 Discussion

This thesis presents an empirical analysis of the effects of mobile phone use, and the empirical results may thus contribute to discussions about ethical issues related to ICTs. The well-being implications of ICTs have previously not been studied in innovation studies. They have also been neglected in the RRI literature so far. As shown in the previous chapter, using mobile phones may have implications for individuals' subjective well-being. By considering these effects, we will hopefully be better able to minimize the negative consequences of using this technology, and enhance the positive outcomes.

First and foremost, the mobile phone is traditionally a communication device, and it can be a great for maintaining and enhancing social connectivity. Interaction becomes effortless with a mobile phone, and sending a text message requires much less effort than meeting someone face-to-face. Small parts of our day and funny or interesting anecdotes can be shared instantly, reaching people from across the world. Furthermore, today's digital technology allows people to be "present" in meetings, gatherings and events, despite physical distance through video and audio calls that can easily be made through the mobile phone. The social connectivity the mobile phone allows for, have positive effects for individuals' well-being, and is an effect that is present in all adult age groups.

At the same time, however, studies have found that the mere presence of mobile phones may negatively affect in-person social interactions. The constant connectivity mobile phones provide may cause people to check their mobile phones and participate in online conversations even when they are in real-life social settings. As a result, our attention often becomes divided, where we have one foot in the "real world" and one foot in the virtual world. We may not even notice the distraction because mobile phone use and its presence has become a habit and as natural as anything else. We can, therefore, be blind to its use and its impacts, which may explain why young adults have such a high usage of network and communication apps, even though it may negatively affect their well-being.

Becoming aware of the effects mobile phone use has on young adult well-being can help both developers and consumers enhance the positive effects that accompany its communication features and decrease the negative effects that accompany network and communication apps.

However, it is difficult to change the use of a technology so embedded in society. Referring to the Collingridge dilemma presented in chapter 2.1, only once a technology has been adopted and been merged into the everyday lives of consumers will we become aware of how its use affects our lives. By then, we can have become somewhat locked into this technological trajectory. Mobile phones have become an integrated part of individual lives and the infrastructure of society, and we use them for more and more purposes. Habits related to mobile phone usage would be difficult to challenge.

Network and communication apps are found to be negatively associated with the well-being of young adults. However, it is unreasonable to expect young adults to stop using these applications simply because a few academic studies have found negative associations between its use and their well-being. Social networking applications have become such a pervasive presence in our lives that one can even build a career based on them. They are part of many people's everyday lives and routines. Changing people's use and habits around these applications requires a desire and willingness from both the producers of the technology and the users of the technology.

Due to the quick pace of ICT developments and diffusions, it is difficult to predict both the uses and the consequences of ICT use. However, as Stahl (2011) argues, many of the ethical issues related to today's technology will continue to be of significance in future technologies. However, we do not know which consequences and ethical issues will continue into the future, and our values and the determinants of our happiness are not something that will change overnight. For instance, because social connectivity and social interactions positively influence on individual well-being, technology that impacts communication patterns and habits are also likely to impact individual's well-being. Different features of the mobile phone may impact different aspects of our lives. Further, it will be essential to investigate more specifically how these features of mobile phones affect individual well-being. What parts of using network and communication apps causes the negative association between mobile phone use and well-being in young adults? Why are unhappy young adults more inclined to spend additional time on network and communication apps?

By identifying the social consequences of a technology, one can also identify relevant stakeholders to be included in the innovation process. Identifying happiness as a social

consequence of mobile phone use identifies well-being researchers and experts as stakeholders who should participate in the further developments of this technology, particularly when considering the ethical implications it may have for well-being. Working with and engaging well-being researchers and actors may help further identify those aspects of technology use that are important for human well-being.

6.1 Innovation for well-being

The link between innovation and well-being has not been a visible one within innovation studies. Happiness and well-being may not be obvious social consequences of ICTs, compared to implications such as privacy, data protection, surveillance and so on. However, well-being implications may be good measurements of whether an innovation is "good" or "bad", as they to a large degree reveal the positive and negative effects an individual may experience. The empirical investigation of this thesis uncovered some well-being implications that may follow mobile phone use. What can these results be used for? With the help of RRI we can briefly discuss some possible implications of these results. Measuring the well-being impacts of an innovation may inform policy makers, industry actors and society at large how to steer technological development towards ethically responsible outcomes.

In integrating ethical considerations into innovations and by reflecting upon what social consequences an innovation might have, we can help create the future we want to see. However, according to RRI, becoming ethically responsible actors requires interdisciplinary collaborations, and the inclusion of different stakeholders in the innovation process. When it comes to the question of who is responsible for the ethical development of technologies such as the mobile phone, different actors have different responsibilities. For instance, the ETICA project resulted in a set of recommendations for public policy makers, companies, individual researchers and society at large, all of whom can contribute to shifting the development focus to innovation for well-being.

Policy makers

Stahl (2011) advice policy makers to provide frameworks and infrastructure that allows ethical consideration and reflection. Policy makers can provide ICT ethics observatories to identify ethical issues, raise awareness on such issues and provide the infrastructure for

cooperation between industry actors, researchers and technologists and other stakeholders. Collaboration with well-being researchers and experts, and identifying important determinants for individual well-being, can help policy makers create ethical standards for products to meet. Quality checking of products before releasing them to the market can incentivize producers to review ethical impact assessments more thoroughly, thereby ensuring that the product enhances well-being; this is similar to the RRI inspection presented by Stahl et al. (2014b). For example, policy makers could develop requirements for ensuring digital well-being for individuals, making companies aspire to meet certain standards for their products. Moreover, public policies can provide industry actors, researchers and technologists incentives to be ethically responsible and contribute positively to the well-being of their product's users, thereby rewarding and sanctioning certain behaviors.

Further, policy makers can provide regulations to safeguard the well-being of individuals, by enforcing restrictions that protect users from experiencing these negative effects from technology. For example, when it comes to privacy protection, policy makers in the EU made it mandatory for companies and actors to safeguard privacy rights and protect the handling of personal information with the General Data Protection Regulation (GDPR) implemented in 2018 (European Commission, 2020). With this regulation, the EU requires that all actors consider the privacy implications of new technologies during their R&D activities.

Similarly, policy makers can take action to reduce the negative well-being effects of mobile phone use on well-being. For instance, the UK now wants to make social media companies responsible for the harmful content posted on their sites (Sandle, 2020). They want to minimize the sharing of violent videos, cyberbullying and other criminal and harmful content, in order to safeguard the well-being of UK citizens. Germany and Australia have also legislated similar regulations (Sandle, 2020). Policy makers in Norway could also further reflect on the types of regulations that could be implemented to safeguard the well-being of mobile phone users.

Researchers, technologists, and industry actors

For ICT researchers and technologists, different RRI tools can be employed for ethical reflection, such as the AREA plus framework. One can use this framework to uncover ethical dilemmas and concerns a product may face and to reflect upon how one can deal with such

challenges. Firstly, the framework recommends trying to anticipate possible outcomes by using anticipatory activities and by asking questions such as "what if…?" The identification of the existing implications of mobile phone use can help to enhance positive implications, such as the effects of communication features, and prevent negative implications, such as the effects of network and communication apps on young adults, to incrementally improve the products. Further, reflecting upon the type of usage and what consequences that may persist in the future can assist in the creation of more responsible and desirable mobile phones. That is, what is known now, and what is likely to happen in the future? Mobile phone usage continues to increase, as do device features. It increasingly serves as complement to other technologies, and it can be used to access and control other technological artefacts, such as electronic devices, in the household. The potential new uses of the mobile phone may also have other effects on well-being than what we can see today. Therefore, it is useful to reflect upon how today's use may evolve and what other aspects of life the mobile phone may affect, which may thereby may affect individuals' well-being.

Furthermore, the third component of the AREA framework advices researchers and industry actors to reflect upon which stakeholders should be engaged in the development of the technology. The inclusion of well-being researchers and experts in the R&D process may help identify possible well-being outcomes, problem spaces and challenges the technology may face. Additionally, the inclusion of social media and communication experts may provide insights into possible positive or negative impacts of these features. Users can also be important stakeholders to include in the innovation process, as they are the ones who have been using older versions and will be using newer versions of the device. Moreover, use and impacts may vary among different types of users, as we have seen, and engaging a variety of users may therefore be beneficial.

As previously mentioned, von Schomberg (2013) argues that products should be evaluated and designed on the basis of ethical acceptability, sustainability and societal desirability. Stated another way, that ethical considerations can be designed into the product, and the product can be designed with a view to, in this instance, increasing happiness. As the ethical issue of privacy has been largely focused on, it has resulted in its own way of thinking when creating products, namely privacy by design. Perhaps this could be an inspiration for working towards innovations for well-being; that is, designing well-being considerations into new

products. Furthermore, Eden et al. (2013) argues that looking at the responsibilities researchers and companies have as "problem spaces", one can better exemplify bad outcomes and address risks. Now that different researchers and other actors, such as Medietilsynet, have found negative implications in the younger generations from their use of network and communication apps and social medias, solutions for reducing the negative effects could be designed into the mobile phone. Some smartphones and apps have these functions already, such as time restrictions for certain apps, designed to reduce time spent on them, and measurements of screen time, designed to make users more aware of their own usage. Further research should be done to measure the impact of such functions.

As the Responsible Industry project uncovered, the concept of RRI is not widely known among industry actors, and there are some conflicting interests when it comes to commercialization and ethical responsibility. Many companies want to be perceived as ethically responsible actors; however, the actions required to get there are both money and time consuming. The ICT industry develops at a rapid pace, and companies who cannot keep up fall behind. Furthermore, many companies profit from the increased use of network and communication apps, and may be reluctant to restrict or change usage. At the same time, consumers may be more inclined to choose the products of those companies they perceive as caring about individuals' well-being and happiness, compared to those companies that do not take the same steps to safeguard mental health and well-being. Being regarded as an actor who protects and appreciates digital well-being could increase competitive advantage and attract consumers who value this highly. Additionally, it could be argued that companies are ethically responsible for ensuring that the products they carry improve lives and make the world a better place.

Society at large

Even though technology developers and industry actors are responsible for the products they introduce to the world, this does not mean that individual consumers are simply passive users of technology. Individuals, and society at large, help shape and place value on technologies and products, thereby shaping the social consequences that may follow the technology's use. Harmful and negative content on network and communication apps exists because someone placed it there. In "liking," sharing and following, individuals help highlight certain content and acknowledge certain actions and messages.

Becoming aware of one's own usage and the corresponding effects could, to some extent, incentivize individuals to protect themselves from technology's negative effects. Moreover, individuals can become aware of how their own actions, in terms of what they share or how they communicate with others online, may affect others. However, this requires self-awareness and self-control, as well as a desire to change. Many young adults may not be aware of how exactly their mobile phone use affects them, making it challenging for them to limit the use that impacts them negatively. As Andrews et al. (2015) and David et al. (2018) found, there are often deviations from individuals' perceived mobile phone use and their actual mobile phone use. People may not be aware of how much time they spend on their phones or what activities they mostly use their mobile phones for, which makes it difficult to assess one's own use. Additionally, high usage of network and communication apps means that the apps have an appeal, and limiting or restricting their use may come at the expense of something else. The step might be too large for an individual to take alone. As mentioned, RRI can be seen as a co-creation method, where policy makers, researchers and industry actors, as well as individuals', share the responsibility for ensuring their actions and use of digital devices enhance the device's benefits and limit their disadvantages. We live in a democratic society, and the public should have a say in the development of technologies that ultimately affect them.

7.0 Conclusion

Technological development and the diffusion of novel ICTs over the past decades have had pervasive impacts on our lives. This digital transformation increases work efficiency, makes information and different services more available and accessible, and provides opportunities for wealth creation and economic growth. Despite the many benefits and improvements that follow technological advancement and the diffusion of innovations, we also experience many unintended consequences as well, such as greenhouse gas emissions and privacy implications. Interactions between technologies and humans result in a number of ethical concerns. Societal impacts, such as the well-being of individuals and the connection this has to innovation, have so far been neglected in innovation studies (Castellacci & Tveito, 2018). This thesis helps fill this research gap, and addresses the implications of a technology that has a prominent role in our daily lives has on individual well-being: the mobile phone.

First and foremost, this study shows that a digital technology *per se* is not intrinsically "good" or "bad". Its effects are dependent on how we choose to use it and the value we place on it. It would be incorrect to simply state that mobile phone use is good or bad for us; the underlying relationship is much more complex. Measuring the well-being implications of mobile phones give insight in the positive and negative effects of its use. The results of this thesis show that different uses of mobile phone activities have different impacts on individuals. Hence, technology use has social consequences for its users. In identifying such social consequences, policy makers, researchers, industry actors and society at large should be better equipped to deal with the consequences we will face in the future.

Information and communication technologies are ubiquitous, and we can become blind to their presence and impacts. They can have unnoticed negative consequences and can significantly change our society. Human well-being is an acknowledged, basic value throughout the world, and attention should be given to how the many technological devices around us affect our well-being. The smartphone is, as previously mentioned, one of the technologies that humans have adopted fastest in history (Pew Research Center, 2019). The vast majority of the Norwegian population own and use smartphones, and the highest percentage of ownership (99 %) is found in young adults (SSB, 2018). The device is always on hand, and its use is not restricted to any time nor place. In a time like this, the spring of

2020, when social distancing and self-isolation have been requirements in the fight against a global pandemic, digital devices such as the mobile phone have been an essential communication tool for many people. In Norway, companies experienced an 25 % increase in mobile data use (Telenor, 2020), demonstrating a significant increase in mobile phone use. As a highly used digital device, the mobile phone, is an important technology to study and to learn the effects of.

The empirical study presented in this thesis investigated whether mobile phone use affects subjective well-being in young adults. I made use of a novel survey dataset on a large sample of Norwegian individuals, which is the result of a data collection effort coordinated by the TIK Centre. My empirical analysis has considered the following three sub-questions:

RQ1: Is the intensity mobile phone use associated with subjective well-being?

The young adults age group were the group that reported the highest use of mobile phones in the sample. 1 in 5 young adults spend 4 hours or more on their mobile phones every day, and access it on average every 10 to 15 minutes throughout the day. There is a much skepticism surrounding mobile phone use, especially around high amounts and excessive use, and fears of addiction. Several previous studies found a negative association between the intensity of mobile phone use and subjective well-being. I, therefore, expected to find a negative association as well; however, no statistically significant association, neither with the hedonic nor evaluative well-being of the respondents, was found. Both measurements of the intensity of use were tested, number of hours spent per day and times used per hour, and no associations were found with subjective well-being. This might indicate that it is not the usage in itself that is problematic, but how one spends one's time on the mobile phone that may have caused these negative associations found by others. The second specific RQ is, therefore, of interest too:

RQ2: Which mobile phone activities are most associated with subjective well-being?

The communication features of mobile phones were the features that I found to be positively and significantly associated with the subjective well-being of all the respondents. Making private phone calls and texting were positively associated with both hedonic and evaluative

indicators of subjective well-being. This implies that using a mobile phone to connect with others increases both in-the-moment happiness as well as overall life satisfaction. In addition, this contributes to highlighting social connections as one of the most important determinants of individual well-being. As the dataset at hand does not enable us to uncover the causal direction of these relationships, it could be argued that in-the-moment feelings of happiness and people who are more satisfied with their lives are more inclined to use the communication features of the mobile phone to connect with others. As previously discussed, this is a possible limitation of this study and an important aspect future research could investigate using longitudinal datasets.

Despite this positive association, the positive effect may be dependent on the context and situation in which these features are used. Other studies have found that the mobile phone distracts from in-person social interactions due to the opportunities it provides for online communication. It can create a divided attention, where half of an individual's attention is on the current in-person interaction, and the other half of his or her attention is on an online conversation, or short online interactions. This may have implications for social relationships, and it may lower the quality of in-person interactions. Therefore, even though the communication features of mobile phones can have positive effects for an individual, they may come at the expense of other "real-life" interpersonal relationships if phones are used in certain unfavorable situations. Finally, the thesis investigated the following third specific RQ:

RQ3: Does the relationship between the mobile phone use and subjective well-being of young adults differ from other demographic groups?

The empirical results indicate that the relationship between mobile phone use and subjective well-being does differ for young adults compared to the other demographic groups. What distinguishes young adults from other age groups are their high use of network and communication apps and the negative association this has with their subjective well-being. These are applications such as Facebook, Instagram and Twitter, and are meant to be platforms for social connections, to communicate with and to share parts of your life with others. However, since the communication features of the mobile phone are positively associated with the well-being of this age group as well as the others, there must be some other aspects than this that contributes to the negative association found.

There could be several reasons to explain this. Social media may contribute to increased social comparisons, which may result in body image pressures, purchase pressures, and so on. These applications may also contain harmful contents that may be disturbing for users, such as violent videos, or fake news and other types of manipulations. This is something both industry and policy makers should be aware of so they can attempt to limit the disadvantages that follow this use.

Additionally, I found that using the mobile phone to send text messages was more strongly positively associated with the subjective well-being of young adults than it was for the rest of the sample. This may indicate that young adults get more out of texting than what others might do. This further indicates that different demographic groups may have different communication patterns and habits, which might provide useful insights for further developments of the mobile phone.

Through our technologies we can consciously express our values. We must, therefore, ask ourselves, which values do we want to express and enhance through technology? What kind of future do we want to create? As happiness is so important throughout the world and within different cultures, it should be prioritized as some of what we want our technologies to provide us. Furthermore, happy citizens may have subsequent positive effects on society. Happiness may be a predictor for good physical, mental health and longevity. A healthier population may result in lower medical expenses and fewer sick leaves, which may contribute to wealth creation in nations. Being happy is good for the individual and for the society. Measurements of well-being may additionally be used as indicators to assess the positive and negative impacts of an innovation, and whether the innovation is responsible or not. Therefore, further mobile phone developments should consider its effect on happiness and well-being and work towards enhancing the positive and minimizing the negative effects.

Through the use of RRI, industry and policy makers can ensure increased individual well-being is as an objective throughout the innovation process, as well as create regulations for ICTs that support individual well-being. Tools such as the AREA plus framework can guide ethical reflection and considerations in an innovation process, helping to create products that are socially acceptable and desirable while incorporating ethical responsibility into the

innovation. A shift in focus from innovation for wealth to innovation for well-being is paramount (Martin, 2016). Policy makers can contribute by creating regulations and setting ethical standards for products to produce more good outcomes than bad. Increased awareness of the social consequences of ICT use will help industry and policy makers set the stage for more RRI activities. This thesis contributes to expand the knowledge of ethical issues related to ICTs, and can thereby help stakeholders broaden their understanding of these technologies, mobile phones in particular. As the mobile phone continues to develop, new ethical issues will likely occur, and new features may have novel implications for individual well-being other than what we see today. A continuous effort to analyze and anticipate current and novel impacts is therefore important.

The things we surround ourselves with and the technological artefacts we use become, at some point, part of our lives. As with the people we surround ourselves with, it is important to ensure that the technological devices we spend multiple hours using ultimately contribute positively to our lives. In understanding the effects of our current activities, we can build our capacity to respond to these effects, and ensure that we make responsible choices in the future. We can help shape information and communication technologies, instead of waiting for them to shape us, to ensure they provide us with the greatest happiness.

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Appendix – Questionnaire

SPØRRESKJEMA OM IKT, LYKKE OG BÆREKRAFTIG FORBRUK

LIVSTILFREDSHET

Før vi snakker om bruk av informasjons- og kommunikasjonsteknologier, ønsker vi å stille deg noen spørsmål om ditt nåværende nivå av livstilfredshet.

1. I det store og hele, hvor lykkelig er du?

0	1	2	3	4	5	6	7	8	9	10
Svært ulykkelig										Svært Lykkelig

2. Nedenfor står fem utsagn om tilfredshet med livet som helhet. Hvor godt eller dårlig stemmer disse for deg og ditt liv?

	Stemmer dårlig						Stemmer perfekt
På de fleste måter er livet mitt nær idealet mitt	1	2	3	4	5	6	7
Mine livsforhold er utmerkede	1	2	3	4	5	6	7
Jeg er tilfreds med livet mitt	1	2	3	4	5	6	7
Så langt har jeg fått de viktige tingene jeg ønsker i livet	1	2	3	4	5	6	7
Hvis jeg kunne leve livet på nytt, ville jeg nesten ikke forandret på noe	1	2	3	4	5	6	7

3. Hvor mange prosent av den norske befolkningen tror du er mindre lykkelig enn deg?

1. ____ **%**
88. Vet ikke

4. Hva tror du det lykkenivået er for den typiske norske borgeren akkurat nå?

0	1	2	3	4	5	6	7	8	9	10
Veldig ulykkelig										Ekstremt lykkelig

BRUK AV MOBILTELEFON OG INTERNETT I HVERDAGEN

M1
Alt i alt, hvor mye tid bruker du på din mobiltelefon en vanlig ukedag?

0. Ikke noe tid
1. Mindre enn 1 time
2. 1-2 timer
3. 2-3 timer
4. 3-4 timer
5. 4-5timer
6. 5-6 timer
7. Mer enn 6 timer
88. Vet ikke

M2 Hvor ofte bruker du din mobiltelefon på en vanlig ukedag?
Regn med alle ganger du utfører en aktivitet med mobilen

0. Ikke noen gang
1. Mindre enn 1 gang i timen
2. 1-2 ganger i timen
3. 2-4 ganger i timen
4. 4-6 ganger i timen
5. 6-8 ganger i timen
6. Mer enn 8 ganger i timen
88. Vet ikke

M3 Hvor mye av tiden som du bruker på mobiltelefonen på en vanlig dag går med til det følgende:

	Ikke noe av tiden	Litt av tiden	En del av tiden	Mesteparten av tiden
Private telefonsamtaler				
Sende SMS				
Høre på radio/podcast				
Høre på musikk (Ikke musikk på radio, men på musikkfiler og streaming)				
Se på TV				
Surfe på internett				

Spille spill				
Nettverks-/kommunkasjonsapper (for eksempel Facebook, Twitter, Instagram, Snapchat, whatsApp, Google Hangouts, Skype eller lignende)				

M4
Hvor mange ganger i timen tror du en gjennomsnittlig nordmann bruker mobiltelefonen sin?

0. Ikke noen gang
1. Mindre enn 1 gang i timen
2. 1-2 ganger i timen
3. 2-4 ganger i timen
4. 4-6 ganger i timen
5. 6-8 ganger i timen
6. Mer enn 8 ganger i timen

88. Vet ikke

M5
Vil du si at de fleste i din familie …

1. Ikke eier smarttelefon
2. Eier smarttelefon

M6 Når var første gang noen i din familie kjøpte smarttelefon?

0. Ingen i min familie eier smarttelefon
1. Før 2012
2. Mellom 2012 og 2014
3. Etter 2014

88. Vet ikke

M7 Hvor mange prosent av nordmenn tror du bruker smarttelefon sjeldnere enn deg?

1. %

88. Vet ikke

Internettbruk

M8 Har du eller noen i din husholdning tilgang til internett hjemme?

0. Ja
1. Nei

M9 Hvor ofte har du brukt internett i løpet av de siste 3 månedene?

1. Aldri
2. Mindre enn én gang i uken
3. Minst én gang i uken, (men ikke hver dag)
4. Hver dag / nesten hver dag

M10 Alt i alt, hvor mye tid bruker du på internett en vanlig dag?

0. Ikke noe tid
1. Mindre enn 1 time
2. 1-2 timer
3. 2-3 timer
4. 3-4 timer
5. 4-5 timer
6. 5-6 timer
7. Mer enn 6 timer
88. Vet ikke

M11
Hvilket år fikk du trådløst nett (Wi-Fi) hjemme?

1. Årstall: __
0. Jeg har aldri hatt / har ikke trådløst nett hjemme
88. Vet ikke

Internettbruk på forskjellige arenaer

Sosialt liv

I1
I løpet av <u>den siste måneden</u>, hvor ofte har du brukt de følgende internettjenestene for å kommunisere med familie og/eller venner?

	Aldri	En gang i måneden	To ganger i måneden	En gang i uken	Flere ganger i uken	En gang om dagen	Flere ganger om dagen
Sosiale medier (Facebook, Twitter)							

Skype, facetime eller lignende							

Forbruk

I2
I løpet av <u>den siste måneden</u>, hvor ofte har du brukt internett til pengetransaksjoner (betale regninger, overføre penger, styre sparekontoer eller investeringer)?

0	1	2	3	4	5	6
Aldri	En gang i måneden	To ganger i måneden	En gang i uken	Flere ganger i uken	En gang om dagen	Flere ganger om dagen

Handle på nett

I3
Hvor ofte har du brukt internett til å kjøpe følgende typer varer eller tjenester til privat bruk i løpet av <u>de siste 12 månedene</u>?

	Aldri	Sjeldnere enn en gang i måneden	En gang i måneden	Flere ganger i måneden	En gang i uka	Flere ganger i uka	Hver dag
Mat eller dagligvarer							
Husholdningsvarer (f.eks. møbler, leker, hvitevarer etc. men ikke elektronikk)							
Medisiner							
Klær, sportsutstyr							
Datamaskin, maskinvare							
Annet elektronisk utstyr (inkl. kamera)							
Telekommunikasjonstjenester (F.eks. TV- og bredbåndsabonnement, fasttelefon- eller mobiltelefonabonnement, fylle på kontantkort o.l.)							
Overnatting (Hotell o.l.)							

Reiser (Billetter til fly/tog/buss, leiebil, o.l.)							
Billetter til arrangement							
Filmer eller musikk							
Bøker, aviser, ukeblader, (Inkludert e-bøker)							
E-læringskurs / materiell							
Dataspill, annen programvare og programvareoppdateringer							
Annet : _____							

I4

Har du kjøpt eller bestilt varer eller tjenester for privat bruk direkte via å klikke på en reklame på sosiale medier eller i en app i løpet av de siste 12 månedene?

1. Ja
2. Nei

88. Vet ikke

Arbeid

I5

I løpet av <u>den siste måneden</u>, hvor ofte har du brukt internett i jobben til de følgende oppgavene?

	Aldri	En gang i måneden	To ganger i måneden	En gang i uka	Flere ganger i uka	En gang om dagen	Flere ganger om dagen
Epost i jobbtiden							
Epost utenfor jobbtiden							
Internettsurfing							
Intranett							
Nettbasert utdanning og opplæringskurs							

Kontakt med det offentlige

I6
I løpet av <u>de siste 12 månedene</u>, hvor ofte brukte du internettjenester for å gjøre følgende:

	Aldri	Sjeldnere enn en gang i måneden	En gang i måneden	Flere ganger i måneden	En gang i uka	Flere ganger i uka	Hver dag
Levere selvangivelsen							
Søking /fornying av lisenser og løyver							
Polititjenester							
Arbeidslivsrelaterte tjenester (søke jobb, søke dagpenger eller sykepenger, fylle ut meldekort, o.l.)							
Tjenester knyttet til barn eller helse (Søke barnehageplass, skifte fastlege, o.l.)							
Delta i lokaldemokrati/delta i lokalsamfunnet/engasjere seg i lokalsamfunnet (Sende brev ti l byrådet, svare på spørreskjema o.l.)							

Helse og velvære

I7
I løpet av den siste måneden, hvor ofte har du brukt følgende type apper:

	Aldri	Sjeldnere enn en gang i måneden	To ganger i måneden	En gang i uken	Flere ganger i uken	En gang om dagen	Flere ganger om dagen
Treningsapper							
Meditasjonsapper							
Andre helse-relaterte apper (f.eks. Helsenorge.no, Helse app på iPhone, FitBit o.l)							

I8

Har du programmer installert på din datamaskin/nettbrett for å blokkere internettreklame (som Adblock eller lignende)?

1. Ja
2. Nei

88. Vet ikke

PERSONLIGE MÅL

P1

De følgende spørsmålene handler om mål du har for fremtiden. Kryss av for det tallet som viser hvor viktig hvert mål er for deg personlig. Prøv å bruke hele skalaen når du rangerer målene - noen mål vil være lavt på skalaen, andre i midten, og andre høyt oppe på skalaen.

1 Ikke viktig i det hele tatt – 9 Ekstremt viktig

a. Noen i mitt liv vil akseptere meg som den jeg er, uansett.
b. Jeg vil håndtere problemene i livet mitt på en effektiv måte.
c. Jeg vil gjøre verden til et bedre sted.
d. Jeg vil ha en jobb som er godt betalt.
e. Jeg vil bli beundret av mange.
f. Jeg vil være i god fysisk form.
g. Jeg vil ha moteriktige klær og hår.
h. Folk vil vise omsorg for meg, og jeg for dem.
i. Jeg vil føle meg fri.
j. Jeg vil hjelpe folk som trenger det, uten å be om noe tilbake
k. Folk vil kommentere på hvor fin jeg ser ut.

l. Jeg vil ha nok penger til å kjøpe alt jeg har lyst på.
m. Jeg vil være i god fysisk helse.
n. Jeg vil at mange skal vite hvem jeg er.

SOSIO-ØKONOMISK OG DEMOGRAFISK INFORMASJON

S9.
Hvilke av disse beskrivelsene passer best på det du har gjort de siste 7 dagene?
a. I lønnet arbeid (eller midlertidig fraværende) (ansatt, selvstendig næringsdrivende eller arbeider i familie bedrift)
b. Under utdanning (som ikke er betalt av arbeidsgiver, medregnet fravær fra utdanning pga ferie)
c. Arbeidsledig og aktivt arbeidssøkende
d. Arbeidsledig, ønsker en jobb men er ikke aktivt arbeidssøkende
e. Varig syk eller funksjonshemmet
f. Pensjonert
g. I siviltjeneste eller militærtjeneste
h. Husarbeid, passer barn eller andre personer
i. Annet _____

S10.
Hvis du er i lønnet arbeid, hvor mange timer arbeider du vanligvis i løpet av en uke? (uavhengig av den avtalte arbeidstiden din, regn med eventuell betalt eller ubetalt overtid).
Antall timer _____ (oppgi svaret i hele timer, halve timer rundes oppover)

S 11.Hvordan vurderer du din egen helse i det store og hele? Vil du si den er:

1	2	3	4	5
Svært dårlig	Dårlig	Verken god eller dårlig	God	Svært god

S12
Vennligst indiker til hvilken grad de følgende utsagn er sanne for deg og ditt liv generelt.
(1= Ikke sant i det hele tatt -2 -3- 4 Noe sant 5-6- 7 Veldig sant

1	2	3	4	5	6	7
Ikke sant i det hele tatt			Noe sant			Veldig sant

1. Jeg føler meg levende og vital
2. Iblant føler jeg meg så levende at jeg holder på å sprekke!
3. Jeg har energi og livskraft
4. Jeg ser frem til hver dag som kommer
5. Jeg føler meg nesten alltid våken og opplagt

6. Jeg føler meg oppstemt

BÆREKRAFTIG FORBRUK OG NÆRHET TIL NATUREN

B1
Denne seksjonen inneholder spørsmål om dine handlinger knyttet til miljø. Krys av for det svaret som passer best for deg.

0	1	2	3	4
Aldri		Iblant		Alltid

1. **Hvor ofte går du, sykler eller tar offentlig transport i stedet for bil for korte reiser (som til og fra jobb, for å handle eller til faste fritidsaktiviteter)?**
2. **Hvor ofte tar du tog eller buss i stedet for bil eller fly for lange reiser (definert som ikke-regelmessige reiser med overnatting)?**
3. **Hvor ofte passer du på å redusere energibruken i hjemmet (skrur av lyset i rom som ikke er i bruk, trekker ut stikkontakten til apparater, skrur ned varmen i rom som ikke er i bruk)?**
4. **Hvor ofte skrur du ned termostaten når du er borte en helg eller lenger?**
5. **Når du kjøper elektriske apparater, hvor ofte kjøper du det mest energieffektive alternativet?**
6. **Hvor ofte spiser du "lavutslipps-mat" - f. eks. spiser mindre kjøtt, eller spiser kortreist mat?**

B7 På en vanlig måned, hvor ofte er du ute i naturen/friluft?

1	2	3	4	5	6	7
Aldri	Sjeldnere enn en gang i måneden	En gang i måneden	Flere ganger i måneden	En gang i uka	Flere ganger i uka	Hver dag

B8 Når du er ute i naturen/friluft, <u>hvor ofte</u> bruker du din mobiltelefon?

0. Ikke noen gang
1. Mindre enn 1 gang i timen
2. 1-2 ganger i timen
3. 2-4 ganger i timen
4. 4-6 ganger i timen
5. 6-8 ganger i timen
6. Mer enn 8 ganger i timen
88. Vet ikke

B9 Velg alternativet som du syntes best beskriver omgivelsene der du vokste opp:

1. Kystlandskap
2. Fjell og vidde
3. Åker/Jordbrukslandskap
4. Mark/beitemark
5. Skog
6. Tettsted/forstad
7. By/sammenhengende bebyggelse
8. Bar bakke (stein, sand, grus, jord)

INNTEKT, SPARING OG FORBRUK

Spar 1 Slå sammen inntekten DU får fra alle kilder. Hvilket alternativ beskriver din totale inntekt etter at skatten er trukket fra? Hvis du ikke vet, velg det alternativet du tror passer best

Vi vil understreke at du er anonym. Resultatene vil bli brukt til forskning på sammenheng mellom inntekt, lykke og IKT.

❍ Mindre enn NOK 19 000 netto i måneden
❍ NOK 19 001 til NOK 28 000 netto i måneden
❍ NOK 28 001 til NOK 35 000 netto i måneden
❍ NOK 35 001 til NOK 42 000 netto i måneden
❍ NOK 42 001 til NOK 49 000 netto i måneden
❍ NOK 49 001 til NOK 56 000 netto i måneden
❍ NOK 56 001 til NOK 63 000 netto i måneden
❍ NOK 63 001 til NOK 73 000 netto i måneden
❍ NOK 73 001 til NOK 88 000 netto i måneden
NOK 88 001 eller mer netto i måneden
Ønsker ikke svare

Spar 2

Slå sammen inntekten HUSHOLDNINGEN får fra alle kilder (Til husholdningen regner vi alle personer som er fast bosatt i boligen, og som har felles matbudsjett. Personer som er fast bosatt i boligen, men som er borte fra hjemmet, f.eks. på grunn av arbeid, skal regnes med).

Hvilket alternativ beskriver husholdningens totale inntekter etter at skatten er trukket fra? Hvis du ikke vet, velg det alternativet du tror passer best.

Vi vil understreke at du er anonym. Resultatene vil bli brukt til forskning på sammenheng mellom inntekt, lykke og IKT.

❍ Mindre enn NOK 19 000 netto i måneden
❍ NOK 19 001 til NOK 28 000 netto i måneden
❍ NOK 28 001 til NOK 35 000 netto i måneden
❍ NOK 35 001 til NOK 42 000 netto i måneden
❍ NOK 42 001 til NOK 49 000 netto i måneden
❍ NOK 49 001 til NOK 56 000 netto i måneden
❍ NOK 56 001 til NOK 63 000 netto i måneden
❍ NOK 63 001 til NOK 73 000 netto i måneden
❍ NOK 73 001 til NOK 88 000 netto i måneden
❍ NOK 88 001 eller mer netto i måneden
❍ Ønsker ikke svare

Spar 3 Generelt, hvor tilfreds er du med inntektsnivået til din husholdning?

0	1	2	3	4
Helt utilfreds	Ikke særlig tilfreds	Noe tilfreds	Veldig tilfreds	Helt tilfreds

Spar 4

Hvem sin inntekt ville du mest sannsynlig sammenligne din egen med?

1. Arbeidskollegaer
2. Familiemedlemmer
3. Venner
4. Andre (Hvem?):
5. Sammenligner ikke
6. Vil ikke svare
7. Vet ikke

Spar5

Når du sammenligner deg selv med andre, til hvilken grad fokuserer du på folk som …

	1 Ikke i det hele tatt	2	3	4	5 Svært mye
Har bedre levestandard enn deg selv?					
Har dårligere standard enn deg selv?					

Spar6

Hvor søker du inspirasjon/råd før du bestemmer deg for å kjøpe noe (til privat forbruk)?

1. Arbeidskollegaer
2. Familiemedlemmer
3. Venner
4. Media (f.eks. Tv-kjendiser/rollefigurer, ukeblader, o.l.)
5. Sosiale nettverk på nett (Facebook, YouTube, Instagram, o.l.)
6. Internett (f.eks. meningene til andre kunder, bloggere, etc.)
7. Andre (Hvilke?): ____ _____
8. Vet ikke

Spar7

Hvor mange prosent av din månedsinntekt går til sparing**?**

1. _____%
88. Vet ikke

Spar8
Enkelte bruker hele inntekten sin med det samme, mens andre sparer penger for å ha noe å falle tilbake på. Marker hva du gjør med penger som er til overs etter å ha betalt for mat, husleie, og andre grunnleggende behov. Er du av den typen som pleier å bruke pengene dine med det samme, er du av den typen som pleier å spare så mye som mulig, eller ligger du et sted mellom de to?

1	2	3	4	5	6	7	0
Jeg pleier å bruke pengene mine med det samme						Jeg pleier å spare så mye som mulig	Vet ikke

Bakgrunn:

Bak 1
Hva er din sivilstatus?

1. Ugift
2. Gift/Registrert partner/Samboer
3. Enke(mann)/gjenlevende partner
4. Separert/separert partner
5. Skilt/Skilt partner

Hvor mange personer er det i husstanden?
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5 eller flere
- ❍ Vil ikke svare

Hvor mange personer er det i husstanden under 18 år?
- ❍ Ingen
- ❍ 1
- ❍ 2
- ❍ 3
- ❍ 4
- ❍ 5 eller flere
- ❍ Vil ikke svare

5. Hvilket land er du født i?
   a. Open comment
   b. **Ønsker ikke å oppgi**

Hva er din høyeste fullførte utdannelse?

- ❍ Ingen fullført utdanning (0)
- ❍ Grunnskole (1)
- ❍ Videregående (2)
- ❍ Universitet/høyskole 1-3 år (Bachelor eller tilsvarende) (3)
- ❍ Universitet/høyskole 4 år + (Master eller tilsvarende) (4)
- ❍ Universitet/høyskole 5 år + (Doktorgrad eller tilsvarende) (5)
- ❍ Annet (98)