BEHIND THE NUMBERS

The effects of likes and fitness data on consumers

Abstract

The number of users of social media and fitness applications have increased tremendously in recent years. Consumers of these apps are constantly presented with numerical expressions of others' performances; how many likes others get on their content, or how fast and far they run. So far, little research has looked at how consumers actually feel as a consequence of constantly being exposed to others' performances in the form of numbers. This thesis aimed to examine any possible and unintended effects on consumers' well-being and behaviour, from seeing others' numbers of social media likes, and running pace. Taking support in the theory of social comparison, two experimental studies were conducted, where participants were exposed to stimuli that insinuated a *better* or *worse* performance than similar others, using the numerical constructs of Instagram Likes and Running Pace. The findings show that participants who were told they receive less likes than others, were more likely to choose hedonic over utilitarian products. Findings also show that participants who were told that their running pace is faster than other', reported higher self-esteem and life satisfaction, as well as lower feelings of stress. Self-esteem was further found to mediate the relationship to stress. Against these results, this thesis suggests that consumer behaviour can be affected from seeing other users' numbers of likes, and that users' well-being can be affected by seeing other users' running paces. The findings contribute to valuable insights for both consumers and practitioners, as well as the growing academic interest in the unintended effects that marketing can have on consumers.

Keywords: social media likes, fitness data, social comparison, consumer well-being, consumer behaviour

Authors:
Gustaf Delemark, 23448
Alexandra Jonerheim, 41157

Supervisor:
Micael Dahlén

Our sincerest thanks to

Micael Dahlén
for the abiding support

Proofreaders
for your valuable insights

and,

Family and Friends
for cheering us on

Table of Contents

Definitions

Mobile Applications	A software program that runs on a mobile phone (Cambridge Dictionary, 2018)
Mobile Fitness Applications	For this thesis defined as mobile applications that allow users to track their physical activity, visualise the performance data and share it with an ''in-app'' network or on social media.
Fitness data/ Physical Performance Data	Numerical expressions and/or statistics describing the outcome of the physical activity performed on several variables such as time, distance and elevation climb.
Social Networking Sites/ Social Media	Social Networking Sites are defined as web-based services that allow individuals to construct a public or semi-public profile, articulate a list of other users with whom they share a connection and view their list of connections and those made by others within the system (Boyd & Ellison, 2007). This definition includes social media, hence the two definitions are used interchangeably in the thesis.
Social media likes	For this thesis defined as one-click feedback to the content that social media users have posted (Scissors, Burke & Wengrovitz, 2016), that have the potential to be of social and affective relevance (Rosenthal-von der Pütten et al., 2019).
Self-Quantification	The collection of data on one's own bodily performance through the use of tracking devices or mobile applications (Lupton, 2013)
Consumer well-being	For the purpose thesis defined as a consumers' mental state characterised by positive emotions and the absence of negative affect.
Consumer behaviour	Defined as ''the study of the process involved when individuals or groups select, purchase, use or dispose of products, services, ideas or experiences to satisfy needs and desires'' (Solomon et al, 2006).
Social comparison	The process of comparing one's own standing in terms of abilities and opinions, to similar others (Festinger, 1954). Includes *downward comparison* (comparing to someone worse off) and *upward comparison* (comparing to someone better).
Self-presentational numbers	For the purpose of this thesis referring to numbers that are used as part of the user's presentation of self, on social media and in fitness applications. For example, likes and fitness data.

1. Introduction

1.1 Background

In recent years, the industries of social media and mobile health (mHealth) applications have grown tremendously. Social media, one of the fastest growing technology sectors, expands with about 13% of users every year and shows no signs of slowing down (Jacobs, 2016). In 2017, close to 2.4 billion of the world's population had a social network account (Statista, 2017a), with Facebook hosting 2.13 billion active users (Statista, 2018a). At the same time, more than 200 new mHealth applications are introduced on app stores every day, adding to the more than 318 000 health and fitness applications available on app stores worldwide (Iqvia Institute, 2018). Of all downloaded mHealth application, nearly 75% are accounted for by fitness and weight loss applications (Kesiraju & Vogels, 2017).

Not only do users merely hold an account on social media or download fitness and weight loss applications. On Instagram, the fastest growing social networking site (Southern, 2018), the average US user spends about 53 minutes every day (SimilarWeb, 2018), and every fourth user of fitness applications accesses the app ten times or more a week (Kesiraju & Vogels, 2017). The increasing usage of fitness applications can be largely attributed to the rise of wearable tracking devices (wearables), such as the Fitbit. With a projected growth of 9000% between 2015 and 2025 (Statista, 2016a), an estimated 500 million wearables will be in the hands of consumers by 2020 (Gartner, 2015). While tracking devices enable users to track every calorie burned, every minute slept and every step taken, fitness applications make it possible to visualize these numbers. Furthermore, most fitness applications include a social function, allowing users to view other users' activity, compare the performance data and compete with friends and other users. These ''in-app'' networks are attracting attention from several big brands such as Powerade (Coca-Cola) and Under Armour (Endomondo, 2012), who have seen the potential the networks bring to engage in consumer relationships (Under Armour, 2015).

Social networks are seen to act as self-presentational tools, where users engage in self-presentational practices by uploading content and communicating through the platform's functions (Seidman, 2013; van Dijick, 2013). On the two popular social networking sites Facebook and Instagram, the communicative function of Likes allows users to give feedback to each other's' content. Likes, in their aggregate expression, have come to represents signs of acceptance and approval of the self-presented content (Ellison & Vitak, 2015). It is not surprising then, that users seek to maximize the number of likes received.

Receiving likes is feedback on the self-presentation created on social media. On Instagram, a search for the ''like4like'' hashtag generates around 470 million results, and refers to the practice where users like each other's pictures in order to raise the amount of total likes displayed (Urban Dictionary, 2018). As the activities suggest, the number of likes received, and consequently displayed to the network, seem to hold self-presentational value to the user on social networking sites.

1.2 Problematization

Academic inquiries into the meanings of social media likes, have suggested that Likes have a social meaning, beyond their primary function of showing support and agreeing with the posted content. As signs of popularity and social status (e.g. Madden et al., 2013), they affect users' behaviour on, and off the social networking site (VitalSmarts, 2015). Similarly, quantifying one's physical activity and being aware of the bodily performance through numbers, have shown to increase one's physical activity (e.g. Sjöklint, 2015) and to affect the motivation to reach set goals (Pettinico & Milne, 2017). Clearly, fitness applications can also affect user's behaviour beyond the fitness application itself.

With literature suggesting that social media likes and fitness tracking has the power to affect behaviour, very little research has focused on how the individual feels as a consequence. In the eight years since the introduction of the 'Facebook Like'' (Gerlitz & Helmond, 2013), only a handful of studies have looked at well-being effects as a consequence of receiving a certain amount of likes (e.g Rosenthal-von der Pütten et al, 2019). Similarly, fitness applications and their social functions are a very recent phenomenon and have barely been considered in academic research. Although, initiated studies on the topic suggest that seeing others' fitness data can affect one's physical activity (Wu & Huang, 2015; Zhou, Kankanhalli & Huang, 2016), none has considered effects on well-being.

All users of social media and fitness applications further represent a large group of consumers, partly as consumers of the application and its functions, but also as potential consumers to companies associated with the application. Instagram has recently become a valuable tool for businesses to advertise in, at times even providing a direct link for users to access e-commerce websites. Social media has become an effective tool for businesses to reach consumers, one that has been largely linked to affecting purchasing behaviour (Nielsen, 2014). Similarly, fitness applications are often used as a compliment to wearable tracking devices, that currently represent the most revenue driving segment of the global

fitness market (Statista, 2018b). As social networks within fitness applications grow, brands are also starting to embrace the potential they bring. Using Powerade as an example, the brand early partnered up with the social fitness application Endomondo, awarding the users' fitness performance through the app with sponsored products (Endomondo, 2012).

However, research has not yet considered the effects on consumer behaviour from comparing with others' self-presentational numbers on social networks. Even though consumers spend more time on social media than ever before (Statista 2017b), and use fitness applications to track their performances, any unintended effects on consumer behaviour has yet to be observed.

Hence, the biggest issue is that there is a lack of understanding of the possible effects that self-presentational numbers can have on consumers' well-being and behaviour. In adjacent fields of research, awareness has been brought to the fact that consumers at times are negatively and unintendedly affected by marketing practices (e.g Stoeckl & Luedicke, 2015). As a marketing concept, advertising has been seen to lead to cognitive processes unrelated to the product being advertised (Åkestam, Rosengren & Dahlén, 2016). In another field closely related to numbers, priming consumers with the concept of money has been shown to affect both well-being and behaviour in aspects unrelated to money (e.g. Tong et al, 2008; Vohs, 2006; Zhou, Vohs & Baumeister, 2009). Consequently, it has been recognised that both marketing practices and environmental cues have the power to lead consumers to cognitive processes initially not intended of. Therefore, it is not strange to assume that likes and fitness data can have similar unintended effects, especially because likes can be seen to signal popularity (Ellison & Vitak, 2015), and fitness can be seen to signal status (Johansson, Tienari & Valtonen, 2017). Thus, finding out whether exposure to others' self-representational numbers has any unintended effects on consumers, is called for.

1.3 Purpose

With the problematization in mind, the purpose of this thesis is to investigate if and how self-presentational numbers on social media and within fitness applications affect consumers' well-being and behaviour.

More specifically, the research questions below will be answered:

1. Will having more as compared to less likes than others, have an impact on consumers' well-being and behaviour?
2. Will having a faster as compared to a slower running pace than others, have an impact on consumers' well-being and behaviour?

1.4 Expected Contribution

With this thesis, we aim to contribute with further knowledge to consumers, practitioners and the theoretical research community. Observing the unintended effects of marketing on consumers and society seems to be a growing interest in academic research (e.g. Stoeckl & Luedicke, 2014; Pollay, 1986; Åkestam, Rosengren & Dahlén, 2017), making this thesis relevant in time. Specifically looking at the numerical constructs of Likes and Running Pace, this thesis aims to reinforce academic relevance on how self-presentational numbers may affect consumers' well-being and behaviour.

Secondly, the findings of this thesis contribute to a greater understanding among consumers of how their usage of social media and fitness applications, may affect their well-being and behaviour.

Thirdly, this thesis is expected to provide contributions to businesses associated with social media and fitness applications. These could be businesses developing social media and fitness applications, or simply those with a presence on the platforms, i.e. marketers. Knowing how consumers are affected by the medium that is used, can be an important observation and ethical consideration for both developers and marketers.

Lastly, knowing how consumers are likely to feel and act in different situations, are important considerations in strategic marketing decisions, such as segmenting and targeting. In present time, marketing research often highlights observing and understanding the consumer and tailor the marketing message followingly, rather than trying to make one marketing message fit for all (e.g. Kotler & Armstrong, 2010).

1.5 Delimitations

The first delimitation of our studies, was the choice to look at social media and fitness applications. Social media was chosen because it is deemed an ever more present part of consumers' lives. Spending an increasing amount of time on the applications and websites,

users are largely making decisions based on what they see and are exposed to on social media (Nielsen, 2014). Within the health and fitness category of mobile applications, there are a wide range of applications tracking bodily as well as mental health, that also include a social function. Fitness applications were chosen among these, because they (together with weight loss applications) make up the largest portion of the category (Kesiraju & Vogels, 2017).

The second delimitation was the choice of numerical constructs, likes and fitness data. On both social media and in fitness applications, other numerical constructs exist, such as *number of friends, number of comments/shares, number of workout sessions*. Likes and fitness data were chosen because these are a direct type of feedback to the users' performance on the mediums, i.e. the users' capability to create a desirable self-presentation and physical capability.

Furthermore, the study was delimited to the specific numerical constructs of Instagram likes and Running Pace. Instagram is the fastest growing social media, and while it attracts more and more users every day, it has not been widely discussed in research on social media likes. Running Pace was chosen because tracking one's running pace is a function included in most fitness applications (Statista, 2018c), as well as running is the most widely exercised outdoor activity in the US (Statista, 2017c).

Lastly, the number of variables of both well-being and consumer behaviour were delimited. The chosen variables mainly represented some of the most widely researched constructs of well-being and types of consumer behaviour.

1.6 Thesis Outline

This thesis has been structured into five sections, each presenting a distinct aspect of the research conducted. The sections are outlined as follows: *1. Introduction*, *2. Theory*, *3. Methodology*, *4. Results & Analysis*, and *5. Discussion & Concluding Remarks*. The following section, *Theory,* will review relevant extant literature and with the theoretical lens chosen deduce hypotheses to be tested. The third section, *Methodology*, will present the results of the pre-studies conducted, as well as lay out the scientific approach and research design of the main studies. The penultimate section, *Results & Analysis*, will present the results from the main studies, analyse the findings and conclude whether the hypotheses tested are supported or not. Finally, the fifth section, *Discussion & Concluding Remarks*, will discuss the findings, practical implications, limitations of the current studies and suggestions for future research.

2. Theory

The following section will give an overview of the existing and relevant literature from research on self-quantification, numbers' persuasiveness, numbers in social media and numbers in fitness applications. Following, the theoretical lens of social comparison will be presented, and ultimately the hypotheses to be tested will be deduced.

2.1 Literature Review

2.1.1 Self-Quantification

There is a growing trend to track one's physical activity (Fox & Duggan, 2013; Statista, 2017d; Wu, Sum & Nathan-Roberts, 2016). This activity has in official terms been named ''self-quantification,'' and is defined as the collection of data on one's bodily performance through the use of tracking devices or mobile applications (Lupton, 2013). In this thesis, mainly the term self-quantification will be used, although other terms such as self-tracking (e.g. Sjöklint, 2015), self-monitoring (e.g. Shilton, 2012) and lifelogging (e.g. Dodge & Kitchin, 2007), exist. Thanks to wearables, fitness applications and built-in activity monitors in mobile phones, the simplicity of self-quantification has increased dramatically in only a few years. Consequently, self-quantification is now an activity available for anyone with a tracking device or a mobile phone.

Recording people's behaviour, thoughts and feelings is not a new concept. In research, self-monitoring has been an area of interest within behavioural psychology since the 1970's (Kopp, 1988). In practise, clinicians, psychologists and educators have all used self-monitoring practices to measure behavioural change (e.g. Paton et al, 2012; Prince 2014; Williamson, 2014). However, the concept of willingly quantifying oneself for one's own purposes, has only recently earned academic consideration (Maltseva and Lutz, 2018).

Gary Wolf and Kevin Kelly coined the term and initiated the Quantified Self movement in 2007 with the objective to increase self-knowledge through self-tracking (Wolf, 2010). In accordance with these ideas, self-knowledge, self-control and self-reflection have in literature been argued to be the biggest motivators, but also effects, from self-quantification (e.g. Choe et. al, 2014; Li et. al, 2011; Lupton, 2016; Ruckenstein and Pantzar, 2017). Feeling in control is widely recognized to be important for our physical and psychological well-being (e.g. Langer, 1975; Larson, 1989; White, 1959). Additionally,

Kelley, Lee and Wilcox (2017) suggest that self-reflection can be a great tool for stress management and well-being, as long as the user is not overwhelmed or ashamed of what the data entails.

Another motivation to self-quantify is to improve performance, which is suggested to be positively affected by the act of self-quantifying. Improvements of both one's physical activity and diet have been attributed to the quantification of one's behaviour (e.g. Didžiokaitė et al., 2018; Michie et al, 2009; Sjöklint, 2015). The changes in physical activity and diet are argued to be a consequence of the greater awareness that self-quantification brings to the specific activity monitored, as well as to the body and the surrounding environment (e.g. Choe et al., 2014; Didžiokaitė et al., 2018; Wilde and Garvin, 2007).

On the other hand, some resistance to the quantified-self movement can also be observed in the extant literature. According to Etkin (2016), self-quantification can make otherwise enjoyable activities feel like work. Similarly, Toner (2018) argues that self-quantification objectifies the user, which makes he or she forego the sensation and enjoyment of physical activity. As a potential health hazard, an overuse of self-quantification has been suggested to trigger obsessive behaviour, mental stress and depression (Everett, 2015; Wu Sum, & Nathan-Roberts, 2016).

Achieving self-knowledge through numbers, was an early motivation for the Quantified Self movement (Wolf, 2010). Given the emphasis on numbers as central to knowledge, the act of self-quantification sheds light on a contemporary relationship to data as well as on trackers' tendencies to replace qualitative experiences with numbers (Swan, 2013). Pettinico and Milne (2017) put it simply; ''You can't hide from the numbers''.

2.1.2 The Power of Numbers

For most, numbers are seen to demonstrate objectivity (Maturo and Moretti, 2018). Extending this line of argument, objectivity is seen to represent the reality, while subjectivity can be regarded as beliefs and ideas that only exist in our minds. It is argued that the reason for quantified expressions being perceived as objective, is because numbers are easily communicated, which makes them accepted with less cognitive resistance and thus perceived as the truth (Porter, 1996). In research, numbers' powerful persuasion effects have been looked at in amongst all the areas of communication and advertising (e.g. Anderson and Jolson, 1980; Holbrook, 1978; Yalch and Elmore-Yalch, 1984). Including numerical information in messages relayed to an audience, has been seen

to spark a so called ‘’peripheral processing’’, meaning that the message is judged on its credibility (use of numbers) rather than the descriptive information it contains. As a consequence, messages that contain numerical information are seen to persuade the consumers more in the direction desired (Yalch and Elmore-Yalch, 1984).

Moreover, the power of numbers has been identified beyond just its persuasiveness. Numerical information compared to verbal information is recognized faster (Childers and Viswanathan, 2000), perceived as more credible (Holbrook, 1978), encountered with less cognitive resistance (Edell and Staelin, 1983), to have stronger influence on beliefs and attitudes (Zebregs, 2014) and to produce more positive customer responses (Darley and Smith, 1993). Lastly, customers encountered with information about a product expressed in numerical form, are more likely to believe that the product will deliver on its promise, and that the information is more accurate and authoritative (Zhang and Schwarz, 2012).

Being persuaded by numbers is not only a tendency of the consumer. The great reliance on numbers can also be seen in professional contexts. Most managerial decisions are based on objective data rather than on feelings because data is seen as more rational (e.g. Fineman, 1997; Sadler-Smith & Shefy, 2004). In other words, when rational decision-making is the norm, tangible evidence in terms of numbers become preferred (Saaty, 2008; Simon, 1979). When it comes to the managing of people in businesses, rewarding performance based on numerical information such as the number of sales made, efficiency level achieved, or ideas generated, are further examples of the inclination to rely on numbers in the organisational life (e.g. Otley, 1999).

Put in a communications perspective, numbers seem to make the message more credible and easy to understand (Edell and Staelin, 1983; Holbrook, 1978). With the argument that numbers are perceived to express the truth (Porter, 1996), consumers are through their daily media consumption exposed to an increasing amount of truths every day. Two mediums that stand out in their novelty and rapid growth are social media and mobile fitness applications (Kesiraju & Vogels, 2017; Jacobs, 2016). By the nature of these mediums, numerical expressions are a focal point, subjecting their users to the power of numbers.

2.1.3 The Power of Numbers in Social Media

In 2009, Facebook introduced the ‘Like Button’, allowing user engagement to be instantly transformed into numbers. With one click, users can express a variety of affective

emotions; including agreement with and understanding of the posted content (Gerlitz & Helmond, 2013). Seeking attention and approval has been shown to be two of the main motivations for uploading content on social media (Malik, Dhir & Nieminen, 2016; Stefanone, Lackaff & Rosen, 2011). Through uploading content and communicating on the platform, the users aim to present a version of themselves (Seidman, 2013; van Dijick, 2013). They are also seen to engage in impression management (Pounders, Kowalcyk & Stowers, 2016) and tend to upload positively skewed content (Appel et al., 2016). Likes in turn act as affective feedback to the uploaded content and leave traces of how much the content has been attended to by the user's network. The signals of attention are visible to both the user and its network and express in a numerical form how much the content has been paid attention to and/or agreed with. Ellison and Vitak (2015), further conceptualise that likes can be seen as quantified metrics, that can be used to make inferences about the user's popularity.

Likes on social media have further been seen to express signs of social support (Carr, Wohn & Hayes, 2016; Hayes, Carr & Wohn, 2016). In their studies of how likes, upvotes and favourites are being used to communicate on Social Networking Sites (SNS), Wohn, Carr and Hayes (2016) found that the quantity of likes received is positively correlated with the individual's perception of social support. Both the volume, as well as the receiver's subjective satisfaction with it, were shown to have an effect on the social support perceived (Wohn et al., 2016). Further reinforcing that the number of likes can be seen as social support, Madden et al. (2013) observed how teenagers manipulated their social media profiles and timelines to receive more likes and deleted content that they thought had too few likes. Likes, the authors argue, can be seen as a ''strong proxy for social status''.

SNS users' satisfaction with the feedback received on posted content, has been seen to vary with the expectancy of feedback. Grinberg et al. (2017) found that if the user deems the content important, he or she is more likely to expect feedback in the form of likes and reactions. In a similar line of argument, a post was found to be successful or not depending on whether the number of likes and reactions reached the user's perceived threshold of success (Carr, Hayes and Sumner, 2018). This threshold of success was in turn found to be established as the users compared the number of likes and reactions they received to similar other friends on the social network. Observing a user with less likes and reactions would lower the threshold, while observing a user with more likes would increase the threshold (ibid.).

Recent studies conducted with the help of MRI technology, showed that regions in the brain connected to reward processing and social connectivity were more active when participants were exposed to pictures with *many* compared to *few* likes (Sherman et al,

2016; 2018a; 2018b). The participants were more likely to enjoy the pictures that had been more extensively endorsed by their peers, i.e. displayed more likes underneath them, than those less endorsed by their peers. In line with these findings, Rosenthal-von der Pütten et. al (2019) conceptualise likes as social rewards, that in aggregation form an ''online social currency''. Similar to money rewards, social rewards are seen to act as secondary reinforcers. Secondary reinforcement refers to stimuli that create a behavioural response because they have been associated with a biological need. In the case of social media likes, the 'Like' in itself is suggested to have been paired with the biological feeling of social belonging (Maslow, 1943; Rosenthal-von der Pütten et al., 2019; Sherman et al, 2018). As a ''social currency'', higher amounts of likes would then lead to stronger feelings of social belonging.

Rosenthal-von der Pütten (2019) also introduces the argument that viewing another user's numerical expression of likes should lead to effects of social comparison, in line with existing research stating that other users' content on Facebook often is compared with (e.g. Appel et al, 2016). Their findings show that the social comparison in turn led to affective responses such as superiority/inferiority, joyfulness/sadness, jealousy and resentment.

Extant research on numerical expressions on social media, has found that it is not only the amount of likes that seem to affect users. Kim and Lee (2011) found support for a positive relationship between an individual's number of friends on Facebook, and subjective well-being. Visually exposing the participants to their number of friends, reminded them of their social connections, and affirmed or enhanced their feelings of self-worth. Similarly, Nabi et al. (2013) saw that a user's number of friends affected perceived social support, which in turn, was associated with reduced stress, less physical illness and greater well-being.

In line with previous research on how likes can signify attributes of the person posting (e.g Gosling, Gaddis & Vazire, 2007; Hayes et al, 2016; Scissors, Burke & Wengrovitz, 2016), the number of friends has also been seen to communicate inferences about the user. In an experimental study, Tong et al. (2008) investigated the relationship between the number of Facebook friends and the perceived physical attractiveness of the user. Exposing participants to fake Facebook profiles with varying amounts of friends displayed, a curvilinear relationship between the number of friends and perceived attractiveness of the user was found. By simply manipulating the number displayed on the user's profile, different judgements about the user's appearance incurred as a result.

2.1.4 The Power of Numbers in Fitness Applications

Numbers have been used to track fitness performances for quite some time. Professional athletes quantify aspects of their training, such as oxygen consumption, heart rate, distance or time run; all in order to understand their physiological form and progress (Borresen & Lambert, 2009; Hopkins, 1991). This practice used to be limited to professional athletes and their coaches, but with the emergence of tracking devices and mobile fitness applications, even the hobbyist runner can easily track several aspects of their physical performance (Pettinico & Milne, 2017). A number of fitness applications also include social sharing functions (e.g. Lomborg & Frandsen, 2016; Stragier, Evens & Mechant, 2015). Users of tracking applications such as Strava, Runkeeper and Nike Training Club, can choose to share their quantified performance with their in-app network or on social networking sites such as Facebook, Instagram and Twitter (Nike, 2018; Runkeeper, 2018; Strava, 2018). Messages in the style of ''Just ran 9.23 km in XX minutes'' are frequently posted and shared with others (Stragier, Evens & Mechant, 2015).

Research has further shown that users of fitness applications tend to pay attention to other users' fitness data (e.g. Gui et al., 2017; Hamari & Koivisito, 2015; Koo & Fallon, 2018). Novice users are found to favour and to track others' fitness data, while experienced users prefer to follow the social media posts broadcasting the same data (Koo & Fallon, 2018). According to Gui et al. (2017), the tendency to pay attention to and acknowledge other users of the fitness app is further strengthened. Users are found to reflect on other users' data, and to even make inferences about their health based on the activity. Seeing others' activity make the users reflect on their own ''online images'', and question how it, in turn, is interpreted by the network. Similarly, Lomborg & Frandsen (2016) argue that fitness tracking is a socially meaningful event that highlights social recognition of an individual's efforts. Tracking and expressing physical performance data, is seen to meet a need of communicating with others, which in itself provides a sense of belonging (Lomborg & Frandsen, 2016).

The availability of other users' fitness data in the form of Leaderboards have furthermore been looked upon in research. Leaderboards are ''in-app ranking lists'' that rank users according to performance. Looking at Leaderboards within the applications Nike+ and Runkeeper, Wu and Huang (2015) suggest that users' physical activity is affected by the existence of the Leaderboard. Seeing other users' fitness data in connection to one's own, makes the user engage in social comparison, they suggest. The act of comparing to one's own data creates attitudes which in turn affects physical performance. Also taking support in the theory of social comparison, Zhou, Kankanhalli and Huang (2016) suggest that

observing more friends below one's ranking on leaderboards than above, will have a positive outcome on performance. In contrast, observing more friends above one's ranking than below, will create a feeling of belonging to the ''worse'' performing group and impact physical performance negatively.

2.1.5 Theoretical Research Gap

Reviewing the extant literature on numbers in social media, and numbers in fitness applications, two knowledge gaps become evident. A few studies have pointed to what social media likes mean to the person performing them, as well to the person receiving them (e.g. Rosenthal-von der Pütten et al., 2019; Sherman et al., 2018). However, few studies have looked at how the social media user feel as a consequence of seeing others' aggregated amount of likes. While the findings of Rosenthal-von der Pütten et al. (2019) suggest that the quantity of likes can have an effect on self-esteem, happiness and superiority, no further effects on well-being are tested. Neither do the authors look at any potential effects on consumer behaviour.

Secondly, the effects of numbers in fitness applications have barely been addressed in literature. The activity of quantifying one's behaviour and bodily functions have to some extent been examined in research on self-quantification behaviour (e.g. Choe et al., 2014; Etkin, 2016). However, none has investigated if and how being exposed to numerical representations of others' physical performance affect consumer well-being or consumer behaviour.

2.2 Theoretical Lens: Social Comparison

While the similarities between fitness applications and social media have not been discussed in research, studies of both phenomenon have suggested social comparison to be an underlying factor (Rosenthal-von der Pütten et al., 2019; Wu & Huang, 2015; Zhou et al., 2016). Again, users on social media are seen to engage in impression management (Pounders, Kowalcyk & Stowers, 2016) and to post positively skewed content (Appel et al. 2016) that aims to present themselves in a desired way (van Dijick, 2013). Feedback in the form of likes, then signify acceptance and approval of the posted content and the self-presentation that users have created. With these arguments, we assume that likes act as feedback not only to the content itself, but also as feedback to the user's ability to present him/herself. To support our claim is that self-presentations, although referring to offline presentations, have been conceptualised as performances (Goffman, 1959).

Similarly, fitness data shared on fitness applications represents a physical performance. Fitness has been regarded as an important ability since the beginning of mankind, (Dalleck & Kravitz, 2002). Today, fitness is highly valued in organizational contexts (e.g. Johansson, Tienari & Valtonen, 2017), where employees strive to perfect their bodies to improve their professional identities (Costas, Bagoev & Kärreman, 2016). Fitness and sporting abilities have further been considered to increase managerial status (Sinclair, 2005). As the core of social comparison theory explains that humans seek to evaluate their abilities, the theory proves appropriate to use. With the argument that both social networking sites and fitness applications are environments that often ''push'' others' numbers on the user (Sjöklint, 2013), social comparison can be seen as an appropriate mechanism to make sense of the information and one's own ability in relation. Hence, to explain any effects on consumer well-being and behaviour that might follow as a consequence of the exposure to numbers, we employ the theory of social comparison.

The theory of social comparison states that there is a need in every human to evaluate one's abilities and opinions (Festinger, 1954). When we evaluate these abilities and opinions, we seek an objective benchmark towards which we can compare. Doing so will produce a sense of cognitive clarity and validity. However, an objective and stable benchmark to compare towards does not always exist, leading the individual to compare performances and opinions to *similar others* instead. Festinger (1954) suggested we seek to compare with those that are similar to us, and that we due to society's unexplained drive to become better tend to *compare upwards* to those that are considered better than ourselves.

Wills (1981) added to the theory by introducing the concept of *downward comparison,* explaining that we in order to enhance ourselves, also compare with those that are worse off than we are. Respectively, *upward and downward comparison* produce different effects on subjective well-being. Although the effects of each direction have been debated (e.g. Buunk et al., 1990; Collins, 1996), a recent meta-analysis by Gerber, Wheeler & Suls (2017) affirm that comparing upwards tend to result in a worsened mood and lower ability appraisal, while comparing downwards leads to the opposite. Thus, early studies that found upward comparison to lead to negative effects on self-esteem and the self-image, and downward comparison to enhance satisfaction and motivation (Taylor & Lobel, 1989; Wills, 1981), still stand.

Social comparison can also be imposed and unwanted (Wood, 1989), and produce so called reactive effects. One aspect of imposed social comparison that has been considered in research, is the effect on well-being of advertising portraying ''ideal'' body types (e.g.

Jones, 2000; Bessenoff, 2006). Being exposed to ''ideal'' representations of how one's body ''should'' look like, has been seen to lead to negative effects on well-being, through the process of social comparison (Bessenoff, 2006). With the emergence of social media, the theory of social comparison has resurfaced. Due to the nature of social media, users are imposed to numerous opportunities to compare with others; the effects of which has been of interest to many researchers (e.g. Fox & Moreland, 2015; Blease, 2015; Appel et al, 2016). Since social media users often post positively skewed content, plenty of opportunities for upward comparison are given, and its effects on well-being have been documented (e.g. Moreno et al, 2011; Vogel et al, 2014).

Looking at the two numerical constructs of this thesis, Likes and Running Pace, no objective benchmark exists towards which the user can evaluate his or her performance. As stated by Festinger already in 1954; ''...if a person evaluates his running ability, he will do so by comparing his time to run some distance with the times that other persons have taken'' (p. 118). Similarly, an individual receiving likes on Instagram will not be able to evaluate the quantity received against an objective benchmark to determine if the quantity is good or bad. Instead, he or she should compare to similar others in the network. With this theoretical lens, we further argue that seeing someone with more likes or better physical performance data, will lead to upward comparison, i.e. contrasting one's abilities with someone perceived as ''better''. Reversely, seeing someone with less likes or worse physical performance data than oneself, will lead to a downward comparison, i.e. to someone perceived as ''worse''.

With these theoretical considerations in mind, we hypothesise how being exposed to numbers that lead to an upward or downward social comparison, could have an effect on consumer well-being and consumer behaviour.

2.3 Hypotheses Generation

2.3.1 Effects on consumer well-being

Self-Esteem

Self-esteem has been defined as ''extent to which one prizes, values, approves or likes oneself'' (Blascovich & Tomaka, 1991), and an often-discussed parameter of well-being (e.g. Diener, 1984; Diener, Oishi & Lucas, 2003). In connection to social comparison, self-esteem has been seen to be affected by the direction of comparison (e.g. Wills, 1981).

Comparing downwards, can grant feelings of higher self-esteem, while comparing upwards, can produce a lower sense of self-esteem (e.g. Morse & Gergen, 1970).

In line with extant research on how other social media users' posted content can affect the onlooker's self-esteem through social comparison, we hypothesise that the numerical expression of likes also to lead to the same effects. Burrow & Rainone (2016) and Rosenthal-von der Pütten et al. (2019) found this to be the case when likes on users' Facebook profile pictures were investigated. Similarly, in mobile fitness applications where users take part of others' fitness data, multiple social comparisons are bound to be made. Consistent with the theory of social comparison, we then hypothesise that;

H_{1a}: *Having more vs less likes than similar others increases self-esteem*

H_{1b}: *Having a faster vs slower running pace than similar others increases self-esteem*

Life Satisfaction

Similar to self-esteem, life satisfaction is often a considered parameter in research on subjective well-being (e.g. Diener, 1984; 2000), and has been defined as ''the degree to which a person positively evaluates the overall quality of his/her life as-a-whole'' (Veenhoven, 1996). Frieswijk et al. (2004) found support for upward social comparison leading to lower life satisfaction. Similarly, Huang (2016) saw that volunteers reported higher life satisfaction when volunteering for a downward comparable target. Lastly, those that engage in upward social comparison over a longer time, were seen to report a lower subjective well-being (Wheeler and Miyake, 1992).

In research on social networking sites, a number of studies have suggested effects on life satisfaction from spending time on the sites (e.g. Ellison, Steinfield & Lampe, 2007; Steinfield, Ellison & Lampe 2008; Valkenburg & Schouten, 2006). Further studies suggest that sites such as Facebook and Instagram, provide ample opportunities for social comparison, and that comparing to others can cause feelings of envy (Appel et al, 2016). Although life satisfaction has been looked at as a consequence of the time spent on social networking sites, we assume that potential effects also can be regarded from social comparison on the site. With both social media sites and fitness applications allowing for opportunities to engage in comparison, and the fact that social comparison over time can be seen to affect subjective well-being, we hypothesise that:

H_{2a}: *Having more vs less likes than similar others increases life satisfaction*

H_{2b}: *Having a faster vs slower running pace than similar others increases life satisfaction*

Stress

Comparing to someone perceived as ''better'' than oneself, can lead to negative evaluations of oneself, which in turn has been linked to psychological depression (Swallow & Kuiper, 1988). Similarly, recent research suggests Facebook usage increases scores of depression and anxiety (Labrague, 2014). In the past few years, the term ''Facebook depression'' has become a way to describe the affective response from spending too much time on the site (Selfhout et al., 2009; Kross et al., 2013). The effects on depression levels were higher the more friends the user had, because of the increasing amount of opportunities to observe others' ''higher status'' cues. Observing higher status cues led to users feeling lower relative social value (Blease, 2015). In other words, more friends on social networks enable increasing opportunities to engage in upward social comparison, due to the positively skewed content users tend to post (Appel et al., 2016).

Taking support from the theory of social comparison, comparing to those of lower ability, tend to lead to increased self-evaluations (Gerber, Wheeler & Suls, 2017). Although existing social comparison research shows effects on psychological depression, stress factors correlate highly with those of anxiety and depression (Henry & Crawford, 2005). Psychological Stress is thus deemed appropriate to test, here defined as the emotional ''feeling of strain and pressure'' (Mental Health America, 2013).

Furthermore, self-esteem has been found to have a moderating effect on the relationship between a *stressor* (a stressful situation) and *strain* (adverse reactions) (Jex & Elacqua, 1999). Those low in self-esteem are more likely to be adversely affected by the stressor, than those high in self-esteem. In this thesis we hypothesise that self-esteem will be affected as a dependent variable. With the mentioned findings in mind, we thus hypothesise it will act as a moderator in the relationship between the independent variable and stress. We hypothesise that:

H_{3a}: *Having more vs less likes than similar others decreases stress*

H_{3b}: *Having a faster vs slower running pace than similar others decreases stress*

2.3.2 Effects on consumer behaviour

Healthy vs. Unhealthy Product Choices

Looking at extant literature, the number of likes can be seen as "strong proxy for social status" (Madden et al., 2014). Similarly, fitness is an important ability in many contexts, which also can be linked to social status (e.g. Johansson, Tienari & Valtonen, 2017; Sinclair, 2005). With that in mind, Jo et al. (2003) resonates that social status is a considerable predictor of healthy behaviour. Thus, we hypothesize that downward comparison should lead to a preference of healthy product choices due to the perceived increase of social status.

The notion that self-efficacy is highly contributive to healthy behaviour is suggested in several studies (e.g. Bandura, 1997; Luszczynska et al., 2004; Schwarzer and Fuchs, 1996). According to Bandura (1997), self-efficacy is the most important predictor of initiating and sustaining a healthy behaviour. Although the argument by Bandura presupposes that there is a willingness to eat healthy, a direct correlation between general self-efficacy, and healthy nutrition exists (e.g. Luszczynska et al., 2004). General self-efficacy has many similarities with self-esteem. There has been some controversy about whether general self-efficacy and self-esteem can be seen as the same construct (e.g. Brockner, 1988), or not (e.g. Sherer et al., 1982). However, Stanley and Murphy (1997), determined that it can. Hence, treating self-efficacy and self-esteem similarly, is possible (ibid.). Therefore, as we believe self-esteem will increase with downward social comparison, we hypothesize that preferences of healthier product choices will ensue. We hypothesise that:

H_{4a}: *Having more vs less likes than similar others increases the likelihood of choosing healthy over unhealthy product*

H_{4b}: *Having a faster vs slower running pace than similar others increases the likelihood of choosing healthy over unhealthy products*

Hedonic vs. Utilitarian Product Choices

Hedonic products can be characterized as impractical and self-indulgent (e.g. ice cream), while utilitarian products can be characterized as necessary and practical, rather than pleasurable (e.g. detergent).

Hirschman (1983) introduced a type of hedonic behaviour called escapism which is conducted in order to escape unpleasant realities or events. Being told that one has fewer

likes or run slower than others can arguably be seen as being told an unpleasant reality. López and de Maya (2012) further suggest that consumers' need to repair a mood strongly correlates to hedonic consumption. People feeling worse are more likely to see the opportunity of changing one's circumstances by purchasing hedonic products (Lerner et al., 2004; López & de Maya, 2012). Moreover, Shrum et al. (2013) emphasize that a boost in social identity is a primary reason for hedonic consumption. Social identity is to a large extent evaluated by one's "social ability" and "physical ability" such as likes or fitness. Therefore, when a consumer's social identity is damaged by being informed having less likes or run slower than similar others, considering hedonic over utilitarian products is a possible succeeding behaviour.

Furthermore, in research within social psychology it is argued that overall consumption increases with a lower self-esteem (e.g. Braun & Wicklund, 1989; Kasser, 2001). Truong and McColl (2011) also state that self-esteem is strongly related to self-directed pleasure which can be linked to hedonic product choices. A common behaviour to strengthening one's self-esteem is to purchase luxury products as a personal reward (Truong & McColl, 2011). As we hypothesize that upward social comparison will lead to a decreased self-esteem, a way to restore that decrease would be to choose hedonic products over utilitarian ones.

We hypothesize that:

H_{5a}: *Having less vs more likes than similar others increases the likelihood of choosing hedonic over utilitarian products*

H_{5b}: *Having a slower vs faster running pace than similar others increases the likelihood of choosing hedonic over utilitarian products*

Risk Behaviour

The theory of social comparison suggests a direct relationship between ability and risk behaviour, for the purpose of this thesis defined as ''behaviour that has the possibility of putting the individual at harm, financially or physically''. Taking more risks signals higher abilities, and the notion is that one is expected to take more risk when having higher perceived ability (Jellison & Riskind, 1970). Therefore, downward social comparison leading to a higher sense of self-perceived ability should lead to higher levels of risk-taking behaviour. As argued above, we assume that Likes and Running pace are important abilities. Therefore, with the reasoning above, downward social comparison of both phenomena should lead to higher inclination to engage in risky behaviour.

Moreover, Krueger & Dickson (1994) argue that those with higher perceived self-efficacy tend to take more risks. The authors resonate that risk behaviour is connected to what you see as an opportunity or a threat. Those who mostly see opportunities rather than threats, are more optimistic and have higher self-efficacy, and in turn are more likely to take risks. As mentioned in healthy product choices, self-efficacy and self-esteem may be treated similarly (Stanley and Murphy, 1997). As we believe self-esteem will increase from downward social comparison, we also hypothesize that:

H_{6a}: *Having more vs less likes than similar others increases the inclination to engage in risky behaviour*

H_{6b}: *Having a faster vs slower running pace than similar others increases the inclination to engage in risky behaviour*

2.3.3 Self-esteem as a mediator

As observed in research and mentioned above, self-esteem has been shown to affect the outcome of four of the dependent variables. With the support from literature on social comparison as well as social media and fitness applications, it was hypothesised that participants' self-esteem in this thesis will be affected. Hence, a possible mediating relationship between the stimuli and the dependent variables below will be hypothesised for each study.

H_{7a}: Self-esteem acts as a mediator from the manipulation (more vs less likes) to the dependent variables 3a-6a;

- *3a) Stress*
- *4a) Healthy vs Unhealthy Product choices*
- *5a) Hedonic vs. Utilitarian Product choices*
- *6a) Risk Behaviour*

H_{7b}: Self-esteem acts as a mediator from the manipulation (faster vs slower running pace) to the dependent variables 3b-6b;

- *3b) Stress*
- *4b) Healthy vs Unhealthy Product choices*
- *5b) Hedonic vs Utilitarian Product choices*
- *6b) Risk Behaviour*

2.3.4 Summary of hypotheses

Instagram Likes	Consumer well-being	**H_{1a}**: Having more vs less likes than similar others increases self-esteem **H_{2a}**: Having more vs less likes than similar others increases life satisfaction **H_{3a}**: Having more vs less likes than similar others decreases stress
	Consumer Behaviour	**H_{4a}**: Having more vs less likes than similar others increases the likelihood of choosing healthy over unhealthy products **H_{5a}**: Having less vs more likes than similar others increases the likelihood of choosing hedonic over utilitarian products **H_{6a}**: Having more vs less likes than similar others increases the inclination to engage in risky behaviour
		H_{7a}: Self-esteem will act as a mediator from the manipulation (more vs less likes) to the dependent variables 3a-6a; 3a) Stress 4a) Healthy vs Unhealthy Product choices 5a) Hedonic vs. Utilitarian Product choices 6a) Risk Behaviour
Running Pace	Consumer well-being	**H_{1b}**: Having a faster vs slower running pace than similar others increases self-esteem **H_{2b}**: Having a faster vs slower running pace than similar others increases life satisfaction **H_{3b}**: Having a faster vs slower running pace than similar others decreases stress
	Consumer Behaviour	**H_{4b}**: Having a faster vs slower running pace than similar others increases the likelihood of choosing healthy over unhealthy products **H_{5b}**: Having a slower vs faster running pace than similar others increases the likelihood of choosing hedonic over utilitarian products **H_{6b}**: Having a faster vs slower running pace than similar others increases the inclination to engage in risky behaviour
		H_{7b}: Self-esteem will act as a mediator from the manipulation (faster vs slower running pace) to the dependent variables 3b-6b; 3b) Stress 4b) Healthy vs Unhealthy Product choices 5b) Hedonic vs. Utilitarian Product choices 6b) Risk Behaviour

Figure 1: Summary of hypotheses

2.3.5 Conceptual Model

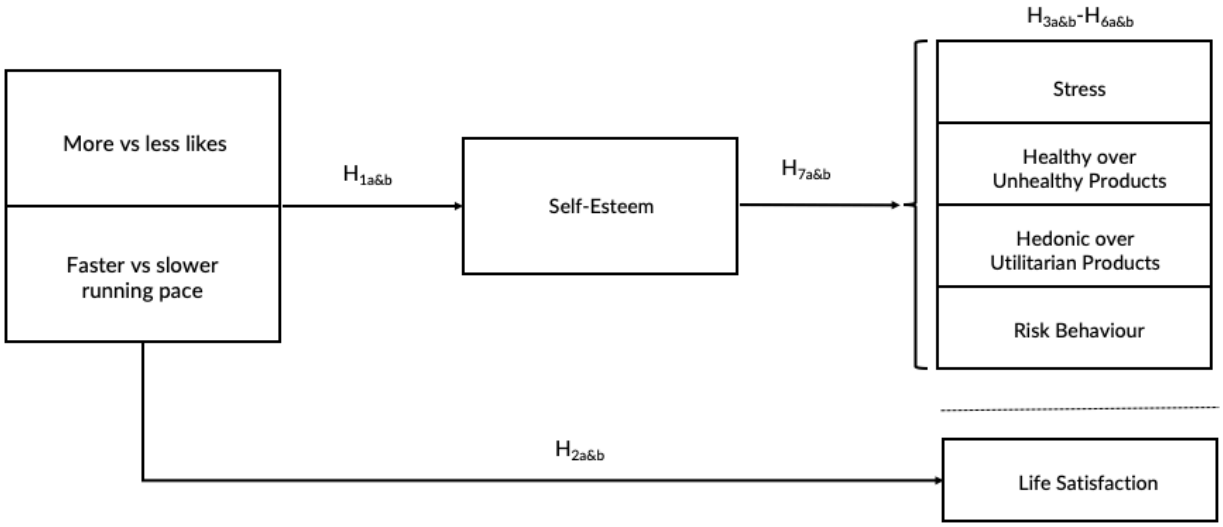


Figure 2: Conceptual Model

3. Methodology

The following section will outline the methodological approach used for this thesis. A short description of the scientific approach will ensue, followed by preparatory work conducted, the main studies and considerations about the quality of data.

3.1 Scientific Approach

This thesis aims to look at potential effects on consumer well-being and behaviour, from being exposed to self-presentational numbers. Findings aim to shed light on, revise and suggest further theoretical explanations behind a potential relationship (Bryman & Bell, 2015), consistent with the deductive approach to theory building. By consolidating current knowledge on the topic and adjacent strands of research, hypotheses were created and tested empirically. An experimental research approach was chosen to examine the relation between the independent variables, Likes and Running Pace, and the dependent variables, consumer well-being and behaviour. The design followed a between-subjects design. An experimental approach is suggested when a cause-and-effect relationship is investigated (Malhotra, 2004), and is considered appropriate when consumers' reactions to environmental cues is to be observed (Söderlund, 2018)[1].

A quantitative data collection through self-completion questionnaires was chosen. Although concerns have been raised about the self-completion questionnaire not necessarily reflecting respondents' honest beliefs (Bryman & Bell, 2015), it was for this study deemed the most appropriate data collection method. The self-completion questionnaire can be distributed effectively to a larger sample online, and allows respondents to remain unaffected by interviewer effects. Moreover, since most of the dependent variables tested concerned the respondents' perception of self, it was essential to use a data collection method where respondents would feel comfortable enough to disclose their true beliefs and not let their responses be affected by social desirability (Malhotra, 2004).

The two numerical constructs, although hypothesised to have similar effects, will in the sections below be treated as two independent studies. The reason being that the two

[1] The potential drawback of using an experimental approach, is that the results obtained are observed from an artificial setting. Although the approach brings benefits in terms of control of variables, it poses the risk that same results might not be observed in a natural situation.

numerical constructs represent two different phenomenon, and thus should be looked at independently for a better understanding. For the clarity of our arguments, dividing the studies into two, thus proved to be most appropriate.

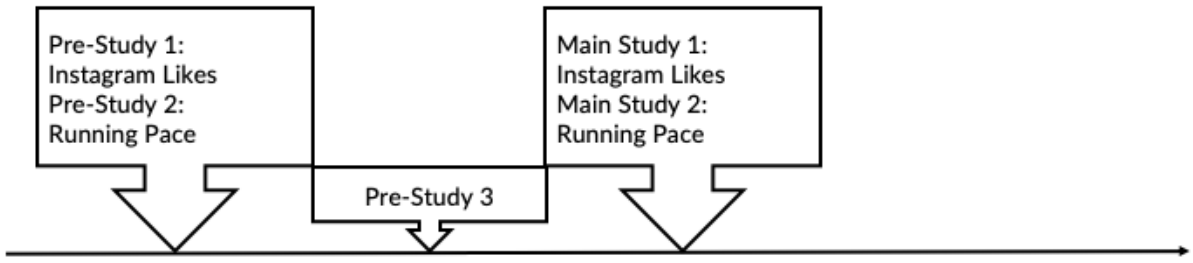


Figure 3: Timeline of research studies

3.2 Preparatory work

With the aim to design effective stimuli for the main studies, two types of numbers, absolute numbers and percentages, were considered. Because both means can be used to express progress, relationships and values, it was necessary to see which was stronger and more realistic.

Two pre-studies were conducted, one testing which stimuli to use for the Instagram Likes study, and one testing which stimuli to use for the Running Pace study. This meant eight stimuli were tested in total (see all stimuli in Appendix A-B). The stimuli were designed with the aim to provide a realistic setting, and it was therefore important to confirm in the pre-study that they seemed realistic to the participants. To measure the strength of the stimuli, the dependent variable *satisfaction* was chosen. Responses were measured on a 10-point Likert scale. Using the term similar others in the stimuli was based on social comparison theory, argued for in the theoretical lens.

3.2.1 Pre-study 1: Test of stimuli and design, Instagram Likes

The pre-study was carried out through a self-completion questionnaire, including open-, closed- and control questions. The respondents were first asked to estimate how many likes they usually get on pictures they upload to Instagram. They were then randomly assigned to Stimuli 1-4 (Appendix A), each testing a type of number (likes expressed in absolute numbers or percentages), and a direction of social comparison.

Attention to the stimuli was tested by asking the participants to confirm the type of condition they had been exposed to, upward or downward social comparison. Any incorrect responses to the control question were omitted from the final data set.

The respondents were retrieved from Amazon Mechanical Turk's (MTurk) online panel. To strengthen the response validity, only respondents with an Instagram account were permitted to take the questionnaire.

Results & Conclusions

The difference in satisfaction between the two conditions, upward and downward social comparison, proved to be greater when *percentage* was used to express the difference. The difference between the two conditions was 2.96 mean points, which was significantly larger than when the two conditions along with *absolute numbers* were used (1.32). The numerical expression expressed in percentage was consequently chosen to be used for the main study. See Appendix C for detailed results.

In the questionnaire, respondents were asked to indicate on a 10-point Likert scale ranging from '1-Extremely Unrealistic' to '10-Extremely Realistic', how realistic they thought the design of the stimulus was. The results provided a mean score of 7.37 with a standard deviation of 2.0. The design was consequently deemed realistic enough to be used for the main studies.

All stimuli included the number, '33'; 33 likes or 33%. The specific number was originally chosen because it was thought to be large enough to have an impact on the respondents, yet still be perceived as credible. To be sure it indeed was the most appropriate number to use for the main study, it was necessary to find out how large and realistic the respondents in the pre-study perceived the number '33' to be. Adjustments could then be made to make sure the number was as large as possible while still perceived to be realistic. On a 10-point Likert scale ranging from '1- Extremely small' to '10-Extremely large',

respondents rated the size of the number with a mean of 6.3. On the 10-point Likert scale measuring how realistic the number was, respondents rated it with a mean of 7.74. The number '33' was seen as realistic but not very large. With these results, it was decided to slightly increase the number in preparation of the main study, with the aim of creating stronger stimuli. See Appendix C, table 1-4 for more detailed results of Pre-study 1.

3.2.2 Pre-study 2: Test of stimuli and design, Running Pace

The second pre-study was also conducted with self-completion questionnaire consisting of open-, closed- and control questions. The responses were collected using Amazon MTurk's online panel. Respondents were first asked to estimate how fast they usually run one kilometer. They were then randomly assigned to Stimuli 5-8 (Appendix B), each testing a type of number (running pace expressed in absolute numbers or percentages), and a direction of social comparison.

Attention to the stimuli was tested by asking the participants to confirm the type of condition they had been exposed to. To strengthen the response validity, only respondents who had gone running during the past 12 months were permitted to take the survey.

Results and Conclusions

The difference in satisfaction between the two conditions, upward and downward social comparison, proved to be slightly greater when *absolute numbers* were used. The difference between the two conditions was 3.08 mean points, which was larger than when the two conditions along with *percentage* were used (2.37). The numerical expression expressed in absolute numbers was consequently chosen to be used for the main study.

The design of the stimuli was considered realistic enough to be used for the main study, with a mean score of 7 on a 10-point Likert scale ranging from '1-Extremely Unrealistic' to '10-Extremely Realistic'.

Again, it was measured how large and realistic the respondents perceived the number '33' seconds to be. On a 10-point Likert scale ranging from '1- Extremely small' to '10-Extremely large', respondents rated the size of the number as '6.18' on average. On the 10-point Likert scale measuring how realistic the number was, respondents rated the it as

7.2 on average. The number '33' was seen as quite realistic but not very large. With these results, it was decided to very slightly increase the number in preparation of the main study. See Appendix C, table 5-8 for more detailed results of Pre-study 2.

3.2.3 Criticism of Pre-study 1 and 2

The sample size of each condition tested in pre-study 1 and 2 ranged from 14 to 27 respondents. With the many stimulus tested and available budget, we aimed for a sample size of 21 respondents to each condition. However, having had to exclude responses that responded incorrectly to the control question resulted in a rather uneven distribution among the conditions, leaving certain groups with less than 21 respondents.

Nevertheless, the results of a smaller study can still be argued to be very valuable when they are being used to design larger confirmatory studies (Hackshaw, 2008). The findings of the pre-studies were not intended to be generalized to a population, but merely to indicate what elements were better to use in the main studies. The external validity was therefore not a question of concern following the smaller sample size.

3.2.4 Pre-study 3: Test of questionnaire

Before conducting the main studies, the finalised questionnaires was tested for any linguistic inaccuracies on a convenience sample (n=10). Because neither of us are native English speakers, we needed to make sure the questions and statements were clearly posed. Since the main studies were to be conducted online through self-completion questionnaires, it was essential to make sure the questionnaires presented few opportunities for misinterpretation.

The questionnaire was sent to a convenience sample of n=10, with six native English speakers and four non-native, making sure the questions could be understood by both groups. The participants were specifically asked to review the clarity of the questions and to provide suggestions if they were to be worded differently. The suggested alterations were considered and, in a few instances, implemented. Overall, the questionnaires were considered clear and straightforward.

3.3 Main Studies

The two main studies were conducted as reaction studies and measured the reaction effects of the manipulated stimuli. Questionnaires were made available to qualified respondents online, and the effects of each stimulus was tested predominantly through multi-item scales. The two studies were conducted independently, where the participants of each study were randomly assigned to one of the study's two stimuli. However, the two studies tested the same measures and the questionnaires were identically constructed, apart from the stimulus and accompanying specifying questions. Therefore, section 3.3.1 below will only point out differentiating aspects between the studies. Control groups were not used, consistent with many existing reaction studies looking at social comparison (Gerber, Wheeler & Suls, 2017), where the effects between upward and downward social comparison are deemed sufficient.

Responses for both studies were collected over a ten-day period in October 2018.

3.3.1 Main Study 1: Instagram Likes

3.3.1.1 Questionnaire

The questionnaire was designed and distributed with the online survey platform *Qualtrics.* The questionnaire first asked the participants to state their gender and age, and how many likes they usually receive on pictures they upload to Instagram. The respondents were then exposed to the stimulus, telling them they receive *39% more*, or *39% less* likes than other similar Instagram users. After seeing the stimuli, they were asked to confirm the type of stimuli they had been exposed to as a manipulation check. The respondents received the question ''Did the result on the previous page show that you receive more or less likes than similar others?''. If the respondent had gotten the stimuli telling them they receive more likes than others, and they selected ''less' on the manipulation check, they were sent to a debriefing page and exited from the survey.

Following these questions, the dependent variables were introduced. All but two variables were tested through multi-item scales. The two variables not tested with a multi-item scale asked the respondents to choose one of the products from the product pairs presented. A 10-point Likert scale was used as measurement of the multi-item scales, as recommended when the aim to detect smaller changes in the overall attitude (Wittink & Bayer, 1994). Using the 10-point scale can also be beneficial because people are generally

used to rate responses ''out of 10'' (Dawes, 2008), and it allows respondents to express their feelings adequately (Preston & Colman, 2000).

Because several dependent variables were tested and respondent fatigue posed a risk, the questionnaire was kept as short as possible and the respondents encountered two more control questions. Overall, 28 participants were removed from the final data set because of incorrect responses to either of the three control questions, or the manipulation check.

3.3.1.2 Stimuli

The stimuli were presented in the form of manipulated images with a text overlay and a graphic. As suggested by the pre-study results, minor adjustments were made to the stimuli in order to make them stronger. The stimuli of the main study now stated that the respondent have ***39% more*** or ***39% less*** likes on Instagram than similar others. The design of the stimuli aimed to replicate a realistic situation, using the logo and interface associated with an Instagram comment (see Appendix A).

The respondents to each condition each saw the exact same image, and the variations of the dependent variables can therefore reliably be attributed to the stimuli (Malhotra, 2004).

3.3.1.3 Measures

The effects on the dependent variables, consumer well-being and behaviour, were measured with multi-item scales adapted from or based on existing measurement scales. As shown by Bergkvist & Rossiter (2007) and by Ang & Eisend (2018), a multi-item scale does not necessarily measure the variable more validly and reliably than a single-item scale, if the object in question is clear and identifiable. As it was necessary to condense the original measurements, these findings supported our decision to include the items deemed most relevant from each original scale, without risking internal validity. Each variable was thus measured with between three to four items. All multi-item scales used furthermore showed satisfactory internal consistency, with Cronbach's Alpha above 0.7 (Malhotra, 2004). Each variable measured with a multi-item scale was therefore indexed to a single measure to be used for analysis.

<u>Self-Esteem</u>

The widely used *Rosenberg Self-Esteem Scale* was used and adapted to measure respondents' self-esteem (Rosenberg, 1965). The Rosenberg Self-Esteem Scale was chosen over other scales such as 'The State Self-Esteem Scale' because it measures global self-esteem and has been widely used in psychology research. In contrast, the latter

measures subsections of self-esteem such as performance, social and appearance self-esteem (Heatherton & Polivy, 1991).

The original Rosenberg Self-Esteem Scale is comprised of ten items. However, for the purpose of this study, it was condensed to four, two of which were reverse-scored[2]. The respondents were asked to indicate how much they agree with the statements *''At times I think I'm no good at all'', ''I'm able to do things as well as most other people'', ''I feel I do not have much to be proud of''* and *I take a positive attitude towards myself,* on a scale from '1- Strongly Disagree' to '10-Strongly Agree'. Cronbach's Alpha for the four items was 0.92.

Life Satisfaction

Life Satisfaction was measured using items from the *Satisfaction With Life Scale (SWLS)* (Diener et al., 1985; Pavot & Diener, 1993). The original scale measuring five items was condensed to three items. The SWLS was chosen because it has been used extensively in research on subjective well-being (e.g. Diener & Diener, 1996), which often is seen as synonymous with life satisfaction. The participants were asked to indicate how much they agree with the statements *''I'm satisfied with my life'', ''In most ways my life is close to my ideal''* and *''The conditions of my life are excellent'',* on a scale from '1- Strongly Disagree' to '10-Strongly Agree'. Cronbach's alpha for the three items was 0.95.

Stress

To measure stress, a multi-item scale question was designed based on the *State Trait Anxiety Inventory (STAI)* (Spielberger, 1970). The STAI has shown to be fit for situations where the respondents receive negative feedback about performance (Spielberger et al., 1970), and was therefore deemed appropriate to use in the context of social comparison. The scale's items concern both 'state' and 'trait' items, where state items refer to those temporary affected. Because of the experimental nature of the studies of this thesis, that look at temporary effects from a stimulus, only state items were included in the condensed multi-item scale.

The respondents were first asked to what extent the feel stressed on a scale ranging from '1-Not at all' to '10-Very much'. They were then asked to indicate how much they agree with the statements *''I feel calm'', ''I am tense''* and *''I feel nervous''.* Cronbach's Alpha for all four items was 0.96.

[2] The four items measured were chosen as they were thought to represent general feelings of self-esteem to a larger extent than certain other items, for example ''I feel that I have a number of good qualities'. A decision was made to include an equal amount of reverse scored items, to make sure the respondents paid attention to the questions.

Healthy vs. Unhealthy product choices

Respondents were asked to choose products from three product pairs, each consisting of one typically considered healthy product, and one typically considered unhealthy product. The product pairs were inspired from a study conducted by Salmon et al. (2014), who created product pairs that differed in perceived healthiness but not in attractiveness. Although, important to note is that the products were inspired by, and not assimilated from the study.

Respondents were asked to choose one product in each of the following sets; *A soda / A bottle of water, A chocolate bar / A fruit*, W*hole grain bread / White bread*. Cronbach's alpha was not computed since responses were measured on a scale (Santos, 1999).

Hedonic vs. Utilitarian product choices

Respondents were asked to choose products from three sets, each consisting of one hedonic and one utilitarian product. Looking at hedonic and utilitarian consumer attitudes has been done extensively in research on consumer behaviour (e.g. Dhar & Wertenbroch, 2000; Okada, 2005; Voss, Spangenberg & Grohmann, 2003). However, research has largely focused on measuring hedonic and utilitarian attitudes towards a product or brand, or as an outcome of a shopping experience. In this thesis, we wanted to see which products consumers actually would choose in the given situation, which made the attitude scales inappropriate to use. The consumers' choice between utilitarian and hedonic products can in itself be indicative of the consumer's self-control and promotion vs. prevention focus (Tong, Zheng & Zhao, 2013).

In the study conducted by Tong, Zheng and Zhao (2013), six consumer goods were tested for their hedonic and utilitarian values. All products were seen to significantly represent their respective category, and successfully used in the experimental setting. Two of the product pairs were chosen for this thesis, while the third product pair was created with the definitions of hedonic and utilitarian products in mind.

The respondents were asked to choose one of the following products in each of the following sets; *A pen / A can of coca cola, A piece of chocolate / AA batteries*, C*oncert tickets / A month's public transport card.* Cronbach's alpha was not computed since responses were not measured on a scale (Santos, 1999).

Risk Behaviour

Respondents' level of risk-seeking behaviour was measured using situation-based questions where the respondents were asked to estimate how likely they were to follow through with the behaviour described. The scenarios were adapted from the *Domain Specific Risk Attitude Scale* (DOSPERT) (Weber et al., 2002) and were chosen from the ''gambling'', ''recreational'' and ''investment'' domains. These domains seemed most appropriate to use since they refer to how people spend and risk their money, capturing consumer behaviour. Situations were adapted from the DOSPERT Scale because it is based on scenarios describing the risk taking behaviour, rather than on attitude questions such as those by the Risk Propensity Scale (Meertens & Lion, 2008). Using questions that anchor the choice in a situation, increases the possibility that respondents reflect over the answer (Bryman & Bell, 2015, p. 271). The respondents were asked to indicate how likely they are to follow through with the behaviour described on a scale ranging from '1-Very Unlikely' to '10- Very Likely'.

The scenarios read as follow;

1. *You are at the race track and feel confident that you know which horse will win the biggest race of the day. You consider betting a month's salary on the horse.*
2. *You are going on a vacation to a third-world country. You consider not booking any accommodation or travel arrangements beforehand.*
3. *You consider investing 5% of your annual income in a very speculative stock.*

Cronbach's Alpha for the three items was 0.77.

3.3.1.4 Sampling

The respondents were retrieved from Amazon MTurk's online panel and were compensated for taking the survey. To complete the questionnaire, respondents needed to have been awarded a 'Masters' qualification, showing qualitative work performance on Amazon MTurk in the past. Anyone who had completed any of the pre-study questionnaires were prevented from participating in the main study, in order to make sure no previous exposure to the stimuli was possible.

Additionally, it was decided to only sample respondents from the EU and the US; the reason being that these countries have among the highest penetration of Instagram users in the world (Statista, 2018g). Familiarity with Instagram and its interface was important to improve the internal validity.

In total, 202 responses were collected. Stimulus 1 was given to 98 participants (n=98) and Stimulus 2 to 104 (n=104) participants. The gender distribution was 48% female and 52% male.

3.3.2 Main Study 2: Running Pace

3.3.2.1 Questionnaire

The questionnaire was again designed and distributed using the survey platform *Qualtrics*. Depending on their preferred unit of measurement (kilometres or miles), the participants were asked to estimate how fast they run one kilometer/one mile. Following the stimuli, the respondents were then asked to confirm what type of stimuli they had received, in form of a manipulation check. The respondents received the question ''Did the result on the previous page show that you run faster or slower than similar others?''. If the respondent had gotten the stimuli telling them they ran faster than others, and they selected ''slower'' on the manipulation check, they were sent to a debriefing page and exited from the survey. Overall, 28 participants were removed from the final data set due to incorrect responses to either of the control questions or the manipulation check.

3.3.2.2 Stimuli

Again, the stimulus was presented in the form of manipulated images with a text overlay and a graphic. As suggested by the pre-study results, minor adjustments were made to the number element of the stimuli. The stimuli in the main study now stated that the respondent ran ***35*** *seconds faster* or ***35*** *seconds slower* than similar others. The stimuli were designed to resemble a running app to improve the ecological validity.

3.3.2.3 Measures

The measures tested in this study remain unchanged from Main Study 1 (page 34-37). There is therefore no further need to elaborate on the measures in this section except for determining the internal validity of the indexes. Cronbach's alpha on the multi-item scales measured: 0.85 for *Self-Esteem*, 0.95 for *Life Satisfaction*, 0.91 for *Stress* and 0.71 for *Risk Behaviour*.

3.3.2.4 Sampling

As for Main Study 1, the respondents were sampled from Amazon MTurk's online panel and were compensated for taking the survey. Only those who had gone running as a way to exercise during the past 12 months were encouraged to complete the survey. The time period of 12 months was chosen because it was important that the respondents still had

some recollection of their running pace in order to react on the manipulation. Any respondents who participated in either of the prestudies or Main Study 1 were prevented from taking the survey. Consistent with Main Study 1, only participants from EU and the US were sampled.

In total, 202 responses were collected. Stimulus 7 was given to 99 participants (n=99) and Stimulus 8 to 103 (n=103) participants. The gender distribution was 41% female and 59% male.

3.4 Analytical Tools

The data was transferred directly from the *Qualtrics* to IBM SPSS® Statistics version 25, where it was analysed. Due to the uninterrupted transportation of raw data into the software, any errors attributed to manual data input was avoided. To analyse the data, *Independent Sample T-tests* were run on the indexed multi-item scales. As recommended, Cronbach's Alpha values of 0.7 or above were accepted when indexing the items (Malhotra, 2004). The Hayes PROCESS Macro was applied to the SPSS software and used to test the hypothesized mediating variable self-esteem where the sample was bootstrapped (n=5000). All hypotheses were tested with a 95% confidence interval, hence only accepted when $p \leq 0.05$. The primary advantages with Hayes PROCESS over other methods is an increase in power, and that the method provides a superior representation of the data (Preacher & Hayes, 2008).

3.5 Review of Data Quality

3.5.1 Internal Reliability

Internal reliability refers to whether the summed-up result from a multi-item scale can be considered reliable (Malhotra, 2004). To measure internal reliability of the measures used we ran a Cronbach's alpha test on all multi-item scales. As suggested, a 0.7 value was used as the minimum acceptable value to conclude the measure internally reliable. In our studies, all multi-item scales showed internal reliability with alphas between 0.7 and 0.95.

3.5.2 Validity

Validity refers to whether the research conducted really measures what it sets out to measure, and to what extent that measure reflects reality. Regarding the studies of this thesis, three aspects of validity are addressed; internal validity, external validity and ecological validity (Bryman & Bell, 2015).

3.5.2.1 Internal Validity

The concept of internal validity calls into question the causal direction between independent and dependent variables. In an experimental design, as used in this thesis, the causal direction is typically of little ambiguity. The participants were randomly assigned to one of the two stimuli in each study, and as a consequence a pre-experimental equation of the groups was achieved (Campbell & Stanley, 1959). Our manipulated independent variables were consistently deployed to all respondents before they encountered the dependent variables. Any observed changes in the dependent variables could therefore be attributed to the independent variable. As all participants in the samples answered the manipulation check successfully, chances were improved that potential effects were caused by the independent variables. Furthermore, all participants included in the final samples answered the control questions successfully.

Any potential effects of the environment around the participant was controlled by allowing a limited time to complete the questionnaire. The limited time demanded the respondents' full attention, and any external distractions were likely to be minimized. For the main study using the Instagram stimuli, there was a minor tradeoff between having strong stimuli or having neutral ones towards which no previous feelings could have been held. A choice was made to design the stimuli using the Instagram logo and design in order to make it more realistic.

3.5.2.2 External Validity

External validity refers to whether the findings of a study can be generalized beyond the study itself, and be applied to other populations, settings, times, independent and/or dependent variables (Malhotra, 2004). The samples of the two main studies were made up by an acceptable gender distribution, various ages, and included respondents from EU and the US. Internet users tend to differ from non-internet users in the sense that they are more educated, younger and less ethnic (Couper, 2000). Amazon MTurk's panel respondents furthermore tend to be overeducated, underemployed, less religious and more liberal than the general population. Samples drawn from the panel, tend to be

overrepresented by participants residing in the United States and India, and the average participant tends to be around 30 years old. In other aspects, the respondents have been found to be heterogeneous (Paolacci & Chandler, 2014), which is seen to improve the external validity of the study (Bryman & Bell, 2015).

With relatively small sample sizes, an assumed overrepresentation of respondents from the United States and with respondents mostly around 30 years of age, the findings of our studies cannot be generalised beyond the experiment sample. We can however, conclude that the findings are indicative and can be considered for future studies of similar populations.

3.5.2.3 Ecological Validity

The ecological validity of a study looks at to what extent the findings are applicable to people's everyday life (Bryman & Bell, 2015). In our studies, the participants encountered stimuli that had been designed to reinforce the mental process of social comparison. The stimuli might not explicitly occur in reality but were designed to simulate a real situation using design elements from social media and fitness applications.

As our studies were of experimental nature with fictitious stimuli, the ecological validity could be considered limited. In a natural setting, the respondents would have observed someone with an actual amount of more/less likes or an actual faster/slower running pace, to then engage in the social comparison process. However, since this was technically difficult to achieve while still making the stimuli realistic, and due to limited resources and time at hand, it was necessary to create stimuli that simulated this process instead.

To improve the ecological validity, the design of the stimuli simulated the design of the social media app Instagram, as well as the fitness app Runkeeper. The respondents furthermore encountered the stimuli on a screen or a phone; similar to how they see social media likes and their running pace in real life.

3.6 Ethical Considerations

Since our studies investigated emotional effects of manipulated stimuli, ethical considerations were important to keep in mind throughout the process. Although the risk of any psychological harm or lasting effects of the stimuli was considered very small, a debriefing was conducted on all participants who had been exposed to the stimuli. The

few respondents who failed to answer the control questions correctly were also send to the debriefing page. As recommended when the purpose of the study cannot be given at the outset, the debriefing text explained the nature and purpose of the study (American Psychological Association, 2002).

In addition, all respondents voluntarily participated in the studies, and their responses were treated with confidentiality. Lastly, they were able to withdraw their participation at any time, without any affecting consequences.

4. Results & Analysis

In this section we will answer the outlined research questions. We will do this by reporting and analysing the empirically collected data in order to determine whether the generated hypotheses can be supported or not. In addition, we will complement our main findings with extended analysis. Before the hypothesis testing, the proposed conceptual model is again displayed for clarification purposes.

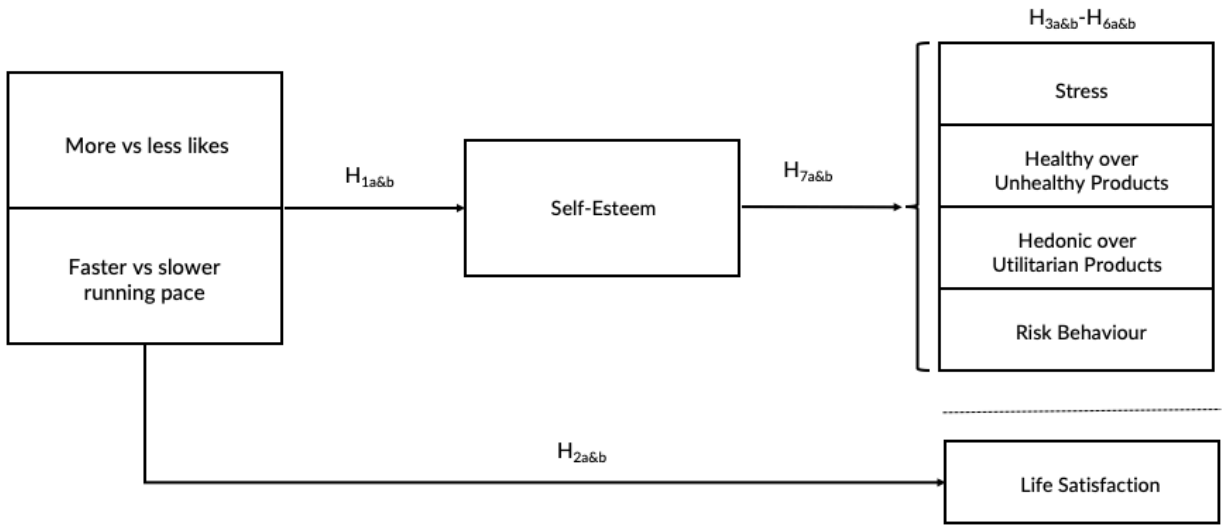


Figure 2: Conceptual Model

4.1 Hypothesis Testing

The hypothesis testing follows the studies, starting with Main Study 1 (Instagram Likes), followed by Main study 2 (Running Pace). Independent t-tests were conducted between the manipulation groups and all the dependent variables, which is preferred when the same variables are tested between two groups (Newbold et al., 2014). Lastly, the *Hayes PROCESS Macro* was applied when testing the mediating variable self-esteem.

4.1.1 Instagram Likes - Effects on consumer well-being

The first generated hypothesis states that having more vs less likes than similar others increases self-esteem. To answer the hypothesis, an independent t-test was conducted between the manipulation groups More Likes and Less Likes. The test revealed that there

was no significant difference between the two groups, as More Likes (M=7.80, SD=2.42) was not significantly higher than Less Likes (M=7.63, SD=2.24), *t*(200)= .54, p> .05 (table 1). This indicates that having more or less likes than similar others, does not impact self-esteem. Ultimately, empirical support is not found to support hypothesis 1a.

The second generated hypothesis considers life satisfaction. An independent t-test showed that there was no significant difference between More Likes (M=6.16, SD=2.96) and Less Likes (M=6.16, SD=2.48), *t*(200)= .02, p> .05 (table 1). The results therefore propose that having more or less likes than similar others does not affect life satisfaction. As a consequence, hypothesis 2a is not supported.

The third and last hypothesis on well-being examines stress. The independent t-test demonstrated that there was no significant difference between More Likes (M=3.84, SD=2.67) and Less Likes (M=4.02, SD=2.46), *t*(200)= -.48, p> .05 (table 1). The results suggest that having more or less likes than similar others does not influence the level of stress. Therefore, hypothesis 3a is not supported.

Table 1. Instagram Likes - Effects on consumer well-being

Dependent Variable	More Likes N=98 (SD)	Less Likes N=104 (SD)	t	Mean Difference	Decision
Self-Esteem	7.80 (2.42)	7.63 (2.24)	.54	.17	Not Supported
Life Satisfaction	6.16 (2.96)	6.16 (2.48)	.02	.00	Not Supported
Stress	3.84 (2.67)	4.02 (2.46)	-.48	.18	Not Supported

Significance levels: ≤ .05*, ≤ .01**, ≤ .001*** Sig. (2-tailed)

4.1.2 Instagram Likes - Effects on consumer behaviour

Moving on to consumer behaviour, the first hypothesis states that having more vs less likes than similar others increases the likelihood of choosing healthy over unhealthy products. As with testing consumer well-being, an independent t-test was performed between the two manipulation groups More Likes and Less Likes. The test concluded that there was no significant difference between More Likes (M=1.65, SD=0.34) and Less Likes

(M=1.60, SD=0.33), *t*(200)= .99, p> .05 (table 2). The results imply that having more or less likes than similar others do not impact preference for healthy or unhealthy products. Thus, hypothesis 5a is not supported[3].

The next hypothesis considers the likelihood of choosing hedonic over utilitarian products. An independent t-test displayed that Less Likes (M=1.55, SD=0.30) was significantly higher than More Likes (M=1.46, SD=0.34), *t*(200)= -1.96, p≤ .05 (table 2). As hypothesised, the test suggests that having less vs more likes than similar others does indeed increase the likelihood of choosing hedonic over utilitarian products. Similarly, the test suggests that having more vs less likes than similar others increases utilitarian product choices. Therefore, hypothesis 6a is supported[4].

The last hypothesis studies risk behaviour. An independent t-test demonstrated that there was no significant difference between More Likes (M=2.30, SD=1.59) and Less Likes (M=2.70, SD=1.86), *t*(200)= -1.61, p> .05 (table 2). This suggests that having more vs less likes than similar others does not impact risk behaviour. Hence, hypothesis 7a is not supported.

Table 2. Instagram Likes - Effects on consumer behaviour

Dependent Variable	More Likes N=98 (SD)	Less Likes N=104 (SD)	t	Mean Difference	Decision
Healthy Products (Unhealthy=1, Healthy=2)	1.65 (0.34)	1.60 (0.33)	.99	.05	Not Supported
Hedonic Products (Utilitarian=1, Hedonic=2)	1.46 (0.34)	1.55 (0.30)	-1.96	.09*	Supported
Risk Behaviour	2.30 (1.59)	2.70 (1.86)	-1.61	.40	Not Supported

[3] To complement the t-test and given the binary nature of the variable, a Chi-Square test was conducted to examine the relation between more likes/less likes and healthy/unhealthy product choices. The relation between the variables was not significant, X^2 (3, N=202) = 1.99, p> .05 (More Likes vs Less Likes: 12% vs 13% no healthy products, 18% vs 23% 1/3 healthy products, 33% vs 37% 2/3 healthy products, 37% vs 28% all healthy products).

[4] A Chi-Square test was also performed between less likes/more likes and hedonic/utilitarian product choices. The relation between the variables was significant, X^2 (3, N=202) = 7.89, p< .05 (Less Likes vs More Likes: 10% vs 20% no hedonic products, 36% vs 40% 1/3 hedonic products, 35% vs 20% 2/3 hedonic products, 20% vs 19% all hedonic products).

Significance levels: ≤ .05*, ≤ .01**, ≤ .001*** Sig. (2-tailed)

4.1.3 Instagram Likes - Self-esteem as a mediator

Since the manipulation (more vs less likes) did not significantly affect self-esteem, no mediator test was conducted.

4.1.4 Running Pace - Effects on consumer well-being

For the second main study, Running Pace, the first generated hypothesis states that having a faster vs slower running pace than similar others increases self-esteem. In order to answer the hypothesis, an independent t-test was made between the two manipulation groups Running Faster and Running Slower. According to the test, Running Faster (M=8.06, SD=1.92) was significantly higher than Running Slower (M=7.16, SD=1.84), $t(200)= 3.41$, p≤ .001 (table 3). The results therefore suggest that having a faster pace than others does increase self-esteem compared to having a slower pace than similar others. Conclusively, hypothesis 1b is supported.

The second hypothesis examines life satisfaction. An independent t-test showed that Running Faster (M=6.93, SD=2.55) was significantly higher than Running Slower (M=6.03, SD=2.14), $t(200)= 2.75$, p≤ .01 (table 3). The test implies that having a faster running pace than similar others does indeed increase life satisfaction compared to having a slower running pace than similar others. Thus, hypothesis 2b is supported.

The third and last hypothesis of the well-being variables considers stress. From an independent t-test it was established that Running Faster (M=3.55, SD=2.20) was significantly lower than Running Slower (M=4.44, SD=2.28), $t(200)= -2.81$, p≤ .01 (table 3). The results propose that having a faster running pace than similar others indeed decreases stress compared to running slower than similar others. Hence, hypothesis 3b is supported.

Table 3. Running Pace - Effects on consumer well-being

Dependent Variable	Running Faster N=99 (SD)	Running Slower N=103 (SD)	t	Mean Difference	Decision
Self-Esteem	8.06 (1.92)	7.16 (1.84)	3.41	.90***	Supported
Life Satisfaction	6.93 (2.55)	6.03 (2.14)	2.75	.90**	Supported
Stress	3.55 (2.20)	4.44 (2.28)	-2.81	.91**	Supported

Significance levels: ≤ .05*, ≤ .01**, ≤ .001*** Sig. (2-tailed)

4.1.5 Running Pace - Effects on consumer behaviour

In terms of consumer behaviour, healthy vs unhealthy product choices was the first dependent variable tested. The hypothesis states that having a faster vs slower running pace than similar others increases the likelihood of choosing healthy over unhealthy products. An independent t-test determined that there was no significant difference between Running Faster (M=1.71, SD=0.30) and Running Slower (M=1.64, SD=0.29), *t*(200)= 1.60, p> .05 (table 4). The results show that, having a faster running pace than similar others does not seem to affect the choice of healthy over unhealthy products. Hence, hypothesis 5b is not supported[5].

The next hypothesis considers the likelihood of choosing hedonic over utilitarian products. From an independent t-test it was established that there was no significant difference between Running Slower (M=1.49, SD=0.31) and Running Faster (M=1.46, SD=0.33), *t*(200)= -.61, p> .05 (table 4). This indicates that having a slower or faster running pace does not affect the choice of hedonic or utilitarian products. Therefore, hypothesis 6b is not supported[6].

[5] To complement the t-test and given the binary nature of the variable, a Chi-Square test was conducted to examine the relation between faster/slower and healthy/unhealthy product choices. The relation between the variables was not significant, X^2 (3, N=202) = 3.96, p> .05 (Faster vs Slower: 5% vs 7% no healthy products, 18% vs 21% 1/3 healthy products, 35% vs 44% 2/3 healthy products, 41% vs 28% all healthy products).

[6] A Chi-Square test was also performed between slower/faster and hedonic/utilitarian product choices. The relation between the variables was not significant, X^2 (3, N=202) = .75, p> .05 (Slower vs Faster: 17%

The last consumer behaviour hypothesis being tested was risk behaviour. An independent t-test showed that Running Faster (M=3.44, SD=2.22) was not significantly higher than Running Slower (M=3.41, SD=2.00), *t*(200)= .90, p> .05 (table 4). Ultimately, hypothesis 7b is not supported.

Table 4. Running Pace - Effects on consumer behaviour

Dependent Variable	Running Faster N=99 (SD)	Running Slower N=103 (SD)	t	Mean Difference	Decision
Healthy Products (Unhealthy=1, Healthy=2)	1.71 (0.30)	1.64 (0.29)	1.60	.05	Not Supported
Hedonic Products (Utilitarian=1, Hedonic=2)	1.46 (0.33)	1.49 (0.31)	-.61	.03	Not Supported
Risk Behaviour	3.44 (2.22)	3.41 (2.00)	.90	.03	Not Supported

Significance levels: ≤ .05*, ≤ .01**, ≤ .001*** Sig. (2-tailed)

vs 21% no hedonic products, 35% vs 33% 1/3 hedonic products, 34% vs 31% 2/3 hedonic products, 15% vs 14% all hedonic products.

4.1.6 Running Pace - Self-esteem as a mediator

Self-esteem was hypothesized to acts as a mediator between the manipulation and each dependent variable 3b-6b. However, since the manipulation (faster vs slower) only significantly affected the well-being variables, only stress was tested. The hypothesis proposes that self-esteem acts as a mediator between the manipulation and the dependent variable stress. Stress had significant indirect effect of 0.618 with BootLLCI 0.258 to BootULCI 1.001, where zero is never crossed between LLs and ULs. The results suggest that the impact from Running Faster vs Running Slower on stress is affected by the level of self-esteem. Consequently, hypothesis 8b is partially supported.

Dependent Variable	Direct Effect	Indirect Effect	BootLLCI	BootULCI	Decision
Stress	. 308	.618	.258	1.001	Supported

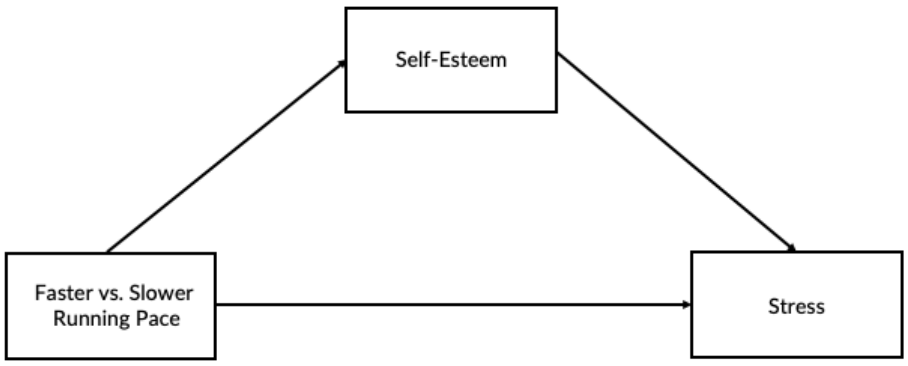


Figure 4: Self-esteem as mediator

4.2 Hypotheses Summary

Instagram Likes	
Consumer well-being	
H_{1a}: Having more vs less likes than similar others increases self-esteem	*Not Supported*
H_{2a}: Having more vs less likes than similar others increases life satisfaction.	*Not Supported*
H_{3a}: Having more vs less likes than similar others decreases stress	*Not Supported*
Consumer behaviour	*Not Supported*
H_{4a}: Having more vs less likes than similar others increases the likelihood of choosing healthy over unhealthy products.	*Supported*
H_{5a}: Having less vs more likes than similar others increases the likelihood of choosing hedonic over utilitarian products.	*Not Supported*
H_{6a}: Having more vs less likes than similar others increases the inclination to engage in risky behaviour.	
Self-esteem as a mediator	*Not Applicable*
H_{7a}: Self-esteem will act as a mediator from the manipulation (more vs less likes) to the dependent variables 3a-6a.	
Running Pace	
Consumer well-being	
H_{1b}: Having a faster vs slower running pace than similar others increases self-esteem.	*Supported*
H_{2b}: Having a faster vs slower running pace than similar others increases life satisfaction.	*Supported*
H_{3b}: Having a faster vs slower running pace than similar others decreases stress.	*Supported*
Consumer behaviour	
H_{4b}: Having a faster vs slower running pace than similar others increases the likelihood of choosing healthy over unhealthy products.	*Not Supported*
H_{5b}: Having a slower vs faster running pace than similar others increases the likelihood of choosing hedonic over utilitarian products.	*Not Supported*
H_{6b}: Having a faster vs slower running pace than similar others increases the inclination to engage in risky behaviour.	*Not Supported*
Self-esteem as a mediator	
H_{7a}: Self-esteem acts as a mediator from the manipulation (more vs less likes) to the dependent variables 3b-6b.	*Partially Supported*

Figure 5: Hypotheses summary

Summarizing the table above, it can first be concluded that the outcome of Main Study 1 (Instagram Likes) did not fall out as hypothesized. All consumer well-being variables; self-esteem, life satisfaction and stress are apparently not significantly affected by having more vs less likes than similar others (H_{1a}-H_{3a}). In terms of consumer behaviour, the likelihood of choosing healthy over unhealthy products, as well as risk behaviour, seems not to be caused by having more or less likes than similar others (H_{4a}& H_{6a}). However, having less vs more likes than similar others does in fact increase the likelihood of choosing hedonic over utilitarian products. Consequently, having more vs less likes than similar others does increase the likelihood of choosing utilitarian over hedonic products (H_{5a}). Finally, as self-esteem is not affected by the manipulation, the mediator test was never conducted.

Moving on to Main Study 2 (Running Pace), the outcomes were more in line with the generated hypotheses, especially in terms of consumer well-being. To summarize, running faster vs slower than similar others significantly increases self-esteem and life satisfaction, as well as significantly decreases stress (H_{1b}-H_{3b}). However, as for consumer behaviour, neither healthy nor unhealthy product choices, hedonic or utilitarian product choices nor risk behaviour are significantly affected by having a faster or slower running pace than similar others (H_{4b}-H_6). Due to the fact that neither of the behaviour variables were significantly affected by the manipulation (faster vs slower), self-esteem was not tested as a mediator between them. However, self-esteem was seen to act as a mediator from the manipulation to the well-being variable stress (H_{7b}).

4.3 Revised Conceptual Model

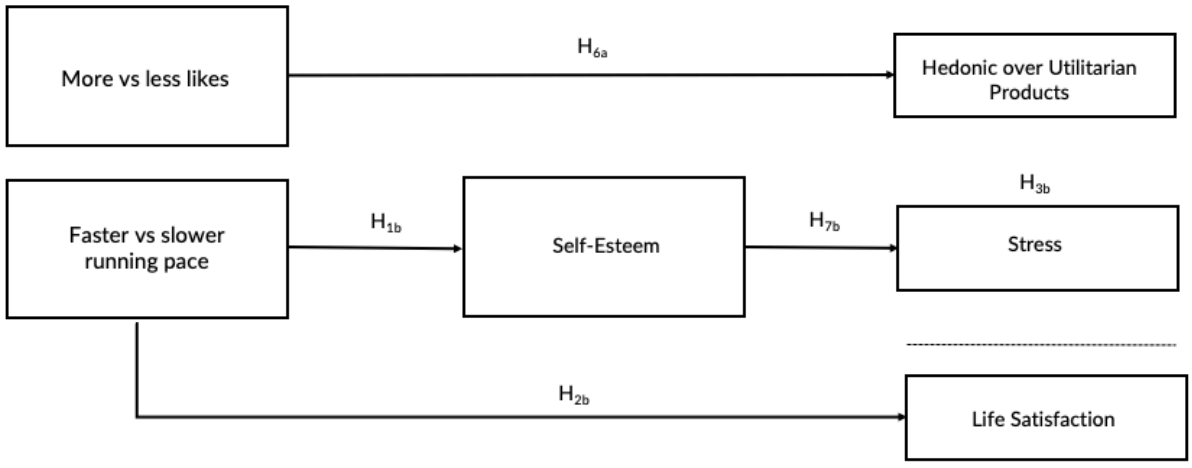


Figure 6: Revised Conceptual Model

4.4 Extended Analysis

Due to the outcomes of Main Study 1 (Instagram Likes), we found it necessary to investigate further to find other possible explanations for the lack of significant effects. In addition, due to the literature taking different stands on self-quantification, we took the opportunity to examine if self-quantifying behaviour has any effects on consumer well-being and behaviour.

4.4.1 Reflecting on Main Study 1

We found it surprising that the participants were not very affected by the stimuli in Main Study 1, given the theory behind it. Wohn et al. (2016) suggested that the subjective satisfaction of one's likes has effect on the perceived social support. Given that the participants in Pre-Study 1 (Instagram Likes) recorded a significant difference ($p \leq .001$) in satisfaction of their likes due to the stimuli, they can definitely be regarded as affected by it. However, despite the fact that the participants were significantly affected by the stimuli in Pre-Study 1, a possible explanation for the low effect in Main Study 1 is that Instagram users might already be to some extent aware of how they stand in terms of likes compared to similar others. Given that Likes are seen as an "online social currency", signals popularity (Ellison and Vitak, 2015) and is so important that many goes a far way to get it (Madden et al., 2013), having an idea already where one stands would not be unreasonable. Therefore, we further tested if there would be any differences between those who actually have more vs less likes in reality.

4.4.2 Actual amount of likes

Before the stimuli was displayed for the participants in Main Study 1, they were asked to indicate the average amount of likes they receive on pictures they upload to Instagram. Thus, it was possible to divide the sample into two groups based on actual amount of likes. The mean amount of likes was 19.65 likes, whereby the "more likes" group refers to the participants with 20 likes or more. The "less likes" group consequently involved the participants with 19 likes or below. To test the new groups, independent t-tests were conducted. The results showed that More Actual Likes were significantly higher than Less Actual Likes on all well-being variables; self-esteem and life satisfaction as well as

significantly lower on stress (table 6). This suggests that users having more actual likes in fact are more pleased than users with less actual likes.

Table 6. Instagram Actual Likes

Dependent Variable	More Likes N=73 (SD)	Less Likes N=129 (SD)	t	Mean Difference
Self-Esteem	8.46 (1.97)	7.29 (2.41)	-3.53	1.17***
Life Satisfaction	7.34 (2.33)	5.49 (2.70)	-4.90	1.85***
Stress	3.45 (2.51)	4.21 (2.56)	2.05	.76*

Significance levels: ≤ .05*, ≤ .01**, ≤ .001*** Sig. (2-tailed)

Despite the decisive table above, it is impossible to determine for a fact that the effects are strictly caused by the amount of likes they state they have. For example, some effects might be caused by a combination of the amount of likes and the stimuli. External factors such as having more likes is an effect of having more friends, might also explain the effects to some extent. Due to this reasoning, the above results will not be used to determine whether any hypotheses are supported or not, but do indicate that likes is not a concept which consumers are entirely indifferent about.

4.4.3 Self-quantification activity

In the end of the survey distributed to the participants in the running pace study, some additional questions were asked. The questions concerned to what extent participants kept track of various physical performances with mobile fitness applications. Following, we will refer to this as the participants' ''self-quantification activity''. More specifically, the questions asked to what extent the participants tracked steps taken, calories consumed, hours of sleep and exercises performed, all of which were answered on a 10-point Likert scale. Cronbach's Alpha for the four items was 0.78, showing a good internal reliability. The four items were consequently indexed. The sample was then divided based on the

mean which was 5.31, whereby the participants having 5.50 or higher were included in the group "active", whereas the participants recording less than 5.50 were included in the group "inactive". In order to test the new groups, independent t-tests were performed. The results determined that Active was significantly higher than Inactive on self-esteem, life satisfaction, healthy over unhealthy products[7] and risky behaviour. This suggests that users quantifying more actually feel better, eat healthier and are riskier compared to users quantifying less.

Table 7. Self-Quantification Activity

Dependent Variable	Active N=104 (SD)	Inactive N=98 (SD)	t	Mean Difference
Self-Esteem	7.87 (1.56)	7.32 (2.23)	-2.02	.55*
Life Satisfaction	7.00 (2.09)	5.91 (2.56)	-3.34	1.09***
Healthy Products (Unhealthy=1, Healthy=2)	1.74 (0.26)	1.61 (0.32)	-3.07	.13**
Risk Behaviour	4.04 (2.36)	2.77 (1.57)	-4.51	1.27***

Significance levels: ≤ .05*, ≤ .01**, ≤ .001*** Sig. (2-tailed)

As with the extended analysis on Main Study 1, the groups tested are the same participants exposed to one of the stimuli in Main Study 2 (Running Pace). As self-quantification activity was not used as stimuli, it cannot be decided that self-quantification activity leads to any effect, but rather that there are correlations between being more active vs inactive and the dependent variables. It is difficult to assign how much of the effect is generated from being active, in relation to how much of the effect is explained by the type of person who likes to be active. For example, maybe the person who likes to quantify also is generally more pleased.

[7] To complement the t-test and given the binary nature of the variable, a Chi-Square test was conducted to examine the relation between active/inactive and healthy/unhealthy product choices. The relation between the variables was significant, X^2 (3, N=202) = 9.92, p< .05 (Active vs Inactive: 2% vs 10% no healthy products, 16% vs 23% 1/3 healthy products, 40% vs 39% 2/3 healthy products, 41% vs 28% all healthy products).

5. Discussion and Concluding Remarks

This section will commence with acknowledging the findings in relation to the research questions, before discussing them further. The section will conclude with implications for consumers and managers, limitations of the studies and suggestions for future research.

5.1 Relating findings to the research questions

The purpose of this thesis was to investigate if and how self-presentational numbers on social media and within fitness applications affected consumers' well-being and behaviour.

Ultimately, the following research questions aimed to be answered:

- *Will having more compared to less likes than others, have an impact on consumers' well-being and behaviour?*

- *Will having a faster compared to slower running pace than others, have an impact on consumers' well-being and behaviour?*

In terms of the first research question, all hypotheses considering consumer well-being were not supported. Thus, it is not supported by our research that having more as compared to less likes than similar others has impact on consumers' well-being. Considering the effects on the consumer behaviour variables, only hedonic over utilitarian products was impacted. Therefore, it can be concluded that having more as compared to less likes than similar others only partially affects consumer behaviour.

In the extended analysis of Main Study 1, we found that those who answered that they in reality have 20 likes or more on their pictures on Instagram, also indicated higher well-being. Although this finding will not be used to answer the research question set out for this specific study, the finding will be discussed further in section 5.2.2 below.

Continuing, we consider the second research question posed; whether having a faster as compared to slower running pace than similar others have a positive effect on consumer well-being and behaviour. As all hypotheses concerning consumer well-being were supported, it is suggested by this thesis that having a faster compared to slower running pace than others, indeed has a positive effect on consumers' well-being. Seeing as all

variables concerning consumer behaviour were not supported, having a faster as compared to slower running pace does not seem to have an effect on consumer behaviour.

However, in the extended analysis of Main Study 2, we found that those who keep track of physical performances with mobile applications to a larger extent, also have a higher self-esteem and life satisfaction. They also prefer healthy products over unhealthy ones and have a higher inclination to engage in risky behaviour. Although these findings won't be used to answer the research question set out for the specific study, it will be further discussed in section 5.2.4 below.

5.2 General Discussion

The findings of this thesis reinforce an academic discussion of numbers' unintended effects of consumers' well-being and behaviour. With findings that do suggest a relationship between seeing others' physical performance data and well-being, as well as numbers on social media and consumer behaviour, this thesis contributes to an interesting topic of discussion.

5.2.1 Likes' effects on consumer well-being and behaviour

This thesis did not find that likes in the aggregate numerical expression, had any effects on consumers' well-being. The finding that self-esteem was not affected contradicts the results of the study conducted by Rosenthal-von der Pütten et al (2017), who did find positive effects from comparing to other users with less likes. However, Rosenthal-von der Pütten and colleagues focused in their study on users' *selfies* (pictures taken of themselves), which might work differently than other types of pictures. In our study, participants were asked to estimate how many likes they get on their Instagram pictures *in general*. Uploading selfies on social networks is seen to be motivated by impression management (Pounders, Kowalcyk & Stowers, 2016), and it could be that this kind of content is extra sensitive to feedback. Consequently, a possible explanation could be that any effects of having more vs. less likes than others is moderated by the type of content that carries the likes, i.e. what kind of picture.

Consumers were not found to have a higher life-satisfaction from having more compared to less likes than others. Neither were they found to be less stressed. One possible

explanation for the lack of effects on these variables could be that users on social media are seen to engage in impression management (Pounders, Kowalcyk & Stowers, 2016) and to post positively skewed content (Appel et al, 2016), in order to construct an online identity (van Dijk, 2013). These findings in literature point to that the online version presented of oneself on social media is an improved version of oneself; an ''ideal'', but not necessarily real version (Higgins, 1987). It could be possible that the ideal online identity acts as a discrepant version to one's ''real'' identity and that any effects from receiving more compared to less likes are mitigated by the fact that it's not the ''real'' version of oneself that receives the feedback. This reasoning would be applicable to all well-being variables, as they all concern the online identity created by the user, rather than their real, offline selves.

Although previous research has shown that social media does affect users in the domains of life satisfaction (Steinfield et al, 2008), depression (Selfhout et al., 2009; Kross et al., 2013) and body image (Haferkamp & Krämer, 2011), these findings attribute social comparison through the seeing of others' content. Users are comparing their ''ideal'' profile and the ''ideal'' content they have construed. While in the study of this thesis, social comparison is done through a form of feedback, Likes. It might simply be that the two constructs work differently, something for future studies to test. The argument could however suggest an explanation to why proven effects from social comparison on life satisfaction and stress were not found in this study.

In terms of consumer behaviour, consumers were seen to indicate a preference for hedonic over utilitarian products, following the stimuli of having less compared to more likes than others. This finding adheres to López and de Maya's (2012) suggestion that hedonic products are preferred as a means to compensate for a worsened mood. Having less likes than others could be perceived as an unpleasant event (Hirschman, 1993), and hedonic products would then repair the unpleasant feeling. Moreover, Shrum (2013) argued that a boosted social identity is an underlying reason for hedonic consumption. As likes are an element of the identity users present in social networks, it follows that finding out you have less vs more likes than others temporarily destabilizes the social identity. Even though we have argued before that the online identity is separated from the real identity, users should still seek to stabilise their online identity, as it is available to one's social network and hence represents a social aspect of oneself. Hedonic consumption would consequently boost the negatively affected social identity.

No inclination for a preference of healthy products over unhealthy ones was observed, in contrast to what was hypothesised. Neither was any inclination to engage in risky behaviour affected. With literature suggesting that likes can act as a proxy for social status

(Madden et al., 2013), and that healthy behaviour is related to one's social status (Jo et al., 2003), we hypothesised that one would want to maintain the social status by choosing healthy products. A possible explanation for the lack of effects is that users consume healthy products to regain their social status from upward comparison, as much as they do to maintain it from downward comparison. The effects would then cancel each other out. Another possibility is that a more lingering feeling of social status is needed in order to affect healthy eating. The reason for why risk behaviour was not affected could be because not all abilities correlate with risk behaviour.

5.2.2 Extended analysis - Instagram Actual Likes

In terms of actual likes, users who reported to have 20 likes or more on their Instagram pictures, noted positive effects on all well-being variables compared to the ones with less than 20 likes. Although we cannot deduce a cause and effect relationship from the observation, the findings are interesting to note. One possible explanation as to why these observations were made, could be that Instagram users to a large extent already are quite certain of how many likes they receive, as well as how many likes similar others receive. It could then be that upon seeing the stimuli, the participants were less affected by the element of social comparison. The participants actually having a higher amount of likes, could possibly already inhibit a feeling of social support from others (e.g Carr, Wohn & Hayes, 2016), and thus feel better as a consequence. While those with less actual likes, possibly do not have the feeling of social support, and thus feel worse in general.

5.2.3 Running paces' effects on consumer well-being and behaviour

In terms of running pace, the positive effects on self-esteem, life satisfaction and stress adheres to findings from research on social comparison. Downward comparison has been found to lead to more positive self-evaluations and higher self-esteem (e.g. Morse & Gergen, 1970) as well as a higher life-satisfaction (Frieswijk et al., 2004), than when comparing upwards (Wheeler and Miyake, 1992). Similarly, negative evaluations about oneself caused by an upward social comparison have been associated with feelings of depression (Swallow & Kuiper, 1988). As a faster running pace indicates a better performance than others, the consumer engages in a positive evaluation about him/herself which leads to a higher self-esteem, higher life satisfaction and less feelings of stress (e.g. Taylor & Lobel, 1989). These findings also show that life satisfaction not necessarily has

to be stable (Diener, 1994), but can be temporarily destabilised by encountering others' numerical expressions of physical performance.

No effects on consumer behaviour were observed by comparing running paces. Social comparison has not directly been observed to lead to a preference for healthy over unhealthy products in past research. However, healthy eating is linked to social status (Jo et al. 2003) and in turn fitness is linked to social status in many contexts (e.g. Johansson, Tienari & Valtonen, 2017; Sinclair, 2005). Due to this reasoning we argued that any following behaviours would aim to maintain that social status. However, our results disprove this reasoning, for which a possible explanation could be that regaining social status after upward social comparison, is as important as maintaining it after downward social comparison, which cancels out the effects.

Furthermore, the idea that self-efficacy (self-esteem), enforces healthy behaviour is advocated in multiple studies (e.g. Schwarzer and Fuchs, 1996). Nevertheless, the fact that the results from this study did not show any significant preference of healthy products, it seems as higher levels of self-esteem does not always lead to a healthier diet. A possible explanation in this case is that general increased self-esteem does not lead to a healthier diet, but one's confidence about specifically initiating and maintaining healthy behaviour might, in line with Bandura's (1997) reasoning.

Similarly, literature has not suggested that social comparison in either direction should lead to the preference of hedonic over utilitarian products. However, we argued that comparing to someone's better running pace could lead to a behaviour of wanting to escape the ''unpleasant reality'' by purchasing a hedonic product. Moreover, hedonic consumption is suggested to uplift bad moods (e.g. López & de Maya, 2012). Contrasting this reasoning, the results showed no indication that hedonic consumption was preferred. A possible explanation for this could be that engaging in comparison to others' better running pace, does not lead to an unpleasant reality or a negative mood strong enough to make the consumer seek to compensate for it through hedonic shopping. More likely though, as likes did affect hedonic consumption, physical ability might not impact hedonic consumption whilst social ability might. Additionally, lower levels of self-esteem did not seem to affect hedonic consumption in this study. An explanation might be that people function differently in this regard. Some purchase more hedonic products because they want to change their mood, whereas some feel that they deserve to purchase hedonic products because of their great performance.

Literature has suggested that self-perceived ability and risk behaviour are correlated (Jellison & Riskind, 1970). We claimed that running pace could be treated as a physical

ability, thus arguing for that downward comparison would increase risk behaviour. However, according to the results, this relationship does not seem to stand as risk behaviour was not significantly altered by one's running pace. One explanation might be that not all abilities are correlated with risk behaviour. Furthermore, self-efficacy (self-esteem) has been argued to strongly affect risk behaviour (Krueger & Dickson, 1994). However, it might be that more lingering increase of self-esteem is needed in order to affect risk behaviour, which is not tested in this thesis.

Assuming that the theory of social comparison plays an important role when making sense of numbers, all findings of this thesis also contributes to the literature of social comparison. The findings discussed above show that also comparison through numbers has effects on well-being aspects, in line with findings using other comparison elements (such as images and profiles). A second addition to the literature is that even when the abilities compared (physical performance numbers) are not reflecting a real situation, and are introduced in temporary stimuli, they are strong enough to affect consumers.

Most importantly though, the findings above contribute to the currently very limited literature on how the use of fitness application affects consumers. Wu, Kankanhalli and Huang (2015) and Zhou, Kankanhalli and Huang (2016) suggested that fitness applications with Leaderboards lead to consumers comparing their performance data with others, and that the type of comparison in turn affects the user's physical activity. With the same logic applied, the findings of this thesis also suggest that consumers' well-being is affected as a consequence from using fitness applications with social functions that allow for comparison.

5.2.4 Extended analysis - Self-Quantification Activity

Drawn from the literature review, several researchers have suggested that self-quantification increases the user's awareness and self-knowledge, which positively impacts the user's perceived level of control (Choe et al., 2014; Li et al., 2011; Lupton, 2016; Ruckenstein and Pantzar, 2017). In turn, feeling in control is widely recognized to be important for our physical and psychological well-being (e.g. Langer, 1975; White, 1959).

The results suggested that more active users of self-quantification have a higher self-esteem and life satisfaction than the less active. These results are therefore in line with the reasoning of the authors above. Self-control was not tested in the studies, as its

importance was not anticipated from the beginning. However, the reported higher levels of self-esteem can possibly be attributed to the higher levels of self-control, which are seen to increase confidence (Langer, 1975). Larson (1989) also stated that happiness increases with higher perceived control, which could explain the higher levels of life-satisfaction from more active users.

In line with the reasoning of the authors above, an intended healthier diet of the more active self-quantifiers, could also be found in our results. More active self-quantifiers also were more risk-taking. Given that self-control actually increases with self-quantifying activity, the results are in line with Langer's (1975) reasoning that perceived self-control increases risk behaviour, as tendencies to worry decreases. As stated in the extended analysis however, it cannot be said for certain whether this finding is due to the users' self-quantification activity or their inherent personalities. People that are more naturally curious (Li et al, 2011) and more open to new experiences (Choe et al., 2014), are commonly those who start self-quantifying.

5.3 Practical Implications

5.3.1 Consumer Implications

The findings from this thesis indicate valuable insights for consumers. Expanding the understanding of how we are affected by social media platforms and fitness applications is increasingly important due to the heavy usage, which does not seem to decelerate.

One important implication for consumers' insights into spending habits is that having less likes than similar others increases hedonic consumption. With Instagram often including direct links to e-commerce websites, it could be that in the choice of a hedonic product vs a utilitarian one, the consumers with less likes than average in their networks are more likely to choose a hedonic product. In a long-term perspective, this could affect the consumers' financial situation as hedonic products not necessarily are what customers *need*, but what they *want*. Furthermore, well-being seems to be higher for users with more actual likes, and lower for users with less actual likes. With that knowledge in mind, Instagram users should be aware of that their presence on the platform affects how they feel, as the amount of likes apparently matters for their well-being.

In terms of fitness applications, well-being seems to be significantly impacted by others' running paces. The findings of this thesis increase users' understanding of how they may

feel when making their physical performances official. Publishing fitness data that is worse than others' may lead to a negative state of mind and affect well-being negatively, while publishing fitness data that is better than others' may lead to the opposite. It is therefore not certain how users might feel after publishing their fitness data, as the ones compared to might be both better and worse.

In terms of the usage of fitness applications, the results from this thesis indicate that users who use mobile fitness applications to a larger extent, actually feel better, indicating that people should self-quantify. However, self-quantification is in this thesis not tested over a longer period of time. Neither has it been determined whether the use of fitness applications is more beneficial for certain personalities. Having the argument of Etkin (2016) in mind, that self-quantification can make otherwise enjoyable activities feel more like work, a possible scenario could be that self-quantification is positive in the beginning. Users feel good about accomplishing their fitness goals, but with time the sense of fun might get lost. Performing the physical activities becomes a compelling must, rather than something fulfilling.

5.3.2 Managerial Implications

The results from this thesis indicate that there are some unintended effects from comparing self-presentational numbers. Hence, developers of fitness applications should keep in mind that users' well-being is affected by functions allowing for comparisons to be made. For brands present on the fitness applications, through sponsored content or advertising, it is also important to know about the possible adverse effects on consumers' well-being. The brand or products might become associated with the consumer's negative emotional state following an upward social comparison. Furthermore, although comparing likes did not show any significant differences on well-being, differences were seen between users with more compared to less actual likes. Thus, consumers do seem to get affected by the likes they have, which should be taken under consideration by social media developers and brands alike.

Furthermore, the results from this thesis can be helpful for segmentation and targeting purposes. Trying to understand the core customer has been a central function of marketing for several years (e.g Kotler & Armstrong, 2010). For example, Instagram users that are likely to experience upward social comparison are more likely to buy hedonic over utilitarian products, which is worth knowing for businesses with a hedonic product offering. In addition, fitness app users who experience upward social comparison are likely

to have a lower self-esteem and higher levels of stress, opening up for self-esteem boosting as well as stress reducing product offerings.

The extended analysis suggests that Instagram users with less actual likes, as well as less active fitness app users, are individuals with lower levels of self-esteem, life satisfaction and higher levels of stress. With the same argument as above, these users might be successfully targeted with products that increase self-esteem and reduce stress. Furthermore, more active fitness app users also have a higher tendency of choosing healthy over unhealthy products as well as being more risk-taking. With these results in mind, businesses that offer healthy products could put more emphasis on those who are active-self-quantifiers. Also, businesses that offer risky products or services, such as a gambling company or a retailer of extreme-sports products could logically put more focus on active self-quantifiers.

5.4 Limitations of the study

Although the findings of this thesis are valuable to the research community, consumers and practitioners, any limitations should be brought forward and considered when interpreting the results.

5.4.1 Design of Stimulus

As mentioned in the *Review of Data Quality* (page 40), the respondents encountered fictitious stimuli that had been designed to reinforce the process of social comparison. Because it is rather unlikely that consumers will encounter the exact or similar message in reality, it could be seen to limit the ecological validity of the studies in this thesis. The stimuli were designed to imitate real situations as much as possible by adopting design elements from Instagram and a running app. However, participants would ideally have been on Instagram or in the fitness app in reality when receiving the questionnaire. As with all experiments, this could be considered a limitation, although it brings other benefits such as a controlled cause-and-effect relationship (Bryman & Bell, 2015).

5.4.2 Type of numerical construct

In this thesis, only numbers in the form of Instagram Likes and Running Pace were tested. The conclusions of the effects from each respectively can therefore not confidently be drawn beyond their specific medium. Likes on other types of social media might function differently, as will have to be determined by future research. The effects observed from Running Paces, can similarly only be confidently extended to fitness applications with a running tracking element, since it is still unknown whether other types of fitness data works in a similar way.

5.4.3 Theoretical Lens

In this thesis, we chose to look at self-presentational numbers' effects on consumers with the theoretical lens of social comparison. The choice of social comparison over other theories was due to the fact that both literature on social media and fitness applications have acknowledged the theory in explaining effects of likes and fitness data. Furthermore, while diving deeper into the literature, we also deemed this theory most fitting for the concepts that were to be tested. However, in extant literature on social media likes, other theoretical explanations have been used to explain how likes are perceived and performed. Social capital (Ellison & Vitak, 2015), sociometric theory (Tong et al., 2008) and Uses and Gratification theory (Hayes, Carr & Wohn, 2016) are a few examples. Social comparison was deemed most fitting by *us*, while we acknowledge that the same preconception might not be shared by everyone. Potentially, other theories could be deemed more fitting by others, or work in tandem with social comparison.

5.5 Future research

The findings of this thesis suggested that self-presentational numbers in the form of Instagram Likes and Running Pace can affect consumers' well-being and behaviour. With these important findings, this thesis paves the way for future research on numbers' unintended effects on consumers.

First of all, consumers were shown to be affected in the domains of self-esteem, life satisfaction and stress by having a faster as compared to slower running pace. Although these variables are indicative of well-being, more variables should be considered to

examine the full effect of self-presentational numbers in fitness applications. Even as consumer behaviour was not shown to be affected in our study, other types of consumer behaviour would be interesting to consider in future research. It is possible, that other types of consumer behaviour than the ones tested in our study, are affected. Furthermore, in this study, the numerical construct of *Running Paces* was tested. In continuous research on the topic, it would be interesting to look at whether other types of fitness data have the same, or other, effects.

In our extended analysis on social media, it was found that the actual amount of likes held by the participants predicted greater self-esteem, and lower stress. These findings suggest interesting areas for future studies, where participants' actual amount of likes received may act as a moderating effect on the variables studied.

In the extended analysis on fitness applications, those who use mobile fitness applications to a larger extent were found to have a higher self-esteem, life-satisfaction, a preference for healthy products and a higher inclination to engage in risky behaviour. This finding greatly indicates that higher usage of tracking applications, affects the user in quite unintended ways, which would be interesting to investigate further. Seeing as the body of literature on self-quantification partially suggests the reverse effects on well-being than what was shown by the extended analysis, it would be interesting to see if the positive effects found in this study are stable over time.

Lastly, the findings of the two main studies in this thesis were observed after temporary stimuli had been introduced. As one out of every four fitness app user accesses the app ten or more times a week (Kesiraju & Vogels, 2017), and the average Instagram user spends 53 minutes on the medium every day (SimilarWeb, 2018), future studies should look at any potential effects of self-presentations numbers over an extended period of time.

6. References

Åkestam, N., Rosengren, S. and Dahlen, M., 2017. Think about it–can portrayals of homosexuality in advertising prime consumer-perceived social connectedness and empathy? European Journal of Marketing, 51(1), pp.82-98.

American Psychology Association. (2002). [online] Available at: https://www.apa.org/ethics/code/ [Accessed 3 Dec. 2018].

Anderson, R.E. and Jolson, M.A., 1980. Technical wording in advertising: Implications for market segmentation. The Journal of Marketing, pp.57-66.

Ang, L. and Eisend, M., 2018. Single versus multiple measurement of attitudes: a meta-analysis of advertising studies validates the single-item measure approach. Journal of Advertising Research, 58(2), pp.218-227.

Appel, H., Gerlach, A.L. and Crusius, J., 2016. The interplay between Facebook use, social comparison, envy, and depression. Current Opinion in Psychology, 9, pp.44-49.

Bandura, A., 1997. Editorial. American Journal of Health Promotion, 12(1), pp.8-10.

Bell, E. and Bryman, A., 2015. *Business research methods.* Oxford university press.

Bergkvist, L. and Rossiter, J.R., 2007. The predictive validity of multiple-item versus single-item measures of the same constructs. Journal of marketing research, 44(2), pp.175-184.

Bessenoff, G.R., 2006. Can the media affect us? Social comparison, self-discrepancy, and the thin ideal. Psychology of women quarterly, 30(3), pp.239-251.

Blascovich, J. and Tomaka, J., 1991. Measures of self-esteem. Measures of personality and social psychological attitudes, 1, pp.115-160.

Blease, C.R., 2015. Too many 'friends,'too few 'likes'? Evolutionary psychology and 'Facebook depression'. Review of General Psychology, 19(1), p.1.
Borresen, J. and Lambert, M.I., 2009. The quantification of training load, the training response and the effect on performance. Sports medicine, 39(9), pp.779-795.

Boyd, D.M. and Ellison, N.B., 2007. Social network sites: Definition, history, and scholarship. Journal of computer-mediated Communication, 13(1), pp.210-230.

Braun, O.L. and Wicklund, R.A., 1989. Psychological antecedents of conspicuous consumption. Journal of Economic psychology, 10(2), pp.161-187.

Brockner, J., 1988. Self-esteem at work: Research, theory, and practice. Lexington Books/DC Heath and Com.

Burrow, A.L. and Rainone, N., 2017. How many likes did I get?: Purpose moderates links between positive social media feedback and self-esteem. Journal of Experimental Social Psychology, 69, pp.232-236.

Buunk, B.P., Collins, R.L., Taylor, S.E., VanYperen, N.W. and Dakof, G.A., 1990. The affective consequences of social comparison: either direction has its ups and downs. Journal of personality and social psychology, 59(6), p.1238.

Campbell, D.T. and Stanley, J.C., 1963. Experimental and quasi-experimental designs for research. Handbook of research on teaching, pp.171-246.

Carr, C.T., Hayes, R.A. and Sumner, E.M., 2018. Predicting a Threshold of Perceived Facebook Post Success via Likes and Reactions: A Test of Explanatory Mechanisms. Communication Research Reports, 35(2), pp.141-151.

Carr, C.T., Wohn, D.Y. and Hayes, R.A., 2016. As social support: Relational closeness, automaticity, and interpreting social support from paralinguistic digital affordances in social media. Computers in Human Behavior, 62, pp.385-393.

Childers, T.L. and Viswanathan, M., 2000. Representation of numerical and verbal product information in consumer memory. Journal of Business Research, 47(2), pp.109-120.

Choe, E.K., Lee, N.B., Lee, B., Pratt, W. and Kientz, J.A., 2014, April. Understanding quantified-selfers' practices in collecting and exploring personal data. In Proceedings of the 32nd annual ACM conference on Human factors in computing systems (pp. 1143-1152). ACM.

Collins, R.L., 1996. For better or worse: The impact of upward social comparison on self-evaluations. Psychological bulletin, 119(1), p.51.

Costas, J., Blagoev, B. and Kärreman, D., 2016. The arena of the professional body: Sport, autonomy and ambition in professional service firms. Scandinavian Journal of Management, 32(1), pp.10-19.

Couper, M.P., 2000. Web surveys: A review of issues and approaches. The Public Opinion Quarterly, 64(4), pp.464-494.

Dalleck, L.C. and Kravitz, L., 2002. The history of fitness: From primitive to present times, how fitness has evolved and come of age. IDEA Health & Fitness Source, 20(1), pp.26-34.

Darley, W.K. and Smith, R.E., 1993. Advertising claim objectivity: Antecedents and effects. The Journal of Marketing, pp.100-113.

Dawes, J., 2008. Do data characteristics change according to the number of scale points used? An experiment using 5-point, 7-point and 10-point scales. International journal of market research, 50(1), pp.61-104.

Dhar, R. and Wertenbroch, K., 2000. Consumer choice between hedonic and utilitarian goods. Journal of marketing research, 37(1), pp.60-71.

Dictionary, M. (2018). *MOBILE APPLICATION | meaning in the Cambridge English Dictionary*. [online] Dictionary.cambridge.org. Available at: https://dictionary.cambridge.org/dictionary/english/mobile-application [Accessed 10 Dec. 2018].

Didžiokaitė, G., Saukko, P. and Greiffenhagen, C., 2018. The mundane experience of everyday calorie trackers: Beyond the metaphor of Quantified Self. New Media & Society, 20(4), pp.1470-1487.

Diener, E. and Diener, C., 1996. Most people are happy. Psychological science, 7(3), pp.181-185.

Diener, E., 1984. Subjective well-being. Psychological bulletin, 95(3), p.542.

Diener, E., 2000. Subjective well-being: The science of happiness and a proposal for a national index. American psychologist, 55(1), p.34.

Diener, E., Oishi, S. and Lucas, R.E., 2003. Personality, culture, and subjective well-being: Emotional and cognitive evaluations of life. Annual review of psychology, 54(1), pp.403-425.

Diener, E.D., Emmons, R.A., Larsen, R.J. and Griffin, S., 1985. The satisfaction with life scale. Journal of personality assessment, 49(1), pp.71-75.

Dodge, M. and Kitchin, R., 2007. 'Outlines of a world coming into existence': pervasive computing and the ethics of forgetting. Environment and planning B: planning and design, 34(3), pp.431-445.

Edell, J.A. and Staelin, R., 1983. The information processing of pictures in print advertisements. Journal of consumer research, 10(1), pp.45-61.

Ellison, N., & Vitak, J. (2015). Social media affordances and their relationship to social capital processes. In S. Sundar (Ed.), The handbook of psychology of communication technology(pp. 205-227). Boston: Wiley-Blackwell.

Ellison, N.B., Steinfield, C. and Lampe, C., 2007. The benefits of Facebook "friends:" Social capital and college students' use of online social network sites. Journal of Computer-Mediated Communication, 12(4), pp.1143-1168.

Etkin, J., 2016. The hidden cost of personal quantification. Journal of Consumer Research, 42(6), pp.967-984.

Everett, C., 2015. Can wearable technology boost corporate wellbeing?. Occupational Health & Wellbeing, 67(8), p.12.

Ergonomics Society Annual Meeting (Vol. 60, No. 1, pp. 1068-1072). Sage CA: Los Angeles, CA: SAGE Publications.

Festinger, L., 1954. A theory of social comparison processes. Human relations, 7(2), pp.117-140.

Fineman, S., 1997. Emotion and management learning. Management learning, 28(1), pp.13-25.

Fox, J. and Moreland, J.J., 2015. The dark side of social networking sites: An exploration of the relational and psychological stressors associated with Facebook use and affordances. Computers in Human Behavior, 45, pp.168-176.

Fox, S. and Duggan, M., 2013. *Tracking for health*. Pew Research Center's Internet & American Life Project.

Gerber, J.P., Wheeler, L. and Suls, J., 2018. A social comparison theory meta-analysis 60+ years on. Psychological bulletin, 144(2), p.177.

Gerlitz, C. and Helmond, A., 2013. The like economy: Social buttons and the data-intensive web. New Media & Society, 15(8), pp.1348-1365.
Gosling, S.D., Gaddis, S. and Vazire, S., 2007. Personality impressions based on facebook profiles. Icwsm, 7, pp.1-4.

Grinberg, N., Kalyanaraman, S., Adamic, L.A. and Naaman, M., 2017, February. Understanding feedback expectations on Facebook. In Proceedings of the 2017 ACM Conference on Computer Supported Cooperative Work and Social Computing (pp. 726-739). ACM.

Gui, X., Chen, Y., Caldeira, C., Xiao, D. and Chen, Y., 2017, May. When Fitness Meets Social Networks: Investigating Fitness Tracking and Social Practices on WeRun. In Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems (pp. 1647-1659). ACM.

Hackshaw, A., 2008. Small studies: strengths and limitations.

Haferkamp, N. and Krämer, N.C., 2011. Social comparison 2.0: Examining the effects of online profiles on social-networking sites. Cyberpsychology, Behavior, and Social Networking, 14(5), pp.309-314.

Hamari, J. and Koivisto, J., 2015. “Working out for likes”: An empirical study on social influence in exercise gamification. Computers in Human Behavior, 50, pp.333-347.

Hayes, R.A., Carr, C.T. and Wohn, D.Y., 2016. One click, many meanings: Interpreting paralinguistic digital affordances in social media. Journal of Broadcasting & Electronic Media, 60(1), pp.171-187.

Heatherton, T.F. and Polivy, J., 1991. Development and validation of a scale for measuring state self-esteem. Journal of Personality and Social psychology, 60(6), p.895.

Henry, J.D. and Crawford, J.R., 2005. The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. British journal of clinical psychology, 44(2), pp.227-239.

Hirschman, E.C., 1983. Predictors of self-projection, fantasy fulfillment, and escapism. The Journal of Social Psychology, 120(1), pp.63-76.

Holbrook, M.B., 1978. Beyond attitude structure: Toward the informational determinants of attitude. Journal of marketing research, pp.545-556.

Hopkins, W.G., 1991. Quantification of training in competitive sports. Sports medicine, 12(3), pp.161-183.

Iqvia Institute (2018). *The Growing Value of Digital Health*. [online] Available at: https://www.iqvia.com/institute/reports/the-growing-value-of-digital-health [Accessed 3 Dec. 2018].

Jacobs, J. (2016). Social Media: Tech's Growth Industry. [online] Global X Funds. Available at: https://www.globalxfunds.com/social-media-techs-growth-industry/ [Accessed 30 Nov. 2018].

Jellison, J.M. and Riskind, J., 1970. A social comparison of abilities interpretation of risk-taking behavior. Journal of Personality and Social Psychology, 15(4), p.375.

Jo, H., Lee, S., Ahn, M.O. and Jung, S.H., 2003. Structural relationship of factors affecting health promotion behaviors of Korean urban residents. Health Promotion International, 18(3), pp.229-236.

Johansson, J., Tienari, J. and Valtonen, A., 2017. The body, identity and gender in managerial athleticism. Human relations, 70(9), pp.1141-1167.

Jones, D.C., 2001. Social comparison and body image: Attractiveness comparisons to models and peers among adolescent girls and boys. Sex roles, 45(9-10), pp.645-664.

Kasser, T., 2003. The high price of materialism. MIT press.

Kelley, C., Lee, B. and Wilcox, L., 2017, May. Self-tracking for mental wellness: understanding expert perspectives and student experiences. In *Proceedings of the 2017 CHI Conference on Human Factors in Computing Systems* (pp. 629-641). ACM.

Kesiraju & Vogels (2017) [online] Available at: https://flurrymobile.tumblr.com/post/165079311062/health-fitness-app-users-are-going-the-distance [Accessed 2 Dec. 2018].

Kim, J. and Lee, J.E.R., 2011. The Facebook paths to happiness: Effects of the number of Facebook friends and self-presentation on subjective well-being. CyberPsychology, behavior, and social networking, 14(6), pp.359-364.

Koo, S.H. and Fallon, K., 2018. Explorations of wearable technology for tracking self and others. Fashion and Textiles, 5(1), p.8.

Kopp, J., 1988, December. Self-monitoring: A literature review of research and practice. In Social Work Research and Abstracts (Vol. 24, No. 4, pp. 8-20). Oxford University Press.

Kotler, P. and Armstrong, G., 2010. Principles of marketing. Pearson education.

Kross, E., Verduyn, P., Demiralp, E., Park, J., Lee, D.S., Lin, N., Shablack, H., Jonides, J. and Ybarra, O., 2013. Facebook use predicts declines in subjective well-being in young adults. PloS one, 8(8), p.e69841.

Krueger Jr, N. and Dickson, P.R., 1994. How believing in ourselves increases risk taking: Perceived self-efficacy and opportunity recognition. Decision Sciences, 25(3), pp.385-400.

Labrague, L.J., 2014. Facebook use and adolescents' emotional states of depression, anxiety, and stress.

Langer, E.J., 1975. The illusion of control. *Journal of personality and social psychology*, *32*(2), p.311.

Larson, R., 1989. Is feeling "in control" related to happiness in daily life?. *Psychological Reports*, *64*(3), pp.775-784.

Lerner, J.S., Small, D.A. and Loewenstein, G., 2004. Heart strings and purse strings: Carryover effects of emotions on economic decisions. Psychological science, 15(5), pp.337-341.

Li, I., Dey, A.K. and Forlizzi, J., 2011, September. Understanding my data, myself: supporting self-reflection with ubicomp technologies. In Proceedings of the 13th international conference on Ubiquitous computing (pp. 405-414). ACM.

Lomborg, S. and Frandsen, K., 2016. Self-tracking as communication. Information, Communication & Society, 19(7), pp.1015-1027.

López, I.L. and De Maya, S.R., 2012. When hedonic products help regulate my mood. Marketing Letters, 23(3), pp.701-717.

Lupton, D., 2013. Quantifying the body: monitoring and measuring health in the age of mHealth technologies. Critical Public Health, 23(4), pp.393-403.

Lupton, D., 2016. The quantified self. John Wiley & Sons.

Luszczynska, A., Gibbons, F.X., Piko, B.F. and Tekozel, M., 2004. Self-regulatory cognitions, social comparison, and perceived peers' behaviors as predictors of nutrition and physical activity: A comparison among adolescents in Hungary, Poland, Turkey, and USA. Psychology & Health, 19(5), pp.577-593.

Madden, M., Lenhart, A., Cortesi, S., Gasser, U., Duggan, M., Smith, A. and Beaton, M., 2013. Teens, social media, and privacy. Pew Research Center, 21, pp.2-86.

Malhotra, N. K. (2004), Marketing Research: An Applied Orientation. 4th edition, Upper Saddle River, NJ: Prentice-Hall.

Malik, A., Dhir, A. and Nieminen, M., 2016. Uses and gratifications of digital photo sharing on Facebook. Telematics and Informatics, 33(1), pp.129-138.

Maltseva, K. and Lutz, C., 2018. A quantum of self: A study of self-quantification and self-disclosure. Computers in Human Behavior, 81, pp.102-114
Maslow, A.H., 1943. A theory of human motivation. Psychological review, 50(4), p.370.

Maturo, A.F. and Moretti, V., 2018. Self-Tracking and the Quantification of Everyday Life. In Digital Health and the Gamification of Life: How Apps Can Promote a Positive Medicalization (pp. 9-27). Emerald Publishing Limited.

Meertens, R.M. and Lion, R., 2008. Measuring an Individual's Tendency to Take Risks: The Risk Propensity Scale 1. Journal of Applied Social Psychology, 38(6), pp.1506-1520.

Mental Health America. (2018). *Stress*. [online] Available at: http://www.mentalhealthamerica.net/conditions/stress [Accessed 2 Dec. 2018].

Michie, S., Abraham, C., Whittington, C., McAteer, J. and Gupta, S., 2009. Effective techniques in healthy eating and physical activity interventions: a meta-regression. Health Psychology, 28(6), p.690.

Moreno, M.A., Jelenchick, L.A., Egan, K.G., Cox, E., Young, H., Gannon, K.E. and Becker, T., 2011. Feeling bad on Facebook: Depression disclosures by college students on a social networking site. Depression and anxiety, 28(6), pp.447-455.

Morse, S. and Gergen, K.J., 1970. Social comparison, self-consistency, and the concept of self. Journal of personality and social psychology, 16(1), p.148.

Nabi, R.L., Prestin, A. and So, J., 2013. Facebook friends with (health) benefits? Exploring social network site use and perceptions of social support, stress, and well-being. Cyberpsychology, Behavior, and Social Networking, 16(10), pp.721-727.

Nielsen. (2014). The role of content in the consumer decision making process [online] Available at: http://www.inpwrd.com/the_role_of_content_inpowered.pdf [Accessed 1 Dec. 2018].

Nike. (2018). Nike Running Club. [online] Available at: https://www.nike.com/se/en_gb/c/running/nike-run-club. [Accessed 30 Nov. 2018].

Okada, E.M., 2005. Justification effects on consumer choice of hedonic and utilitarian goods. Journal of marketing research, 42(1), pp.43-53.

Otley, D., 1999. Performance management: a framework for management control systems research. Management accounting research, 10(4), pp.363-382.

Paolacci, G. and Chandler, J., 2014. Inside the Turk: Understanding Mechanical Turk as a participant pool. Current Directions in Psychological Science, 23(3), pp.184-188.

Paton, C., Hansen, M., Fernandez-Luque, L. and Lau, A.Y., 2012. Self-tracking, social media and personal health records for patient empowered self-care. Yearbook of medical informatics, 21(01), pp.16-24.

Pavot, W. and Diener, E., 1993. The affective and cognitive context of self-reported measures of subjective well-being. Social Indicators Research, 28(1), pp.1-20.

Pettinico, G. and Milne, G.R., 2017. Living by the numbers: understanding the “quantification effect”. Journal of Consumer Marketing, 34(4), pp.281-291.

Porter, T.M., 1996. Trust in numbers: The pursuit of objectivity in science and public life. Princeton University Press.

Pounders, K., Kowalczyk, C.M. and Stowers, K., 2016. Insight into the motivation of selfie postings: impression management and self-esteem. European Journal of Marketing, 50(9/10), pp.1879-1892.

Preston, C.C. and Colman, A.M., 2000. Optimal number of response categories in rating scales: reliability, validity, discriminating power, and respondent preferences. Acta psychologica, 104(1), pp.1-15.

Prince, J.D., 2014. The quantified self: Operationalizing the quotidien. Journal of Electronic Resources in Medical Libraries, 11(2), pp.91-99.

Prnewswire.com. (2012). Endomondo And POWERADE® Add Hydration Guide To Mobile Fitness App. [online] Available at: https://www.prnewswire.com/news-releases/endomondo-and-powerade-add-hydration-guide-to-mobile-fitness-app-176753931.html [Accessed 30 Nov. 2018].

Rosenberg, M., 1965. Rosenberg self-esteem scale (RSE). Acceptance and commitment therapy. Measures package, 61, p.52.

Rosenthal-von der Pütten, A.M., Hastall, M., Köcher, S., Meske, C., Heinrich, T.,

Labrenz, F. and Ocklenburg, S., 2018. “Likes” as social rewards: Their role in online social comparison and decisions to like other People's selfies. Computers in Human Behavior.

Ruckenstein, M. and Pantzar, M., 2017. Beyond the quantified self: Thematic exploration of a dataistic paradigm. New Media & Society, 19(3), pp.401-418.

Runkeeper. (2018). Runkeeper. [online] Available at: https://runkeeper.com/ [Accessed 30 Nov. 2018].

Saaty, T.L., 2008. Decision making with the analytic hierarchy process. International journal of services sciences, 1(1), pp.83-98.

Sadler-Smith, E. and Shefy, E., 2004. The intuitive executive: Understanding and applying ‘gut feel’in decision-making. *Academy of Management Perspectives*, *18*(4), pp.76-91.

Salmon, S.J., Fennis, B.M., de Ridder, D.T., Adriaanse, M.A. and De Vet, E., 2014. Health on impulse: When low self-control promotes healthy food choices. Health Psychology, 33(2), p.103.

Schwarzer, R. and Fuchs, R., 1996. Self-efficacy and health behaviours. Predicting health behavior: Research and practice with social cognition models, 163, p.196.

Scissors, L., Burke, M. and Wengrovitz, S., 2016, February. What's in a Like?: Attitudes and behaviors around receiving Likes on Facebook. In Proceedings of the 19th ACM Conference on Computer-Supported Cooperative Work & Social Computing (pp. 1501-1510). ACM.

Seidman, G., 2013. Self-presentation and belonging on Facebook: How personality influences social media use and motivations. Personality and Individual Differences, 54(3), pp.402-407.

Selfhout, M.H., Branje, S.J., Delsing, M., ter Bogt, T.F. and Meeus, W.H., 2009. Different types of Internet use, depression, and social anxiety: The role of perceived friendship quality. Journal of adolescence, 32(4), pp.819-833.

Sherer, M. and Adams, C.H., 1983. Construct validation of the self-efficacy scale. Psychological reports, 53(3), pp.899-902.

Sherman, L.E., Greenfield, P.M., Hernandez, L.M. and Dapretto, M., 2018. Peer influence via instagram: Effects on brain and behavior in adolescence and young adulthood. *Child development*, *89*(1), pp.37-47.

Sherman, L.E., Hernandez, L.M., Greenfield, P.M. and Dapretto, M., 2018. What the brain 'Likes': neural correlates of providing feedback on social media. Social cognitive and affective neuroscience, 13(7), pp.699-707.

Sherman, L.E., Payton, A.A., Hernandez, L.M., Greenfield, P.M. and Dapretto, M., 2016. The power of the like in adolescence: Effects of peer influence on neural and behavioral responses to social media. Psychological science, 27(7), pp.1027-1035.

Shilton, K., 2012. Participatory personal data: An emerging research challenge for the information sciences. Journal of the American Society for Information Science and Technology, 63(10), pp.1905-1915..

Shrum, L.J., Wong, N., Arif, F., Chugani, S.K., Gunz, A., Lowrey, T.M., Nairn, A., Pandelaere, M., Ross, S.M., Ruvio, A. and Scott, K., 2013. Reconceptualizing materialism as identity goal pursuits: Functions, processes, and consequences. Journal of Business Research, 66(8), pp.1179-1185.

Simon, H.A., 1979. Rational decision making in business organizations. The American economic review, 69(4), pp.493-513.

Sinclair, A., 2005. Body and management pedagogy. Gender, Work & Organization, 12(1), pp.89-104.

Sjöklint, M., 2015. The Measurable Me. Copenhagen Business School [Phd].

Sjöklint, M., Constantiou, I.D. and Trier, M., 2013. Numerical Representations And User Behaviour In Social Networking Sites: Towards A Multi-Theoretical Research Framework. In ECIS (p. 144).

Sjöklint, M., Constantiou, I.D. and Trier, M., 2015. The complexities of self-tracking-An inquiry into user reactions and goal attainment.

Solomon, M.R., 2010. Consumer behaviour: A European perspective. Pearson education.

Southern, M. (2018). Instagram Has 1 Billion Monthly Users, Now the Fastest Growing Social Network. [online] Search Engine Journal. Available at: https://www.searchenginejournal.com/instagram-1-billion-monthly-users-now-fastest-growing-social-network/258127/ [Accessed 30 Nov. 2018].

Spielberger, C. D., 1971. *Anxiety as an emotional state.* New York: Academic Press.

Spielberger, C. D., Gorsuch, R. L. & Lushene, R. E., 1970. *The State-Trait Anxiety.* Palo Alto, California: Consulting Psychologists Press, 1970.

Stanley, K.D. and Murphy, M.R., 1997. A comparison of general self-efficacy with self-esteem. Genetic, Social, and General Psychology Monographs, 123(1), pp.79-100.

Statista (2017a). Number of social network users worldwide from 2010 to 2021 (in billions). Available at: https://www.statista.com/statistics/278414/number-of-worldwide-social-network-users/ [Accessed 30 Nov. 2018].

Statista (2018a) Number of monthly active Facebook users worldwide [online] Available at: https://www-statista-com.ez.hhs.se/statistics/264810/number-of-monthly-active-facebook-users-worldwide/ [Accessed 2 Dec. 2018].

Statista. (2016). Enterprise wearable market revenue in the US [online] Available at: https://www-statista-com.ez.hhs.se/statistics/780221/enterprise-wearable-market-revenue-in-the-us/ [Accessed 3 Dec. 2018].

Statista. (2017b). *Global time spent on social media daily 2017* [online] Available at: https://www.statista.com/statistics/433871/daily-social-media-usage-worldwide/ [Accessed 2 Dec. 2018].

Statista. (2017c). Most popular outdoor activities in the United States from 2009 to 2017 [online] Statista. Available at: https://www.statista.com/statistics/190202/number-of-participants-in-outdoor-activities-in-the-us-2009/ [Accessed 1 Dec. 2018].

Statista. (2017d). mHealth apps market size forecast in the US [online] Available at: https://www-statista-com.ez.hhs.se/statistics/889623/mhealth-apps-market-size-forecast-in-the-us/ [Accessed 3 Dec. 2018].

Statista. (2018b). *Fitness - worldwide | Statista Market Forecast*. [online] Available at: https://www.statista.com/outlook/313/100/fitness/worldwide [Accessed 3 Dec. 2018].

Statista. (2018c). Most popular health and fitness apps in the United States as of May 2018 [online] Statista. Available at: https://www.statista.com/statistics/650748/health-fitness-app-usage-usa/ [Accessed 1 Dec. 2018].

Statista. (2018g). Usage penetration of Instagram of 2018. [online] Statista. Available at: https://www.statista.com/statistics/325567/instagram-penetration-regions/ [Accessed 1 Dec. 2018].

Stefanone, M.A., Lackaff, D. and Rosen, D., 2011. Contingencies of self-worth and social-networking-site behavior. Cyberpsychology, Behavior, and Social Networking, 14(1-2), pp.41-49.

Steinfield, C., Ellison, N.B. and Lampe, C., 2008. Social capital, self-esteem, and use of online social network sites: A longitudinal analysis. Journal of Applied Developmental Psychology, 29(6), pp.434-445.

Stragier, J., Evens, T. and Mechant, P., 2015. Broadcast yourself: an exploratory study of sharing physical activity on social networking sites. Media International Australia, 155(1), pp.120-129.

Strava. (2018). Strava. [online] Available at: https://www.strava.com/ [Accessed 30 Nov. 2018].

Swallow, S.R. and Kuiper, N.A., 1988. Social comparison and negative self-evaluations: An application to depression. Clinical Psychology Review, 8(1), pp.55-76.

Swan, M., 2013. The quantified self: Fundamental disruption in big data science and biological discovery. Big data, 1(2), pp.85-99.

Taylor, S.E. and Lobel, M., 1989. Social comparison activity under threat: Downward evaluation and upward contacts. Psychological review, 96(4), p.569.

Toner, J., 2018. Exploring the dark-side of fitness trackers: Normalization, objectification and the anaesthetisation of human experience. Performance Enhancement & Health, 6(2), pp.75-81.

Tong, L., Zheng, Y. and Zhao, P., 2013. Is money really the root of all evil? The impact of priming money on consumer choice. Marketing Letters, 24(2), pp.119-129.

Tong, S.T., Van Der Heide, B., Langwell, L. and Walther, J.B., 2008. Too much of a good thing? The relationship between number of friends and interpersonal impressions on Facebook. Journal of computer-mediated communication, 13(3), pp.531-549.

Truong, Y. and McColl, R., 2011. Intrinsic motivations, self-esteem, and luxury goods consumption. Journal of Retailing and Consumer Services, 18(6), pp.555-561.

Under Armour (2015). *Under Armour Acquires Endomondo and MyFitnessPal to Establish the World's Largest Digital Health and Fitness Community | Under Armour, Inc.*. [online] Available at: http://investor.underarmour.com/news-releases/news-release-details/under-armour-acquires-endomondo-and-myfitnesspal-establish [Accessed 4 Dec. 2018].

Valkenburg, P.M., Peter, J. and Schouten, A.P., 2006. Friend networking sites and their relationship to adolescents' well-being and social self-esteem. CyberPsychology & Behavior, 9(5), pp.584-590.

Van Dijck, J., 2013. 'You have one identity': performing the self on Facebook and LinkedIn. Media, Culture & Society, 35(2), pp.199-215.

Veenhoven, R., 1996. The study of life-satisfaction.

Vital Smarts (2015) [online] Available at: http://www.marketwire.com/library/MwGo/2015/3/11/11G035484/Likes-Over-Life_Executive-Summary_PDF-1065659813118.pdf [Accessed 1 Dec. 2018].

Vogel, E.A., Rose, J.P., Roberts, L.R. and Eckles, K., 2014. Social comparison, social media, and self-esteem. Psychology of Popular Media Culture, 3(4), p.206.

Voss, K.E., Spangenberg, E.R. and Grohmann, B., 2003. Measuring the hedonic and utilitarian dimensions of consumer attitude. Journal of marketing research, 40(3), pp.310-320.

Weber, E.U., Blais, A.R. and Betz, N.E., 2002. A domain-specific risk-attitude scale: Measuring risk perceptions and risk behaviors. Journal of behavioral decision making, 15(4), pp.263-290.

Wheeler, L. and Miyake, K., 1992. Social comparison in everyday life. Journal of personality and social psychology, 62(5), p.760.

White, R.W., 1959. Motivation reconsidered: The concept of competence. Psychological review, 66(5), p.297.

Wilde, M.H. and Garvin, S., 2007. A concept analysis of self-monitoring. Journal of Advanced Nursing, 57(3), pp.339-350.

Williamson, B., 2015. Algorithmic skin: health-tracking technologies, personal analytics and the biopedagogies of digitized health and physical education. Sport, education and society, 20(1), pp.133-151.

Wills, T.A., 1981. Downward comparison principles in social psychology. Psychological bulletin, 90(2), p.245.

Wittink, D.R. and Bayer, L.R., 1994. The measurement imperative. Marketing Research, 6(4), p.14.

Wohn, D.Y., Carr, C.T. and Hayes, R.A., 2016. How affective is a "Like"?: The effect of paralinguistic digital affordances on perceived social support. Cyberpsychology, Behavior, and Social Networking, 19(9), pp.562-566.

Wolf, G., 2010. The data-driven life. The New York Times, 28, p.2010.

Wood, J.V., 1989. Theory and research concerning social comparisons of personal attributes. Psychological bulletin, 106(2), p.231.

Wu, Q., Sum, K. and Nathan-Roberts, D., 2016, September. How fitness trackers facilitate health behavior change. In Proceedings of the Human Factors and

Wu, Y., Kankanhalli, A. and Huang, K.W., 2015. Gamification in Fitness Apps: How do Leaderboards influence Exercise?.

Yalch, R.F. and Elmore-Yalch, R., 1984. The effect of numbers on the route to persuasion. Journal of Consumer Research, 11(1), pp.522-527.

Zebregs, S., van den Putte, B., Neijens, P. and de Graaf, A., 2015. The differential impact of statistical and narrative evidence on beliefs, attitude, and intention: A meta-analysis. Health communication, 30(3), pp.282-289.

Zhang, Y.C. and Schwarz, N., 2013. The power of precise numbers: A conversational logic analysis. Journal of Experimental Social Psychology, 49(5), pp.944-946.

Zhou, Y., Kankanhalli, A. and Huang, K.W., 2016. Effects of Fitness Applications with SNS: How Do They Influence Physical Activity.

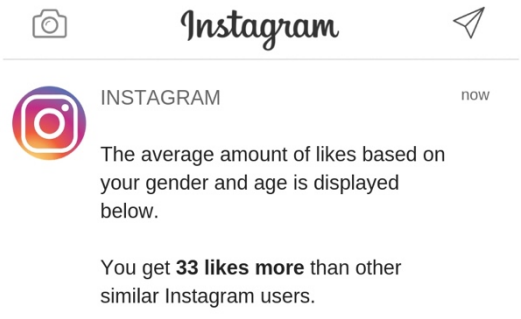
7. Appendices
7.1 Appendix A

Stimuli 1-4

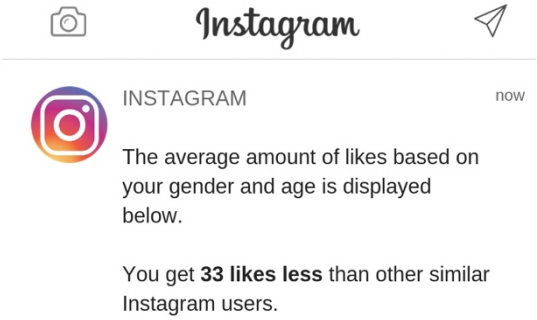
1

2

3



4



7.2 Appendix B

Stimuli 5-8

5

The average pace per kilometer for your gender and age is displayed below.

You run **33% faster** than similar others

6

The average pace per kilometer for your gender and age is displayed below.

You run **33% slower** than similar others

7

The average pace per kilometer (0.62 miles) for your gender and age is displayed below.

You run **35 seconds faster** than similar others

8

The average pace per kilometer (0.62 miles) for your gender and age is displayed below.

You run **35 seconds slower** than similar others

7.3 Appendix C

PRE-STUDY 1

Table 1: How satisfied were the participants with the amount of likes they receive?

Quantification Type	N (Sample Size)	Mean	SD	Sig.
Stimulus 1: 33% + downward social comparison	27	7.96	1.68	0.001
Stimulus 2: 33% + upward social comparison	15	5.27 *Mean diff:* ***2.69***	3.04	
Stimulus 3: 33 + downward social comparison	27	8.11	1.91	0.055
Stimulus 4: 33 + upward social comparison	14	6.79 *Mean diff:* ***1.32***	2.26	

Table 2. How realistic did the participants consider the stimuli to be?

	N (Sample Size)	Mean	SD
Realism of design	83	7.37	2.05

Table 3. How large did the participants perceive the number 33 to be?

Quantification Type	N (Sample Size)	Mean
Stimulus 1: 33% + downward social comparison Stimulus 2: 33% + upward social comparison	42	Mean, Stimuli 1&2: **6.26**

Table 4. How realistic did the participants perceive the number 33 to be?

Quantification Type	N (Sample Size)	Mean
Stimulus 1: 33% + downward social comparison Stimulus 2: 33% + upward social comparison	42	Mean, Stimuli 1&2: **7.12**

PRE-STUDY 2

Table 5. How satisfied were the participants with their pace per kilometer?

Quantification Type	N (Sample Size)	Mean	SD	Sig.
Stimulus 5: 33% + downward social comparison	23	7.87	1.01	0.000
Stimulus 6: 33% + upward social comparison	20	5.50 *Mean diff:* ***2.37***	2.31	
Stimulus 7: 33 + downward social comparison	22	8.14	1.64	0.000
Stimulus 8: 33 + upward social comparison	16	5.06 *Mean diff:****3.08***	2.62	

Table 6. How realistic did the participants consider the stimuli to be?

	N (Sample Size)	Mean	SD
Realism of design	81	7.0	2.15

Table 7. How large did the participants perceive the number 33 to be?

Quantification Type	N (Sample Size)	Mean
Stimulus 7: 33 + downward social comparison Stimulus 8: 33 + upward social comparison	38	*Mean Stimuli 7&8:* ***6.24***

Table 8. How realistic did the participants perceive the number 33 to be?

Quantification Type	N (Sample Size)	Mean
Stimulus 7: 33 + downward social comparison Stimulus 8: 33 + upward social comparison	38	*Mean Stimuli 7&8:* ***7.24***

7.4 Appendix D

Questionnaires Main Study 1 & 2

Main Study 1: Instagram Likes

Do you have an Instagram account?

- Yes
- No

What gender do you identify with?

- Male
- Female
- Other

What is your age?

- Under 21
- 21-25
- 26-30
- 31-35
- 36-40
- 40+

Estimate how many likes you usually get on the pictures you upload to Instagram.

- 0 Likes
- 5 Likes
- 10 Likes
- 15 Likes
- 20 Likes
- 25 Likes
- 30 Likes

Main Study 2: Running Pace

Have you gone running at any point during the past 12 months?

- Yes
- No

If you go for a 5 kilometer run, what is your average pace per kilometer?

- 2 min 30 sec
- 2 min 40 sec
- 2 min 50 sec
- 3 min 00 sec
- 3 min 10 sec
- 3 min 20 sec
- 3 min 30 sec

Please wait a few seconds while your result is being calculated...

Did the result on the previous page show that you get more or less likes than other similar Instagram users?

More

Less

Did the result on the previous page show that your pace is faster or slower than similar others'?

Faster

Slower

To what extent do you agree with the following statements?

	Strongly Disagree 1	2	3	4	5	6	7	8	9	Strongly Agree 10
At times I think I am no good at all.	○	○	○	○	○	○	○	○	○	○
I am able to do things as well as most other people.	○	○	○	○	○	○	○	○	○	○
I feel I do not have much to be proud of.	○	○	○	○	○	○	○	○	○	○
I take a positive attitude toward myself.	○	○	○	○	○	○	○	○	○	○

Tick the box of number thirtyfour.

56 78 12 34 89 5 11 63 115 167

To what extent do you feel stressed?

Not at all 1	2	3	4	5	6	7	8	9	Very much 10

To what extent do you agree with the following statements?

	Strongly Disagree 1	2	3	4	5	6	7	8	9	Strongly Agree 10
I feel calm.	○	○	○	○	○	○	○	○	○	○
I am tense.	○	○	○	○	○	○	○	○	○	○
I feel nervous.	○	○	○	○	○	○	○	○	○	○

To what extent do you agree with the following statements?

	Strongly Disagree 1	2	3	4	5	6	7	8	9	Strongly Agree 10
I am satisfied with my life.	○	○	○	○	○	○	○	○	○	○
In most ways my life is close to my ideal.	○	○	○	○	○	○	○	○	○	○
The conditions of my life are excellent.	○	○	○	○	○	○	○	○	○	○

Tick the box of number 2.

1	2	3	4	5	6	7	8	9	10

You are out shopping and encounter the following products in a convenience store. You can only buy one product from each set. Which one do you choose?

Soda	○	○	Water
Chocolate bar	○	○	Fruit
Whole grain bread	○	○	White bread

You are out shopping and encounter the following products in an all-purpose store. You can only buy one product from each set. Which one do you choose?

A Pen	○ ○	A can of Coca-Cola
A piece of chocolate	○ ○	AA Batteries
Concert tickets	○ ○	One month's public transport card

How likely is it that you would follow through with the behaviours below?

	Very Unlikely 1	2	3	4	5	6	7	8	9	Very Likely 10
You are at the race track and feel pretty confident that you know which horse will win the biggest race of the day. You consider betting a month's salary on the horse.	○	○	○	○	○	○	○	○	○	○
You are going on a vacation to a third-world country. You consider not booking any accommodation or travel arrangements beforehand.	○	○	○	○	○	○	○	○	○	○
You consider investing 5% of your annual income in a very speculative stock.	○	○	○	○	○	○	○	○	○	○

Estimate to what extent you keep track of the following data **with the help of mobile applications.**

	Not at all 1	2	3	4	5	6	7	8	9	Very much 10
Steps taken	○	○	○	○	○	○	○	○	○	○
Calories consumed	○	○	○	○	○	○	○	○	○	○
Hours of sleep	○	○	○	○	○	○	○	○	○	○
Exercise performed (e.g. Runkeeper, Nike Training)	○	○	○	○	○	○	○	○	○	○