Evaluating at the beginning and the end: how we evaluate activities from the perspectives of the experiencing and remembering self

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Abstract

This thesis explores how the quantified self influenced the experiencing self and remembering self for the activities eating, cooking, reading, sleeping, sports, and social activity. First it illustrates how the experience of reading can feel more stressful when trying to read as fast as you can and speculates how this could affect well-being. In the literature study, various ways of measuring and improving well-being are discussed. It is then discussed what bounded rationality and quantified self are and how these three theories are intertwined. The question this thesis tries to answer is how the experiencing self and remembering self differ when gathering data for the quantified self and how these differences could influence the experience of an activity. To answer this question, in this research a scenario-based survey was conducted where a group of 51 participants was divided into two groups which answered from one of two perspectives, either the experiencing self or the remembering self perspective. For each of the six activities the participants were asked to think of 3 to 5 considerations that they would have for the individual activities. Additional literature was searched and overviews of available applications and their features for the activities were made, to give context to the results. The results showed how the considerations aligned with available applications and literature while in other ways they did not. Participants mentioned for various activities how they had social and enjoyment considerations which applications could not support. For some activities it was also posed that quantification could work counter actively by not aligning with the intended purpose of the activity. Overall the research showed how it is important for quantifications are important to be aligned with their intended purpose and showed how there can be unintended consequences while measuring for certain activities. **Keywords:** well-being, bounded rationality, self-actualization, quantified self, persuasive systems

Contents

1 Introduction

It is becoming more and more common for people to measure their performance during activities. When going for a run, many people bring their phones to measure the distance they run and how quick. Some people might also bring a wearable fitness device which can keep track of biometrics during a run. The metrics of a run can help evaluate performance and aid in setting goals for further improvement. In this scenario it makes a lot of sense to measure performance. Take another activity like reading. For many people it is considered a relaxing experience. When reading for your amusement you can learn something interesting or bond with a character. Although a story can be gripping and tense ultimately the activity is usually relaxing. When you are done reading and you evaluate the experience, metrics you might use could be whether you found the reading material interesting, informative, and amusing. These are important metrics to consider when deciding if you want to continue reading the book another time. However, during reading, some people catch themselves trying to read as fast as they can. They try to read one page per minute or possibly faster and when they are done reading they might feel rushed from trying to read so fast. In this scenario, using a metric like reading speed changed the activity reading from a relaxing activity to perhaps a slightly stressful one. As such, using metrics during an activity can change your experience of that activity.

This idea matches with the theory of Bounded Rationality, which states that we value things differently when experiencing an activity compared to when we are remembering an activity (Herder and Atzenbeck 2023; Kahneman 2003). The theory speaks of two selves called the experiencing self and the remembering self. The experiencing self judges experiences from the perspective as the experience is happening, while the remembering self judges an experience from the perspective as it remembers it. You could say that, in the example of running, your experiencing self and remembering self had matching requirements for evaluating the experience. Meanwhile, in the example of reading a book, our experiencing self values the metric speed, while the remembering self values the enjoyment of the experience. But, this rushed feeling that remains in the remembering self could hamper your desire to continue reading the book.

There are many theories of what influences our well-being, one of them being desire theory. Desire theories state that our well-being is determined by how many desires we are able to fulfill. Other theories include hedonistic theories; which state that well-being constitutes of pleasure maximisation and objective list theories; which state that to improve your well-being, there are certain objective metrics in our life that influence our well-being (Crisp 2021; Seligman and Royzman 2023; Chappell and Meissner 2023). Many of these theories have in common that achieving personal goals is important to improving well-being. They encourage having a flourishing social life, living a healthy lifestyle, challenging yourself intellectually, and taking care of your mental health.

As established, setting goals is something very common for activities like running and sleeping and many people attempt to measure their progress towards them using metrics. Take for instance your weight or sleeping pattern. Many people weigh themselves habitually on a scale or they set goals for how many hours they sleep and keep track of at which time they go to bed (Swan 2013). The quantified self takes this practice of measuring progress towards goals using metrics to new heights. Quantified self devices like phones, smart watches, and other wearables, allow us to keep track of many more metrics about ourselves then we have ever been able to with ease. The quantified self movement focuses on trying to achieve goals through data as much as possible, not only focusing on health related goals but even quantifying social life and love life (Ruckenstein and Pantzar 2017). Though this movement has helped people achieve their goals, could there also be a possibility that focusing on certain metrics could take away from the quality of certain experiences, ultimately leading to someone possibly giving up? Or, are there other concerns with certain metrics that our remembering self considers important but our experiencing self is less concerned with?

For example, some insurance companies have started implementing quantified self devices into their policies. One example is an insurer that hands out Fitbits that upload the activity information of their clients and the most active clients can then receive a discount (Siegel Bernard n.d.). You could say that this practice is limiting your freedom by trying to control you behavior and thus negatively impacts your well-being(Baker 2020). Another example from insurers is the awarding of discounts to drivers for driving safely by letting them install a device in their car that analyses driving behavior such as acceleration, breaking, and top speed (Bulthuis n.d.). Some people might have concerns giving this information to a private company, while others don't.

1.1 Research Goal

The perspective drawn here, suggests that there could possibly be downsides taking measurements during certain activities. The interest of this thesis lays in seeing how these downsides can vary between the perspectives of the experiencing self and remembering self. To reiterate, the reading example above shows that your requirements for a certain goal can vary between these two perspectives. This research set out to establish what these metrics are. In this study a survey was conducted among participants in two groups. One group answered from the perspectives of the experiencing self, while the other answered from the perspectives of the remembering self. So as to not nudge the participants, they were asked to come up with 'considerations' instead of 'metrics' as the word metrics was seen as to restrictive. The responses were coded into several consideration categories which are shown in the results section. Finally, in the discussion, the results are put into context with available applications for quantification and with literature a complete picture is drawn of drawbacks which the discussed activities face.

2 Literature Review

In this section the relevant literature is presented. The first section explores the definition of well-being, how well-being can be measured, and what theories exist on the improvement of well-being. The following section will explain the theory of bounded rationality and the influence it has on our experiences and its implications on our choices. The last section will go into the quantified self in more detail, explaining what it is and its influence on reaching goals.

2.1 Theories of Well-Being

This section explores theories on well-being. It explores different ideas from these theories on what well-being is and how it can be improved. These theories range from more abstract ways of thinking about well-being, such as giving value to actions, to more real ways of thinking about well-being, by making a list of conditions to improve well-being.

There are many definitions of what well being is (Crisp 2021) and most people have an intrinsic feeling for what it could mean. A few very general ways of describing it are: 'quality of life','prosperity', and 'what is intrinsically valuable to someone'. Philosophers have been trying to define about well-being for centuries. When trying to define well-being, there are various different aspects of a person's life to consider. These include mental, physical, economic, and emotional well-being. All of these aspects add up to a complete picture of someones well-being. This raises the question of how these factors can be measured and how you could improve them. Another aspect of well being is to consider how to measure it. For this there are basically three trains of thought. Firstly, the hedonistic way, sees well-being as the sum of pleasure and pain in life. Secondly, other theories called desire theories, see well being as a list of desires. The more of these desires a person can fulfill, the higher their well-being. Finally, objective list theories, are theories about objective metrics that define the height of someones well-being.

2.1.1 Hedonistic Theories

There are different theories on what actually is good for a person. These theories try to determine what a person should do to improve their well-being. One of those theories is hedonism. Hedonism states that well-being constitutes only of pleasure and pain (Crisp 2021). Hedonism can be used in a *descriptive* way to show why someone *would* act a certain way or can be used in a *prescriptive* way to determine actions that some one *should* perform.

One of those prescriptive theories is the Epicurean theory, which was taught by Epicurus. This theory taught about how living a moderate life would lead to the highest well-being. Epicureans sought to achieve virtue and peace of mind (Konstan 2022) because they thought it was the goal of life. They avoided politics and fame, as they believed these things ultimately led to more frustrations and ambitions, resulting in pain. Instead, they focused on living in small communes, as being with friends was one of the most important factors of living a good life according to the epicureans.

Epicurus spoke of two different types of pleasures; kinetic and katastemic pleasures. Katastemic pleasures are pleasures which lead to two states known as aponia and ataraxia. These states are respectively defined as the pleasures of being without physical pain and the pleasures of being in a state of tranquility and freedom from fear. Being in these two states was what Epicurus considered to be the goal of life. Kinetic pleasures were considered non-necessary by Epicurus. This is because they are kinetic pleasures which are achieved by fulfilling non-necessary desires. Epicurus considered the feeling of desire to be painful of itself. Thus epicureans sought to fulfill only the necessary desires and suppress their other desires so as to not experience the pain of not fulfilling desire.

The goal of being without physical pain and freedom from fear can be seen as unambitious goals. Epicureans thought occupations like politics were ambitious and avoided them for this reason. However, you could argue that being ambitious is worth it and fulfilling a desire for ambition does not cause pain or is at least worth the pain. Other theories on well-being do not have such goals as reaching a state of aponia and ataraxia. This way of thinking about well-being is, after all, from a very different time. However, the subject of well-being has also received interest from more modern thinkers. These modern thinkers drew some inspiration from epicureanism and one theory that flowed from it was Utilitarianism.

2.1.2   Consequentialism and Utilitarianism

Utilitarianism is another example of a hedonistic philosophy. Yet, it can also be considered a consequentialist philosophy, because it can be used to judge one's actions based upon the consequences of their actions (West and Duignan 2023).

Utilitarianism creates a theoretical sum of all the positive and negative consequences of an action and assigns a value to the action called its utility. This means that every action can be ranked based on its utility from highest to lowest. It dictates that the highest ranked action is the most moral action to take. It is different to Epicureanism in that it does not differentiate between various kinds of pleasures or desires, although this is not universal for all advocates of utilitarianism. It also does not determine a superior way to live life, it only determines how to live it the most moral way by generating the most pleasure and the least

pain.

Utilitarianism also has its flaws. Critics hold that some implications which arise from utilitarianism go against their own moral judgement. For example, in some situations the action with the highest utility could be to lie or to break a promise. A utilitarian would call this justified if the action would have the highest utility. However, a non-utilitarian would argue that it is always bad to break a promise and that it is against their moral code. Some critics go as far as to say that pain should not be acceptable and priority should be minimizing pain.

A more fundamental criticism, and one not just of utilitarianism but of hedonism as a whole, is that you could consider the value of life to be more than just a balance of pleasure and pain. It is argued that some feelings are not possible to be adequately broken down into a 'utility' value. Though some utilitarians think that even non-sensory experiences can be defined in terms of pleasure and pain. Consequentially, hedonistic theories are not the only theories of well-being.

2.1.3   Desire Theories

Desire theories are different to hedonistic theories in that they ground their well-being in fulfillment minus frustration of personal desires. So to get the highest well-being a person only needs to fulfill their own desires (Seligman and Royzman 2023; Crisp 2021). Similar to the ranking of actions in utilitarianism, these desires can be ranked based on what a person desires most.

The Stanford encyclopedia defines multiple theories of what desires are (Schroeder 2020). Of those, action-based theories of desire are the most common. At its most basic form it means that when a person has a desire they feel the disposition to act in a way to fulfill the desire. However, some argue that this theory is insufficiently restrictive because it follows from this that even unintended actions can be seen as desires. Another theory is pleasure-based desire theory, which states that for someone to desire something means that someone feels disposed to take pleasure in it seeming that something is so and it displeasure in it seeming that something is not so. Some desire theorists argue that this way of thinking about desire is the truest to what desire is, as pleasure and displeasure are states of consciousness that are most closely linked to desire.

Another challenge for desire theories is that there are some desires you could consider to not actually influence our well-being. Some desires could be considered irrational. For example, someone's strongest desire could be to collect blades of grass. Desire theorists would still argue that those desire give fulfillment to those people. Desire theories are motivated by the thought that, what makes your life go well for you must be up to you to choose (Chappell and Meissner 2023).

Another aspect of our desires is that they are not always in line with our motivation. In Mariqueo-Russell 2023, this argument is raised to defeat the counterarguments that desire theories would be contradicted by self-sacrifice and depression. This is also applicable to other cases of our life. Our desires might be to say, finish writing your thesis, but when your motivation does not align with this desire, other desires can take the lead.

Ideas about desire tell us that desires are all about actions and feelings and that fulfilling our desires will improve our well-being. We tend to be happier when we achieve our desires. Where desire theories take a more individualistic worldview, hedonistic theories but particularly utilitarianism take a more collectivist worldview. Some might argue though that this way of looking at well-being is too subjective. This is why there is a third way of looking at well-being called objective list theory.

2.1.4 Objective List theory

Objective list theory is very different to desire theories and hedonistic theories because it isn't a monist theory. Monism means that there is ultimately only one value being measured that determines your well-being. For hedonism this is the value calculated from adding pleasure and subtracting pain and for desire theories this is the value that is gained from fulfilling desires. Objective list theory is instead pluralist; it regards different aspects such as happiness, relationships, achievement, aesthetic appreciation, creativity and knowledge as intrinsically valuable (Rice 2013).

Objective list theory works both enumerative and explanatory. This means that it can help with quantifying well-being, while also explaining why it helps with well-being. Theorists argue that hedonism only works enumerative and desire theories only work explanatory (Rice 2013; Fletcher 2013). This focus on quantifying well-being has also seen a rise in modern society. Apps are being developed that focus on specific aspects of well-being. They track certain variables that they deem to determine to improve well-being and make them measurable using apps and wearable devices (Swan 2013).

Objective list theory states that you cannot simplify well-being to just constitute of one value (Crisp 2021). These different values are considered universally to be good for a person's well-being. Take a value like knowledge, while this may not be desired by someone, objective list theory would argue that this value is still objectively good for them Rice 2013.

2.1.5 Improving well-being

Perhaps one of the most popular examples you could consider to be objective list theory is the pyramid of self-actualization from Maslow(Farmer 1984). Summarized, this theory states that humans have a few basic needs which they need to satisfy in order to be able to self-actualize. These needs, in order of fulfilment, are:

1. physiological needs: food, water, sleep, and exercise.

2. Safety and security needs: freedom from fear, physical violence, and abuse.

3. Belongingness and love needs: friendship, love, and a sense of rootedness.

4. Esteem needs: positive self-concept and respect from others.

5. Self-actualization: need to develop one's innate talents and potentials.

Although these needs are ranked, this does not mean that each needs to be fulfilled fully to be able to go on to the next need (Compton 2018). We can see a similarity between the basic needs of this theory and the conditions for well-being from the above mentioned theories. Like the need for friendship from epicureanism or the need for relations from objective list theory. This also holds for the need for self-actualization.

Figure 1: Maslow's hierarchy of needs

There is a large variety in what self-actualization actually means and what it means to be a 'self-actualizer'. Arguably, self-actualizers have many characteristics that are associated with a high or increasing level of well-being. Self-actualizers are open to new experiences and are eager to learn. They are ambitious and know how to fulfill their own desires (Krems, Kenrick, and Neel 2017; Compton 2018). They are autonomous but also posses a large sense of empathy, friendliness, and are characterized by sincerity, self-disclosure and intimacy (Compton 2018).

As a whole, although the field of well-being has many differing theories on how to improve it; there is also a lot of overlap between which characteristics are good. Various basic needs in Maslow's pyramid overlap with values from the other theories like the physiological needs, friendship, and freedom from fear and pain in epicureanism. Many values from objective list theory are also recognized as characteristics of self-actualizers like ambition, autonomy, creativity, and knowledge.

Furthermore, like desire theory and hedonistic theories, self actualizers can find happiness and know how to fulfill their desires. This signifies that despite the drawbacks and inconsistencies of all theories, the overlap of these theories' values and characteristics can aid in improvement of well-being.

2.2 Bounded rationality

Bounded rationality in essence is a theory of choices. To optimize our well-being we make choices everyday. These choices include things like when we are going to sleep, if we are going to exercise, or read a book. We weigh these choices and come up with a decision. The theory of bounded rationality dictates how we weigh these choices.

The theory of bounded rationality is proposed by Kahneman (2003). It is a theory on making choices and how we pay attention to our surroundings. Bounded rationality is a proposal to improve upon the theory of the rational agent model. The rational agent model is meant to be used by economists to model human behavior and has long been used because of its elegance and preciseness in determining belief and choice (Kahneman 2003). It assumes that when a person faces a decision, they always make the optimal decision for their subjective goals, based upon the information that is available to them. This means that when a person faces a choice they will go over all their options, they can then consider the risks and opportunities of this choice. The rational agent model assumes a person values these risks and opportunities appropriately and treats them without bias (Simon 1964). However, this rationality assumption is incorrect, humans sometimes let their biases get in the way of rationality. Bounded rationality addresses this issue.

Bounded rationality dictates that individuals operate using two systems (Herder and Atzenbeck 2023; Kahneman 2003). These systems correspond approximately to an individuals intuition and their reasoning. They have respectively been called system-1 and system-2. Firstly, system-1 can be considered an individuals intuition or perhaps their 'autopilot'. System-1 handles operations that are familiar and which you can do and without thinking. System-1 behaves fast, automatic, effortless, associative, in parallel, and is slow-learning and emotional. Because of the effortlessness, it is our intuition to follow this system. System-1 tasks are not only simple tasks. For example, when a chess master walks past a table, they might see that the white player could checkmate in 5 turns. This ability to see the checkmate is a result of hours of training making the activity a intuitive process for the chess master.

Because we intuitively use system-1, we only switch to system-2 if we feel like a situation requires it. This is not a conscious effort but happens without thinking about it. System-2 tasks, as opposed to system-1 tasks, are deliberate. System-2 behaves slower, controlled, effortful, rule-governed, flexible, neutral, and serial.

This system is concerned with logical reasoning and conscious decision-making. It performs tasks that we are unfamiliar with and that require extra attention.

While performing a system-2 task we can still perform system-1 tasks. For example, while driving a car, a highly automated task, people are generally able to hold a conversation with the passenger, which requires more attention because we are paying attention to what the other person is saying. This can be interrupted by a situation on the road where our system-2 takes over driving from our system-1 interrupting the drivers ability to hold conversation with the passenger.

2.2.1 Two Selves

Another aspect of bounded rationality is that we can experience events differently to how we remember them. An example, that can be very familiar, is that of a party that is ruined by a heavy argument at the end of the evening. While the party prior to the argument could have been a great experience, the memory of the party can be ruined by the argument at the end. This illustrates the difference between the 'experiencing self' and the 'remembering self'. The experiencing self, like system-1 behavior, considers an experience at the very moment it is happening. The remembering self evaluates experiences by a proven rule called the peak-end rule (Kahneman 2017). This means that the remembering self judges experiences on how an experience was during its peak and at the end of an experience (Zajchowski, Schwab, and Dustin 2017).

The question remains for which of these two selves should count the most. Imagine a vacation, during a vacation people often take pictures of what is happening. This could essentially be seen as the storing of a memory for your remembering self to relive this experience later. In many cases we evaluate vacations based on those memories we have of the vacation. In one experiment students were asked to keep a diary of their holiday and to give their experiences during the holiday a rating. Afterwards, they were asked to give one more global rating and they were asked whether they would go on this holiday again. Statistical analysis showed that a decision to go again was entirely determined by the final rating, even if that rating did not reflect the quality of the experiences described in the diary. What this shows is that we make our choices based upon judgements from the remembering self.

2.3 Quantified Self

The quantified self (QS) is a way of thinking about a person or a group of people by gathering metrics to define them in data (Meißner 2016). Additionally, it is a practice where a person feels a need for information about themself and then gather

data to gain insight in order to self-improve (Choe et al. 2014). This practice is something people can do unintentionally, for example, when a person measures their nutrition and their weight in order to lose some pounds (Swan 2013).

A quantified selfer (QS'er) is a person who actively engages in the behavior of collecting personal data. They take a data determined way to set and achieve their goals. First they feel a need for information, they then collect data which they analyze. The analysis is done mostly by visualizing data. The visualizations can give an idea of progression towards goals (Kuka and Oswald 2012). They then reflect on the analysis and evaluate whether they will achieve their goal or if they need more or different information (Berkel et al. 2015).

In Swan 2013, multiple categories are recognized in which QS'ers gather data:

- Physical activities: miles, steps, calories burned

- Diet: calories consumed, carbs, fat, protein

- Psychological states and traits: mood, happiness, irritation, emotions

- Mental and cognitive states and traits: IQ, alertness, focus, selective attention

- Environmental variables: location, architecture, weather

- Situational variables: context, situation, gratification of situation

- Social variables: influence, trust, charisma

For the gathering of information there are multiple options. Some QS'ers collect their data manually, others use of the shelf devices to gather data, and some of the most dedicated QS'ers build their own hardware and software, for example if they want to take a more centralized approach to the gathering of their data. (Choe et al. 2014).

This approach to self-improvement has not only been recognized by individuals but also by larger corporations. In a paper by Stepanovic 2020, they evaluated papers which analyzed the use of QS devices both within organizations and insurance companies. They found that multiple motivational incentives were used to encourage healthy behavior for employees of the organizations and clients of the insurance companies. These incentives came in various forms including feedback, reminders, alerts, social encouragement, education, gamification of goals, and financial stimuli. Health insurance companies want their clients to live healthy to reduce the risk that they fall ill and organizations want healthy employees so they don't need to use their sick days.

There are multiple degrees to how much different data QS'ers will use to set their life goals. Some use it for aspects in their life for which they expect it to be useful while other 'bio-hackers' gather data for as many aspects of their life as they can (Ruckenstein and Pantzar 2017). The theme of optimization takes a prevalent role within the QS community. There are differences in between what you could consider the 'optimum' (Meißner 2016). Like within the discussion of well-being there are some objective factors you could consider the optimum. But, there is not a universal optimum for everything. In the case of weight, different people have different goals. In (Greene and Brownstone 2023) for example, it is theorized that the social incentives of QS might be harmful because seeing others with low weight goals could encourage eating disorders.

To conclude, QS is an opportunity for people to achieve self-actualization. Measuring data and visualizing it can give people an indication of how to achieve goals they have. These goals can be in a large variety of fields. The only limitation is using the right data but, when using the correct data achieving goals becomes a tangible achievement. However, optimization of certain goals can become harmful endeavour. Metrics are not always objective and can have adverse effects. So, a lot of opportunities lay in setting the correct goals.

2.3.1 Gamified Persuasive Systems

A common application of QS is found in gamified persuasive systems. These are systems that use gaming elements in non-gaming fields, like education, healthcare, sustainability, and fitness, to motivate users to achieve goals. These systems try to persuade users to change behavior by letting them set goals for their intended behavior (Hassan, Dias, and Hamari 2019). Users are then shown the discrepancy between their current behavior and their intended behavior and can guide them to reduce this discrepancy. For this multiple established strategies are used some of which have gamified elements. These strategies include the use of rewards like medals and achievements and they use competitive elements like competitions and leaderboards (Wehbe et al. 2014).

These systems are very useful tools to motivate both intrinsically and extrinsically. But for a system to be successful there are a number of important factors to consider. The success is very context dependent (Krath and Korflesch 2021). Firstly, in two studies on user types and personality types it was shown that certain types of users are more sensitive to certain persuasive strategies (Böckle, Novak, and Bick 2020; Orji, Nacke, and Di Marco 2017). Using a competition strategy makes sense in a context of a sporting activity. But in the context of book reading it does not. In one study it was shown that user profiles on Goodreads, a book review platform, allowed other users to see how many books a user had read which led to users feeling a sense of competition Wehbe et al. 2014. It is also important to know existing behaviors of users as these influence the persuasiveness

of certain strategies. Another important factor to consider if an application needs to motivate intrinsically or only extrinsically. In a study where user behavior was tested when they did not have their fitness tracker showed that some users were only motivate to behave healthy they were wearing their tracker (Attig and Franke 2019).

Like what was described in the introduction, there are some ways in which an experience of an activity can be affected by taking measurements of the performance. There are multiple reasons why someone would want to measure these variables. What was seen in the section about bounded rationality is that these choices could can be different between the experiencing self and remembering self. This study applies this idea that the experiencing self and remembering self could have different goals for an activity to the quantified self. It wants to investigate if/how our experiencing self and remembering self differ in which variables they would measure for certain activities.

3   Research Question

As can be seen from the literature, there are a lot of factors that amount to an improved sense of well-being. Many of these factors are measurable and there in fact are various ways in which people quantify these factors. The quantified self shows that setting goals helps people achieve a better sense of well-being, but there are also some downsides. One of those downsides is that the act of measuring performance in certain activities can in turn make such an activity less enjoyable as shown in the introduction, where measuring your reading progress makes you more reluctant to read. Theory also shows that the success of measuring an activity is also highly context dependent. One metric might be appropriate for one activity, like competitive metrics are useful in sports, while they are not appropriate for a context like reading. The goal of this research is to investigate this for various other fields related to the quantified self. This lead to the following main research question:

RQ1: What do the experiencing self and remembering self value when gathering data about various activities?

It is clear that some metrics can take away from the experience of an activity while others can motivate you. It is important to know how these metrics influence the perspectives of the experiencing self and remembering self. This leads to the next research question:

RQ2: What is the influence of specific metrics on the experiencing self and remembering self during a certain activity

Finally you could be asking if there are some activities that do not suit any metrics. It might feel bad to quantify social performance during a conversation with a friend for example. Or is there a suitable metric for each kind of metric? For this reason the final research question is:

RQ3: What are the limitations of measuring in certain activities?

4 Method

This section will explain the methods that will be used to answer the research questions from the previous chapter. It will first explain which participants participated in this study. It will then explain how the study gathered the relevant results. Lastly, it will explain how these results have been analyzed.

4.1 Participants

The participants were going to do a scenario-based survey. They were divided into two groups, either the experiencing self group or the remembering self group. After removing entries which did not fully complete the survey, there were respectively 24 people(of which 17 male and 10 female) and 27 people (of which 9 male and 15 female). In the survey the participants were asked to give considerations about they had for a number of activities. The participants were gathered from a convenience sample. This sample consisted of friends and family of the author. There were 26 female participants (51%) and 25 male participants (49%). The age groups of the participants were divided as follows. One (2%) participant was 17 or younger, sixteen (31%) participants were between 18 and 24 years old, eighteen (35%) participants were between 25 and 34 years old, two (4%) participants were between 35 and 44 years old, 8 participants were between 45 and 54 years old, 4 (8%) participants were between 55 and 64 years old, and 2 (4%) participants were 65 or older.

4.2 Data Collection

When the participant were approached they were asked to answer one of two sets of questions, either from the perspective of the experiencing self or the remembering self. These questions were be about activities that gather data for the quantified self. The activities that the participants were asked about are cooking, eating, sleeping, reading, sports, and social activity. These activities were chosen because they varied from more common activities to measure to less common activities to measure. They were asked to go through a limited amount of questions for each of these six activities. At first the question for activities eating and cooking were grouped together but after some small tests with the survey, participants indicated that they thought this was confusing so these activities shared a scenario but the questions were separated. The participants were not asked about 'measuring', but only about 'considerations', 'goals', or 'outcomes'. This was done to not make the questions too leading.

The participants answering from the perspective of the experiencing self were told

that they were going to be asked for their considerations or goals when they are about to start one of the mentioned activities. They were first given a practice scenario in which they were going to watch a movie. The practice scenario gave a couple of suggestions for considerations or goals and the participants were then asked to come up with a couple of their own. Next, the participants answered questions about the actual activities. This time they were not given any suggestions for considerations or goals. They were again asked which considerations or goals they would have when beginning each activity. They had to perform the same task for each of the six activities separately. For each activity the participants were asked to try to give between 3-5 considerations or goals. The scenarios are visible in appendix A.

The participants answering from the perspective of the remembering self were asked for outcomes that they would consider when they had just finished one of the mentioned activities. They were also first given a practice scenario where they had just finished watching a movie. The practice scenario gave a couple of suggestions for outcomes and the participants were then asked to come up with a couple of their own. Next, the participants went to the actual activities. This time they were not given any suggestions for considerations or goals. They were again asked which outcomes they would consider for each activity. They had to perform the same task for each of the six activities separately. For each activity the participant were asked to try to come up with 3-5 outcomes.

4.3 Data Analysis

For analysis Nvivo 14[1], a qualitative data coding tool, was used. Using this tool each activity was separated into separate files and also divided into separate files for the experiencing self and remembering self.

To analyze the results an open coding approach was used. Each individual answer for each individual activity was tried to put into a code. This resulted in 1119 references which amounted to 234 codes. During a thematic analysis the codes were put into axial codes. To analyze the results graphs were created which graphed the axial codes for each activity where the experiencing and remembering self were put together to easily compare them. All codes can be seen in appendix B.

To give the results more context additional research was done. This consisted of a investigation in which kinds of applications and hardware exist for the various activities. Pages of 'best apps' and 'best hardware' for the activity were searched and compiled into tables which are placed in the discussion. Also more research was searched about the quantified for the specific activities.

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[1]https://lumivero.com/products/nvivo/

5 Results

This section will explore the results that came from the survey. It will go trough each each activity and explain and visualize the differences between the experiencing and remembering self perspectives. The results have been processed using an open coding method. From the answers in the survey 1119 references have been made resulting in 234 codes. In the next step axial coding was performed to categorize the open codes in 9 axial codes. The axial codes are called: "Practical considerations", "Social considerations","Sleep quality","Personal considerations", "Mental well-being", "Book content","Enjoyment food", "Physical well-being" and "Comfort". They illustrate the primary concerns for the various evaluative measures for each activity.

5.1 Activities

This section analyzes the resulting axial codes for each activity of the survey. It will illustrate the kinds of evaluative measures proposed by the participants by stating the major categories and illustrating them with quotes. Then it will show the differences between experiencing self and remembering self by showing differences in categories sizes.

5.1.1 Eating

Lets first discuss the perspective of the experiencing self for the activity eating. In figure 2 it is shown how many references there are for the various kinds of evaluative measures for the activity. It is shown that for the experiencing self, practical considerations were the primary evaluative measure that people used with it having 30 references. The main considerations were about there being enough food: *"Portionsize", "If it is enough food", "Will we have leftovers", "Do I want to eat more tonight and have less leftovers for tomorrow, or more balanced"*, and about laying the table: *"Which utensils do I need", "It needs to fit on one plate","Do we need water"*. Another consideration was how much time there was to eat: *"How much time do I have to eat"*

After the practical consideration the second largest evaluative method was enjoyment of food which had 20 references. People want to make sure they enjoy the taste of the food. They consider if they should add extra ingredients: *"Do I need to add more spices"*. A less specific goal was the taste of the food: *"It needs to taste good"*. Another consideration was the temperature, the texture, and the looks of the food of the food: *"Eat it when it's still warm.","Is there enough variation in mouthfeel","Does it look appealing?"*.
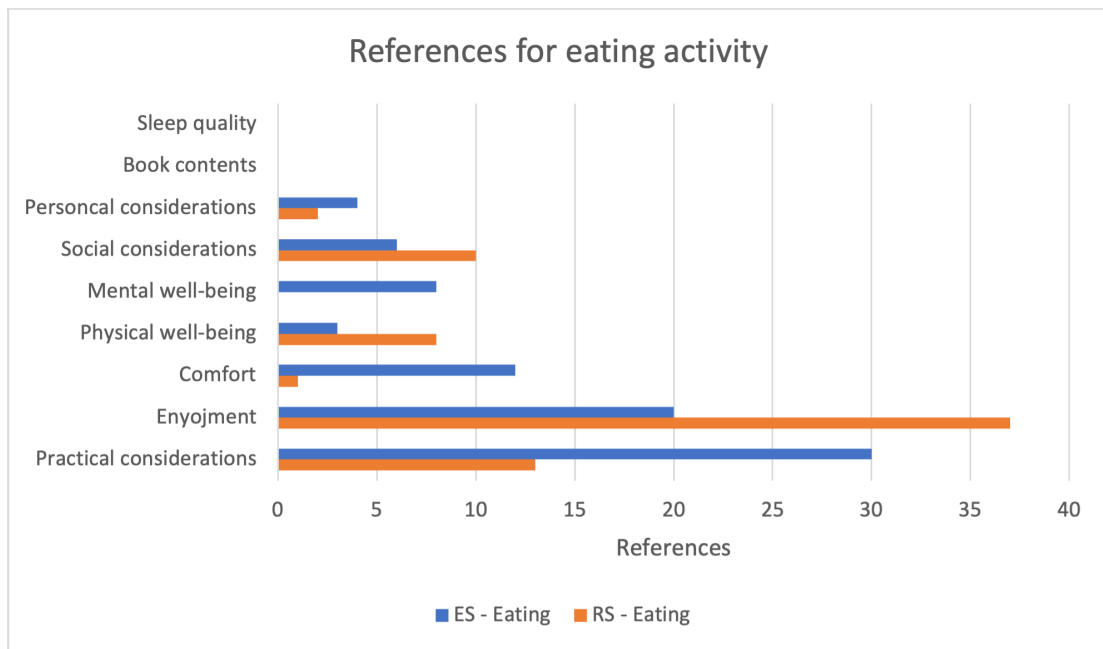
Figure 2: Bar Chart of the number of references for each axial code for the activity eating

At 12 references comfort was the next largest which consisted largely about considerations about where to sit: *"Am i going to sit at the table or on the couch"* and whether they would watch anything during their dinner. The next considerations are mental well-being related with 8 references. The main considerations was of the participants was whether they were already hungry: *"How hungry am I"* and as a goal they wanted eating to be a moment of calm as well: *"Moment of peace"*.

Finally, there were 6 references to social considerations for instance whether there would be company and people who wanted it to be a nice time: *"Do I eat alone or with others","(if I'm not on my own) that it is a nice time"*. Personal considerations like eating vegetarian and saving the best bite for last. The last category was physical well-being which had 3 references in relation to eating healthy and whether the meal contained vegetables.

Now let's compare these considerations to those of the remembering self. When comparing the experiencing self to the perspective to the remembering there is a noticeable difference in references for practical considerations. The number has been reduced to 13 of which more than three quarters are about if there was enough food. The only other considerations were about cost of the food: *"If it was expensive"* and one consideration was about how long the meal took to eat: *"If I liked the time we sat at the table"*.

The enjoyment of the food has seen a steep rise in references to 37 from 20. Half of the references were still about if they liked the taste. There was a small increase

in attention to looks of the food: *"Was the presentation good"*. There were also some considerations if the taste was refreshing: *"Was the taste innovative or special"* and if they would repeat the meal or recommend it: *"Would I eat this again?"*,*"Would I cook this for other people?"*

There is an increase in social considerations from 6 to 10. The change lies in more considerations being about opinions of others about the food: *"If my friends/family was satisfied with the meal."* and physical well-being also sees a rise in references from 3 to 8 considerations being about health. Lastly, personal considerations decreased from 2 to 4 references and comfort considerations decreased from 12 to 1.

5.1.2 Cooking
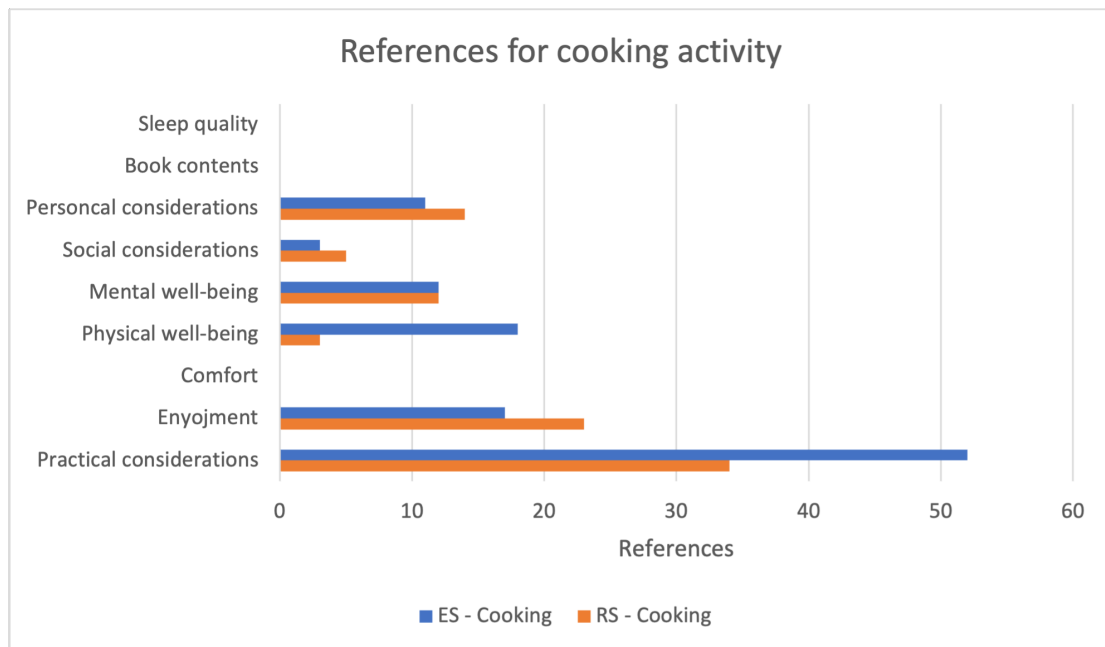
Figure 3: Bar Chart of the number of references for each axial code for the activity cooking

Now let's take a look at the next look at the next activity cooking. The amount of references for each evaluative measure can be compared in figure 3. For the cooking activity the number of references to practical considerations is even higher. With 52 references the highest contributing factors are considerations about preparation time: *"Time to prepare"*, presence of ingredients at home: *"Ingredients I don't have at home"* and costs: *"How expensive is the meal?"*.

The second largest consideration is physical well-being. With 18 references, people are considering the healthiness of the food: *"Do I want it to be healthy or do I want to indulge?"*,*"Do is want to eat healthy or does it not matter"*, people want their

meal to contain enough vegetables: *"It must contain enough vegetables"*. Some people also specifically mention some quantitative aspects of food like it containing enough proteins and calories: *"It must contain enough protein"*,*"It must be high calorie"*.

Another consideration is again the enjoyment of the food at 17 references. People are primarily considering the taste of the food. They want to make something they like: *"I want to make something that tastes good"*. Some participants also state that want to make something new: *"It must be something I haven't made before"*.

The next largest consideration are various personal considerations at 14 references. Participants consider if they actually "feel excited" about the meal: *"Something I am looking forward to now"*. Secondly they consider what they ate yesterday because they want some variety in their meals: *"What have I eaten the last few days"*. Lastly a small number of participants included that they consider whether a meal was vegetarian, had environmental considerations or wanted a meal to contain seasonal products.

Mental well-being was another consideration for the participants. Some considered the degree of difficulty from a recipe: *"How difficult is the recipe?"*. They also consider how much energy they have to cook: *"How much time/energy do I have for cooking?"*. Lastly, a small amount of the considerations was social in nature, considering whether they were eating alone and one person referencing that the meal had to be impressive.

Now comparing the remembering self to the experiencing self for the activity shows that practical considerations fall considerably but are still the primary concern with 34 references. Of those considerations more than half fall consider how long they took: *"Did it take me long"*,*"Cooking duration"*. Some considerations are about how much food there was left. and Some different considerations were about if they made a lot of dishes dirty: *"Did I make a lot of pans dirty?"*

Enjoyment of food saw a slight increase of references at 23. Taste was still the most referenced consideration. Some participants mention that they consider whether they would add different ingredients next time: *"Would I do this different/smarter next time?"*. Some participants consider whether they would repeat the recipe in the first place. Some participants also consider whether the recipe was new to them. Finally some participants consider looks, smell and whether the meal was properly cooked.

The next consideration falls in the category mental well-being. Though it was mostly people questioning how difficult they found the recipe to prepare: *"Was the recipe easy to follow"*,*"Was it easy or a a bit (to) hard to make?"*. One person referenced considering if they found preparing the recipe stressful.

The next largest considerations were personal considerations which had 11 references. Some participants consider if they made mistakes while cooking: *"Did everything go well in the cooking process"*. Other considerations were about if the meal lived up to expectations and if they were satisfied with the result: *"Was it what I expected?"*. People also considered whether they had fun while cooking the meal.

Lastly participants had some social considerations about the opinions of others with 5 references. They were curious if they others enjoyed a meal they cooked and one person considered if it was a nice time at the table. There were 3 references about the healthiness of the meal and what its nutritional value was. There was also one reference to cooking in a comfortable kitchen.

5.1.3 Reading
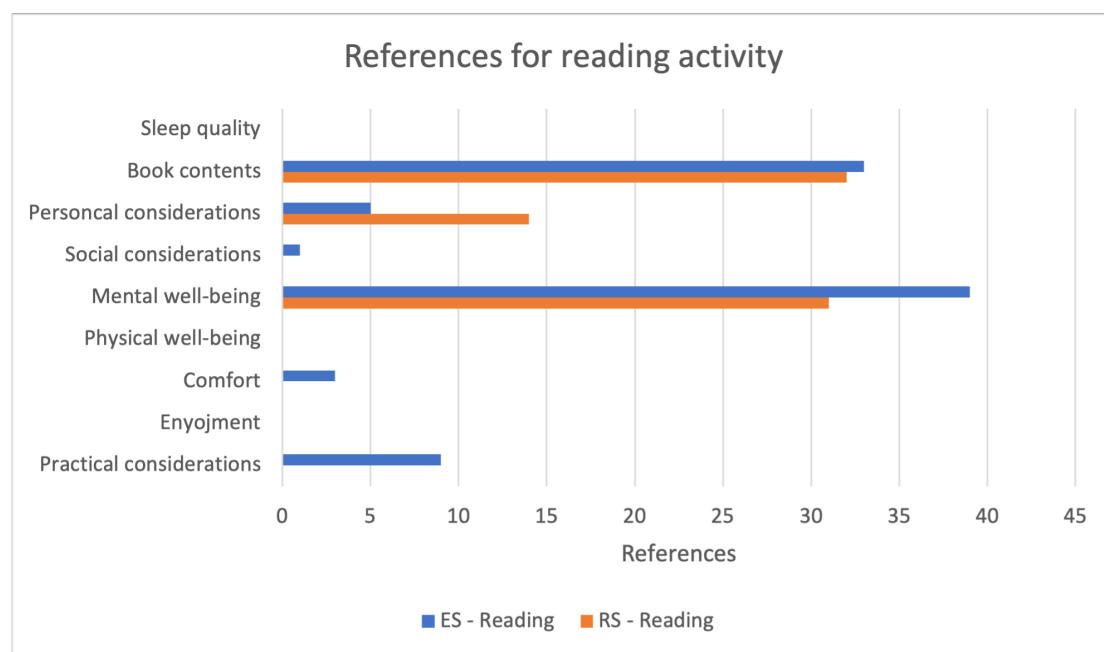
Figure 4: Bar Chart of the number of references for each axial code for the activity reading

The next activity that will be discussed is reading from the experiencing self perspective. In figure 4 can be seen how many references there are to various evaluative methods. To begin lets start with practical considerations again. For this activity people did not have many practical considerations with only 9 references. People considered whether they had time to read *"Do I have time to read"*. They also considered which books were on their reading list: *"Which books am I reading at the moment"*. Finally one reference was to if they still had a loaned book.

Next lets investigate the largest evaluative measure for reading. With 39 refer-

ences, mental well-being considerations is the largest factor for reading. Many participants considered the educational value of books: *"Did I learn something from it","I want to learn something from this book"*. Many of the participants also mention that when they are going to read they want to be relaxed: *"Mental relaxation","I want to relax"*. Another consideration is that the participants will want to concentrate: *"Close the curtains to prevent loss of attention.","Do I have enough peace of mind to read"*. Some considerations with one reference were that people wanted to be inspired or emotionally touched, some people also considered background noise and what kind of music they would listen, some people considered this as a replacement behaviour to using their phone and some considered their mood.

The other big evaluative measure for reading was based on the book contents. People consider the genre, author, reviews, writing style, subject, and realism of a book: *"Genre of the book","Was it easy to read","Somewhat realistic"*. They also consider how many pages the book is long, the funniness':*"It must be fun"*, the humor and the quality:*"Well written"*.

Some smaller considerations fall in the categories personal considerations, comfort and social considerations. There were 5 personal considerations which asked how many pages participants felt like reading: *"How many pages do I want to read?"* and whether there were sequels or other books from the same writer. Three considerations in the comfort category contemplated where to sit. The only social consideration was whether a book they were going to read was currently a popular book.

From the perspective of the remembering self we can see that there are no practical considerations left for reading. The largest considerations are still book contents and mental well-being. The largest of these two is now book contents with 32 references. In this category there are more references to writing style and quality which together make up more than half of the references. A new consideration is the ending of the book which received 4 references. Two other considerations that were new are the character development and whether the story was based on a true story. Both of these considerations were referenced once.

Mental well-being received 31 references from the remembering self perspective. A large part of these considerations evaluate the educational value the book had, just like the experiencing self perspective. The second largest consideration was whether they were able to keep their focus while reading. Some participants also valued being able to identify with the characters: *"Was I able to sympathize with the antagonist"*. Some people also considered whether the book affected their mood, emotions or perspective: *"Did it change a perspective I had"*.

The last category for evaluations were personal considerations. People considered whether a book was worth the time it took to read and whether it lived up to its

expectations: *"Was it worth my energy"*, *"Did it meet the expectations I previously had?"*. Some participants also considered how fast they read a book and if they found the book exciting: *"How fast did I read"*, *"Was it exciting to read?"*

5.1.4 Sleeping
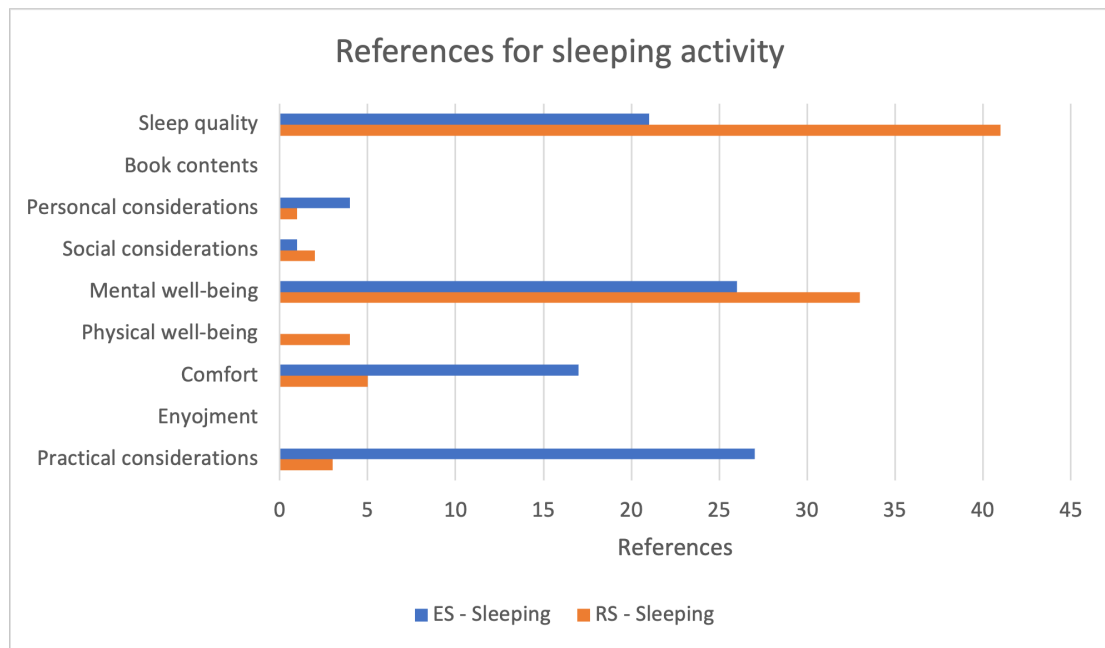
Figure 5: Bar Chart of the number of references for each axial code for the activity sleeping

Lets now explore the perspective of the experiencing self for sleeping. To start, there are 27 references to some type of practical consideration (see figure 5). The most common of these references are about setting an alarm, waking up or what they need to do tomorrow: *"How long can I sleep"*, *"Do I need to set an alarm?"*. Other kinds of considerations contemplate anything they need to have ready to go to sleep like brushing their teeth, getting a glass of water or a nose spray on their nightstand: *"Do I have nose spray next to my bed"*.

The next kind of consideration with 26 references are mental well-being considerations. People consider how tired they feel, if they achieved their goals for the day, and want to let go of the day: *"Did I do everything for today"*, *"Leave the day behind me"*, *"Am I tired?"*. People also consider some goals for the night like waking up well-rested, relaxation and feeling energized: *"I want to wake up well rested"*.

Other considerations are goals for sleep quality which receive 21 references. People state they want to sleep 'enough' or how many hours they want to sleep: *"I want to sleep enough hours"*,*"I want to sleep a couple of hours (ex. 8 hours)"*. They

mention they want to rest deep, fall asleep quickly and not wake up: *"I must sleep deeply"*. They also mention avoiding screens before going to bed: *"Avoid blue light from screens"*. All things that contribute to the quality of their sleep.

There were 17 references to considerations regarding comfort. Of these references most are about how dark the room should be and if they should open a window: *"Is it dark enough"*. Other mentions are about how the bed should be clean and warm. Some mention considering wearing a pyjama or not and whether they should shower now or tomorrow. 4 final personal consideration were if they want some amusement before bed like reading a book.

Comparing the experiencing self to the perspective of the remembering self, brings some changes for sleeping. There is a large reduction in practical considerations when looking back on a nights sleep coming down from 27 references to 3 references all of which are about how late they woke up.

The largest consideration for the remembering self is sleep quality which had 41 references. More than a third of the references are about how often they woke up. The participants also often mention how long they slept. Other similar considerations were about how fast they fell asleep, whether they had to leave bed in the night, how deep their sleep was and how easy it was to leave bed in the morning: *"Fell asleep quickly or not"*, *"How easy was it to come out of bed."*. Some participants also consider if they had dreamt.

Mental well-being is also a large consideration for the remembering self with 33 references. Two thirds of these references are about if the participant felt rested: *"How I feel, still tired or with energy"*, *"Do I feel rested?"*. Participants also consider if they felt relaxed and calm when they woke up. Some participants also considered if they had nightmares or had worrisome thoughts during the night: *"Did I have nightmares"*, *"Was I afraid"*.

The other categories received significantly less references for instance comfort received 5 references. They mentioned if they felt dirty when waking up, they considered if they had drank alcohol and if they should replace their bed sheets. Some also considered the temperatures and what the weather was like.

Physical well-being also received some references adding up to 4 of them. They considered if they felt 'fit' in the morning or woke up with pain: *"Stiff or flexible"*, *"Do I have pain"*. There was also one consideration about if they were sweaty in their sleep.
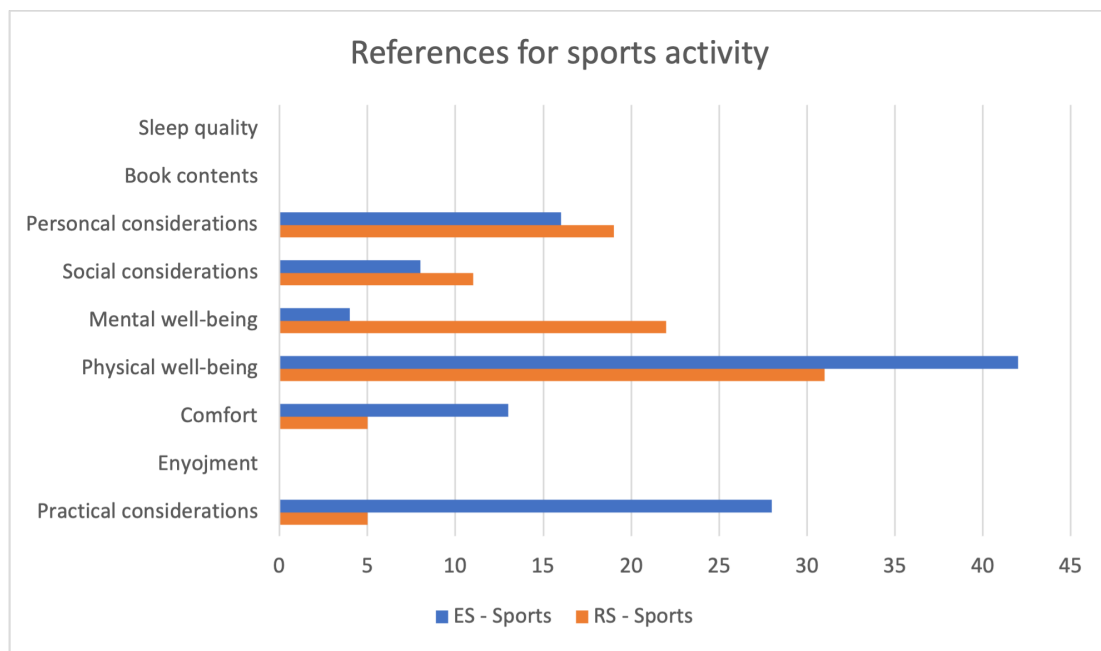
Figure 6: Bar Chart of the number of references for each axial code for the activity sports

5.1.5 Sports

The next activity to discuss is sports. From the perspective of the experiencing self, practical considerations received 28 references. 14 of those references were about how much time it would cost and how much time they would want to spend. Other considerations include if they would need to wear special attire or prepare anything for training: "Do I have to rent special equipment?" Other considerations from the participants were when the next competition match was, maintaining a training schedule and costs of the training: "Do I have a competition match coming up", "Feasibility of training schedule". Some participants also consider which route they would want to run/ride: "Which route".

The most considerations are for physical well-being, adding up to 42 references. A lot of considerations are physical training goals or achievements. People mention goals of being able to run or ride a certain distance or a certain speed. They want to improve their condition, muscles, flexibility, and lose weight: "Improve my stamina", "How can I train to get stronger". Other considerations are that people want to be healthy, be outside, they want to be active and they want to push themself. Some also want to learn new techniques and skills or want to improve generally: "How can I progress to a higher grade", "Improve technique".

There are also many personal considerations that people mention adding up to 14 references. The largest considerations for this category is that they want to have fun and whether they currently want to go. These considerations include desire

28

to win, to play a good game, and to have a fun competition: *"Win, Play good football"*. People also consider that they want to develop a sport into a habit and want the activity to bring variety to their day *"Variety in my day(not sitting all the time)"*.

Some comfort considerations are also mentioned adding up to 13 references. The most mentioned consideration is the weather and the influences it has on the sport: *"Is the weather alright to run"*. There are also 8 references to social considerations which are mostly about the company they will be doing the activity with: *"Who else is coming to training"*.

Finally there are some mental well-being considerations. People mention they want the activity to feel fulfilling, and want to feel energized after: *"A fulfilling feeling once I am finished"*. They also want it to bring calmness to their mind and use it as an outlet for their thoughts: *"Clear my head"*.

Now looking at the practical considerations for sport from the remembering self shows that the amount of references is far lower with only 4 of them. All of these references are about how long the activity took: *"How long have I been exercising"*.

Physical well-being is still the most referenced with 31 references, with mostly the same kind of evaluative measures. The measures are mostly performance goals like speed, distance and how many goals they scored. People are also considering if they were in shape: *"Was I in shape?"* People also consider if they feel any pain once they are finished: *"Have I suffered any injuries"*.

A category that saw a large growth is the mental well-being category which now receive 23 references. They consider how they feel generally or if they feel tired: *"Feeling Tired, How do I feel after exercising"*. They also consider whether it took or gave energy: *"Did I give it all my energy"*. Other measures mentioned by the participants were relaxation, satisfaction, educational value, and clearing the mind: *"Am I tired but satisfied"*. This indicates there is a definite increase in considerations about mental health aspects.

The next largest category were personal considerations with 18 references. Participants considered whether they had fun, found the activity exciting, and laughed: *"Did I have fun while exercising, Did I laugh.* They also considered if they found it time well spent, if the game was good, and how their opposition played: *"Was my opponent skilled, Was my individual performance good?"*

Social considerations saw a slight increase to 11 references. Participants mainly considered what they thought of their company: *"Was my company pleasant"*. Other evaluations were whether there was nice team play, sportsmanlike conduct, communication and a nice ambiance: *"Did we play as a team"*. Finally, some participants also mentioned some comfort considerations like weather, location,

and temperature totalling 6 references.

5.1.6   Social
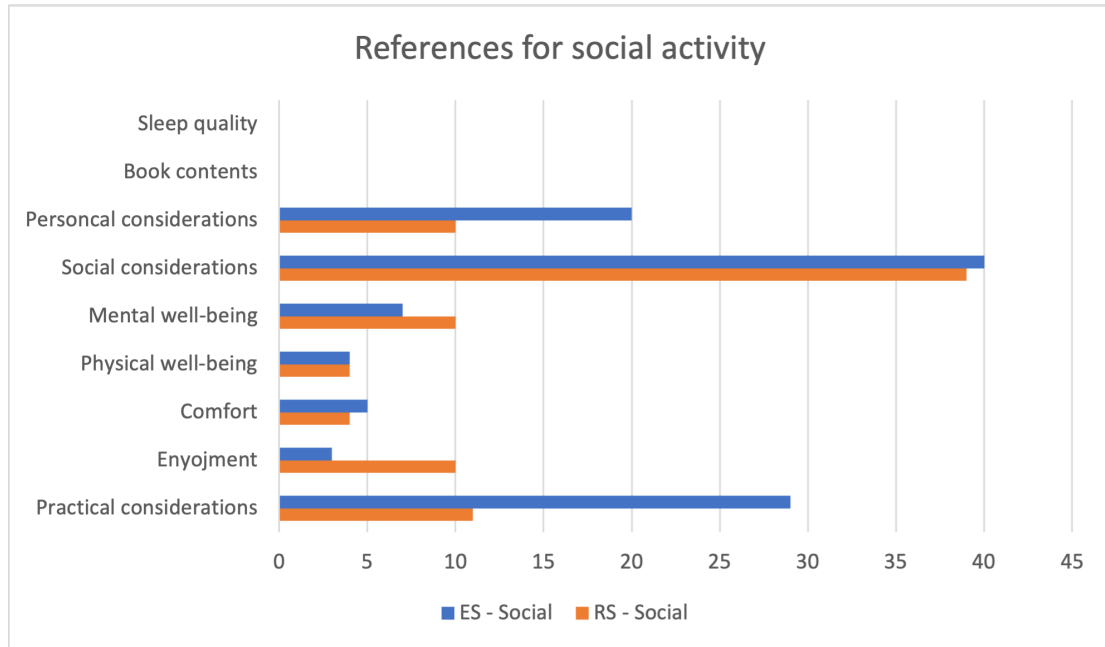
Figure 7: Bar Chart of the number of references for each axial code for social activity

The last activity to discuss is the social activity. Lets begin by discussing the practical considerations for the experiencing self which received 27 references. There is a large variety of considerations. Some considerations are about what they have to do tomorrow and how late they have to wake up: "*Do I have to be productive tomorrow*. Others also consider what time the activity starts, ends, and whether they have the time: "*Until how late do I stay*". Others worry about how much it will cost or how much they want to spend: "*How much can I spend*". Other considerations are what clothes to wear, which mode of transport to take to the activity, and if they will be able to understand the people there.

Social considerations are the largest consideration factor for this activity with 40 references. Of those references a lot mention considering which people will be present, if they are friends and how many people will be there: "*Who will be present?*". People also mention having as a goal to catch up to people and being able to connect to them: "*Get to know how it's going with someone*". Some will also consider if they think the ambiance will be 'gezellig' : "*Have a good social time*". A small considerations is also if it is a mandatory activity or if their boss is present.

Some personal considerations are whether to drink alcohol and to not drink too

much alcohol: *"Am I going to drink alcohol, if yes how much?"*. Of course some consider that they want to have a fun evening and have a laugh: *"Enjoy the evening"*. There are also a few time considerations, about what time to leave, and some make it a goal to leave early. Some consider the possibility that they will be going out after the work outing and whether they would want to dance: *"Is it talking or going out"*.

There are 7 mental well-being considerations as well. They consider as a goal that they want to be able to relax: *"relaxing"*. They consider their mood, how tired they are and if they have energy. They also don't want to be annoyed by loud music or noise: *"Can I keep a conversation (or is it too loud)"*. The comfort considerations can be summarized as participants considering if the activity takes place at a nice place and how far it is.

All physical well-being considerations are about how much alcohol they would want to consume which there are 4 references to: *"Don't drink too much alcohol"*. Finally, there are some considerations about food, them being that they want to enjoy the food that is present.

Looking at the practical considerations from the perspective of the remembering self shows that there is a large drop to 11 references. Some of these considerations are about costs and money: *"Price of drinks"*. Other considerations are if there were nice drinks. Some people consider if they were able to talk and understand everyone.

There were 39 references to social considerations many relating to conversation. They consider how nice the conversations were, if there was a nice ambiance, if they got to know people better, and what the subject of conversation was: *"Did I have fun conversations"*, *"Did I get to know someone better"*, *"Were the conversations about something"*. Some people also consider afterwards who was present and how many. Other considerations are how their social battery felt afterwards and if they were inclusive of others: *"Do I feel I was social and understanding of anyone"*.

The other considerations received far less references. The next largest category was mental well-being which received 12 references. They consider how they felt through the activity found it interesting: *"How did I feel?*. Some participants were considering if they were able to relax or if they it cost energy: *"How much energy did it cost me?"*. There were some considerations about if anything negative happened: *"Was there an uncomfortable or unpleasant situation"*.

There were also 10 personal considerations. Half of these were about if they had fun and if there were funny moments. The other half were about if they had alcohol or if they got drunk. From the enjoyment of food category most considerations are about if the participant enjoyed the food that was present.

Finally, the last two smallest categories for considerations were physical well-being ,receiving 4 references, which were about how much alcohol the participant consumed and if they were feeling hungover the day after. Comfort also received 4 references and most considerations were about if they liked the location and whether there was availability to sit.

6 Discussion

In this section the results from the previous section will be discussed. They will be put into the context of theories about well-being and theories about quantified self. Additionally, the results will also be examined in the context of the kinds of features available currently in different apps and hardware made for the various activities. This is to explore the world of quantifiability for these various activities. This section will again be divided by activity to discuss the implications of the theory, apps and hardware per activity.

Research has shown how the quantifying self can help people improve various aspects of peoples' lives. Ultimately, the goal of this research is to draw different perspectives of the quantifying self by highlighting its opportunities as well as aspects to heed. Herder et al. 2024 proposes an 'online layer' built upon the 'human layer' as proposed by Harari. For example, the way humans go to work is significantly by the ability to enter a video-call, making it much easier to work from home. Similarly it suggests that quantification provides opportunities for personification, but also could make us rely more on system-1 thinking making us miss opportunities. In another paper, Etkin 2016 shows how self quantification makes people increase their output in an activities but shows its ability to simultaneously make activities less enjoyable by measuring them. The rest of this discussion will try to draw more of these opportunities as well as things to heed.

6.1 Eating

First to be discussed, are the considerations about eating. In the results it became clear that there was a decreased number of practical considerations when comparing the experiencing and remembering self. The remembering self considerations were mostly about if there was enough and how much the food cost. Meanwhile there was an increase in considerations about enjoyment of the food and in a smaller increase in considerations about the healthiness of the food and also in social considerations. Arguably, this can be seen as a change priorities in considerations about a meal. When you still have to eat the meal it is most important that you have set the table and if you have enough. After you are finished this is less important. The participants then mainly consider whether they liked the food, whether it was healthy and if they enjoyed the time they had with other people you were eating with.

Comparing the considerations participants give in the survey to the available nutrition apps shown in table 1, shows that the available applications fulfill some of the considerations of the participants. Within the area of nutrition applications there seems to be a distinction between diet focused apps and meal planning applications, although there is overlap between these two kinds of applications.

Diet focused apps, the first three applications in table 1, are aimed at letting users count calories and macro-nutrients. They also let users track their health by sending them weigh in reminders, reminders about entering their meals and letting them scan bar codes on their food to easily enter their nutritional information. They also provide meal plans based on recommended amount of calories and macro-nutrients based on weight loss/gain goals. Meal planning applications, the last three applications in table 1, lay emphasis on collecting and planning recipes. They make planning meals more easily by also making grocery lists, tracking leftovers, scanning recipes, and letting users customize meals. There is also attention for healthy eating but this is without in depth tracking of information. It could be said that these kinds of applications provide in the practical considerations for a user, because these consisted for a large part of considerations about time and portion sizes.

| App	Features
MyNetDiary (application)	- Food, water, exercise tracking, macros tracking - Meal and weigh in reminders - Shopping lists - Nutrition blogs, guidance and information on variety of diets highlighted by other readers - Daily advice and feedback
MyFitnessPal (application)	- Food, intermittent fasting, activity (workout and steps) tracking - Customization for weight and fitness goals - Mealplans for targeted calories and macros - Sync with glucose monitor (for diabetics) - Fitness monitor
Fitbit (application)	- Tracks steps, distance, calories, food, water intake - Audio and video workouts - Meditations and calming sounds for stress relief and sleep
Eat this much Premium (application)	- Meal planning, automatic grocery list, automatic leftover list, customize meals for day of the week - Diet plans my calories or macro-nutrients - Food and recipe browser

Big oven pro (application)	• Custom folders for recipes, Custom notes for recipes • Grocery lists • Nutrition information • Scan recipe with picture • Leftovers tool
Mealime Pro (application)	• Add notes to recipes • Allergen warnings • Filter recipes based on calories • Comprehensive nutritional information • Grocery lists

Table 1: Overview of eating/cooking applications and their features

You could say there is a distinction between these two kinds of apps in how they pertain to the considerations of the participants. The nutrition focused apps fulfil considerations about health by quantifying food and exercise. Some platforms, like MyNetDiary, also provide educational information about eating healthy. What is interesting is that educational content about nutrition has been shown to teach people to eat healthy, however studies those studies were not able to show actual improvements in health (Milne-Ives et al. 2020; Samoggia and Riedel 2020). Research also shows that there is limited evidence that diet tracking actually helps changing behavior. In Milne-Ives et al. 2020 it was shown that a small percentage of diet tracking apps showed significant results in changing dietary behavior. Another concern for nutrition apps has to do with is eating disorders. In Eikey 2021, researchers did a qualitative study on the effects of quantifying nutrition apps on people with an eating disorder. Participants indicated that apps with a high level of quantification led to obsession, fixation on number, and extreme negative emotions. Arguably, in these apps there should be more focus on the enjoyment of food. One could imagine how when focusing on the quantification of food a person could worry too much about healthiness of the food making users enjoy their meal less. Lastly, Participants indicated that aside from considerations about the meals themselves, they also had considerations about how they enjoyed their time with other people at the table. However, there do not appear to be many options for the participants considerations about social aspects of a dinner, making it an option for additional exploration.

To make some suggestions on how to address issues about quantification, the researchers suggest that apps should provide more qualitative feedback and less

Figure 8: Screenshot from Oura sleep ring App
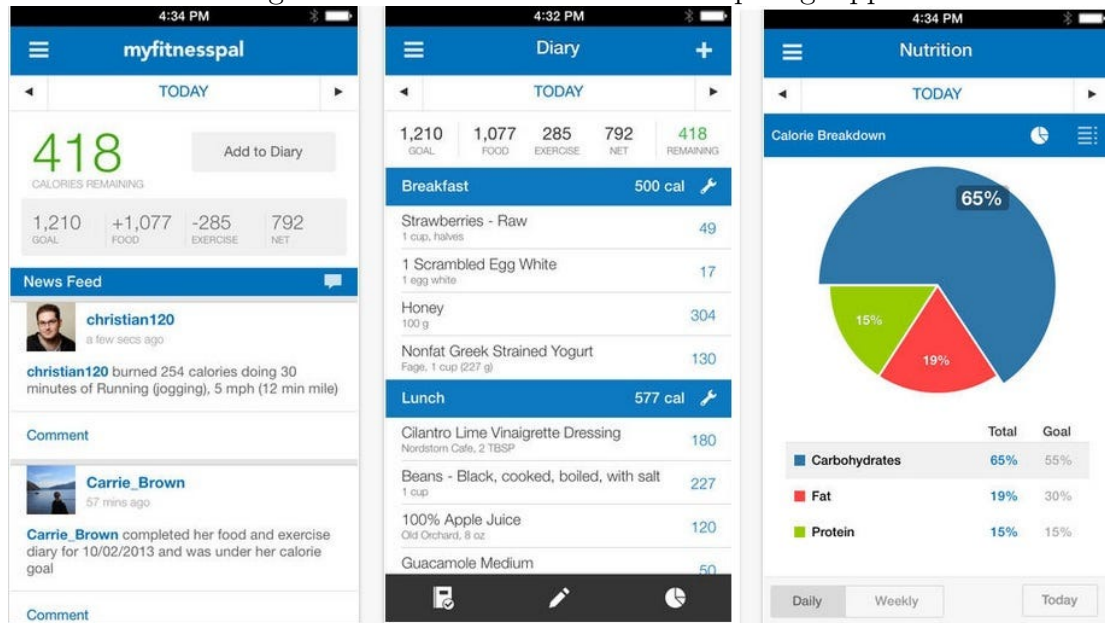
quantitative feedback, health experts should also be consulted to make metrics more indicative of actual health, and apps should rethink engagement focusing on reducing logging and looking at numbers. A way in which apps do not fulfill option for the considerations from the participants is in their enjoyment of food, the focus is mainly on the health considerations and practical considerations. You could say a way in which apps provide for these considerations is with the custom recipe notes. Letting users add notes on how to improve a recipe for another time is a way in which you could improve enjoyment. Perhaps app developers could also consider adding a food diary functionality. Such a functionality is more open for considerations about enjoyment of a meal. Another way that apps could improve is by letting users address their social considerations. These considerations, although not mentioned as much, indicate how peoples enjoyment of a meal is also dependent on their experience with their eating companions. As a suggestion, apps could consider more qualitative measures to evaluate this aspect of a meal, for instance letting users give a short summary with keywords.

To sum up this section, to the experiencing self it is important that practical considerations are taken care of before eating a meal, while afterwards the participants mainly consider if they enjoyed the meal they ate, whether it was healthy, and if they had a nice time with eating companions. So, it could be said that these practical considerations become less important to the remembering self. In the available applications for eating there is mainly a focus on nutrition on the one hand and meal planning on the other. Nutrition apps focus on supporting people in eating healthier by counting calories and other nutrients, sending weigh in and meal tracking reminders, and recommending recipes. Meal planning apps provide a way more easily planning meals for a coming week and letting users create meal plans with specific diet goals in mind. These apps provide in sat-

isfaction for considerations about healthiness and practical considerations. But, they are less capable of fulfilling considerations about enjoyment. Research also suggest that food tracking tools are not as effective as some may think, showing that education helps people know more about eating healthy but failing to show changes in healthy behavior. They may also negatively influence people with eating disorders. Suggestions to address this issue propose to shift focus away from quantitative feedback to qualitative feedback. Finally, this paper establishes a lack in ability for users to express their enjoyment considerations. For this it suggests apps to add diary and keyword summary functionalities.

6.2   Cooking

The next activity to discuss is cooking. This activity shows overlap with the previous section about eating but to maintain the structure as well as to address the differences in results between the activities it will be discussed in this separate section. The results showed that even more so for cooking compared to eating that practical considerations are important. Although the practical considerations did show a decrease between the experiencing and remembering self it was still the largest considerations for the participants. Like in the eating section the second largest considerations were also enjoyment and healthiness. Although, for the remembering self there was a large drop in considerations about healthiness for the remembering self. Perhaps, this is because they have not eaten the meal yet. Because, these considerations reoccur after eating the meal.

In the previous section we also discussed what kinds of applications there were for eating. This section will use the same app overview visible in table 1. Where the apps overlap the most with the considerations are in the practical considerations. The meal planning applications provide a lot of functionalities like being able to create shopping lists, creating lists of leftovers, giving recipe suggestions with ingredients people still have at home. These functionalities fulfill a large portion of the utility considerations mentioned by the participants in the survey. The apps are also able to fulfill some personal considerations by being able to filer recipes based on personal preferences like eating vegetarian. Like in the other section social and enjoyment were less accounted for. Most apps have an ability to add recipes to favorites and give them a rating.

The shortcomings for applications for cooking, are mostly the same suggestions as for the section about eating. Qualitative measures should be provided for users to de-emphasize the quantitative measures to discourage fixation on numbers for people with eating disorders. There could also be more emphasis in enjoyment of food. Many of the participants consider whether they enjoyed the meal. For this some apps already provide some functionality like a rating system and a notes system for specific recipes. This could perhaps be enhanced by letting users enter more detailed judgements of meals, for example, in the form of reviews or a diary.

This could let users review the food as well as other aspects of the meal like the social experience. Though this would need to be researched further to see if this actually provides benefits to the user.

To wrap it up, This section showed how for cooking there are already applications which provide features for practical considerations which was the largest consideration for participants of this research. It also shows that the participants had less considerations about physical well-being or 'healthiness'. Available applications cater to practical considerations by making shopping lists and tracking leftovers and to healthiness by providing dietary filters when searching for recipes and assembling a meal plan. The section about eating showed how to much focus on quantitative aspects of health could be harmful for instance to people with eating disorders. Arguably, this is also an important side-note to this section although this section showed less emphasis on quantification.

6.3   Reading

For the activity reading, the participants' primary concerns for both the experiencing self and remembering self were considerations about the book contents and mental well-being considerations. These considerations show that to the participants the two most important factors were what a book is about, if they learned something from the book, and if it makes them feel something. In literature, this idea is somewhat supported. In Schutte and Malouff 2007, an article about adults' reading motivations for recreational and mandatory reading, it is argued that adults' reading motivations are based on a several factors. One aspect of this paper is about that readers who read recreational books are more motivated by that they consider themselves a 'reader'. While readers who are reading required reading are more motivated by recognition and doing well in other realms. In this study those motivations are not separated but you could say they are reflected in the considerations on one hand about the educational value and on the other hand considerations about enjoyment of the books. Practical considerations were very low and dropped to zero for the remembering self, reinforcing the idea that to the the remembering self these considerations are not as important for activities that are not 'practical' in nature.

App/hardware	Features

Kindle/Kobo (e-reader)	• Market place for books • Book subscription model • Estimates in how much time you finish your book based on your reading speed • Shows parts of the book which are commonly highlighted by other readers • Audiobook library
Goodreads (application)	• Get book recommendations based on liked and disliked books • Follow writers and other readers • Write your own reviews and get response from other readers • Set a yearly book reading goal
Bookly (application)	• Tracks number of pages read/ time spent reading • Set reading goals like number of pages or time • Unlock medeals by achieving goals • Estimates how quickly you will • Infographics of reading history • Reports on improvement of reading
Blinkist (application)	• Summarizes highlights of book into 15 minutes reading time • Only used for non-fiction
Wattpad (application)	• For aspiring writers • Interact with other small writers and reach people willing to read books from beginning writers

Table 2: Overview of reading hardware and applications and their features

The quantified self largely does not play a role for reading to the participants. The only reference to it in the survey answers were that some people mentioned con-

templating how quickly they finished a book. In the overview of reading hardware and applications in table 2 this is reflected. Some e-readers which will estimate how much time it will take a reader to finish the current chapter, a sort of estimation of reading speed but it is not shown as a prominent feature. One other exception is Bookly, in this application users are able to track reading performance in more detail. The application, which focuses on teaching users a reading habit, tracks how many minutes and pages a user reads on a daily basis and allows them to set reading goals. With reminders and gamified elements like awards the application tries to reinforce a reading habit on the user. Other of e-readers do aid in satisfying other considerations mentioned in the survey. E-readers allow readers to highlight interesting parts of the book to read again later and will show popular highlighted areas from other readers. Possibly helping in fulfilling considerations like the enjoyment of the book.

Some of these elements appear supportive of reading habits can be argued less so. Particularly, quantifying reading 'performance' can be argued to be counter productive. In Yoo, Lemos, and Finn 2017, a prototype e-reader application is made similar too Bookly. Some of the participants in the study indicate that they liked the reminders and goal measuring of the application, while others said they made them feel pressured and stressed about reading. The authors of the study theorized it could be up to multiple things like the personality of the reader and also to the goals of the reader. To add to this, other studies show how quantification in some cases can increase output while decreasing enjoyment in an activity. In Etkin(2016) it shows how quantifying reading does help increasing reading output(more pages read). However, enjoyment in reading is shown to go down by focusing more on quantification. Literature agrees that reading is an activity that should be encouraged because it positively associated with employment and community involvement. It can also help against cognitive deterioration (Schutte and Malouff 2007). In a dutch report about encouraging dutch students to read Lezen 2021, it is argued that to stimulate others to read there should be 'a stimulating other'. You could say that platforms like Wattpad and Goodreads could behave like this 'other' by giving book recommendations and providing books which cater to their users interests. In news it is also argued that reading interest is in decline because of the restrictiveness of required reading lists [2]. However, critics of this opinion argue that this restrictiveness is self-imposed and encourage teachers to allow their students more freedom with choosing of literature.

To conclude, the participants of this study indicated a primary considerations when reading were about which kind of book they wanted to read, if the book has educational value, and how it made the participant feel. Few participants show a desire to quantify their reading 'performance' and this is also reflected in what kinds of applications there are available for readers. Quantifying is limited a few applications that try to encourage reading goals with daily reminders and awards

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[2]https://www.demorgen.be/beter-leven/hoe-geef-je-tieners-weer-leesplezier-een-leeslijst-hoef-je-niet-te-haten bedfad2d/

for achieving goals. This may be suitable for some readers but possibly be counter productive for others. When considering reading as a means for enjoyment focus should not be on quantification. But, when reading for work or study purposes where enjoyment is less of a priority it could potentially be helpful. Literature also shows that to stimulate reading the social aspect of reading could also be encouraged.

6.4 Sleeping

What was seen in the results for the activity sleeping was that, to the participants, sleep quality and mental well-being were most important. These categories saw an increase in considerations when going from the experiencing self to the remembering self. The participants had the most considerations about the quality of their sleep meaning that they considered various factors like if they woke up often, whether they fell asleep quickly, and if it was easy to come out of bed. These considerations indeed partially dictate whether you wake up feeling well rested. Obliviously, this is important because feeling well rested improves the rest of the day making you feel more productive and less stressed, improving well-being (Benham 2010; Gibson and Shrader 2018). However, arguably all these metrics are less important as long as you feel well rested when waking up. This is also considered by the participants in the mental well-being consideration category. But when looking at the space of applications and hardware for sleeping emphasis lies on this tracking of quantitative measures about your sleep.

The applications and hardware for sleeping allow people to measure things that otherwise could not be measured when only using our own senses. In table 3 a number of wearables and applications are shown and which features they provide, which were obtained from lists made by Wired[3] and Forbes[4]. There are a number of wearables with accompanied app and various sensors like, infrared sensors, a temperature sensor, and an accelerometer, which can be found in smart watches, wristbands and rings like the Apple Watch and Oura ring. They can measure heart rate, respiration, body temperature, and movement, amongst other things. These metrics can be used to graph a users REM sleep, how light or deep you slept, and moments or restlessness. This information can be tracked reasonably accurately depending on which how the information is measured. Wearable devices improve accuracy a lot by using state of the art sensors, while some apps only try to estimate sleep quality based on microphone recordings which is less accurate (Guillodo et al. 2020; Yoon and Choi 2023). In apps all these factors can be visualized in graphs, used in feedback, and summarized into a score. Some applications also provide help to let a user fall asleep. They have soundscapes like ASMR noises, nature sounds, music, and stories to fall asleep to. There are

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[3]https://www.wired.com/gallery/best-sleep-trackers/
[4]https://www.forbes.com/health/wellness/best-sleep-apps/

also applications that have meditations and even hypnotherapy. However, within the space of sleeping wearables and application the emphasis lies primarily on the tracking of biometrics and other data about sleeping.

App/hardware	Features
Oura Ring Horizon (wearable)	- Sensors that can measure: heart rate, body temperature, and movement. - Tracks total sleep, time in bed, sleep efficiency, and resting heart rate - Measures your REM, light or deep sleep, and if you woke up often - Sleep snapshot gives a score of your sleep quality - Tips for optimizing bedtime
Apple Watch (wearable)	- Sensors that can measure: heart rate, blood oxygen, body temperature, and movement. - Measures: sleep stages, bed time, sleep time, heart rate, respiration - Wind down feature helps get into bedtime routine - No sleep score by design
Better sleep (application)	- Variety of soundscapes to fall asleep to - Bedtime reminders for evening routine - Sleep monitoring and recording tracks sounds of restlessness and snoring
Sleepiest (application)	- Variety of soundscapes - Sleep tracking shows length of sleep, any waking during the night. Interface allows for analyses by user
ShutEye: Sleep Tracker (application)	- Sleep tracking tracks sleep stages by recording sounds of snoring, talking and teeth grinding. - Educational insights like sleep quality rating and biometric data - Automated CBT-I sleep coaching (Cognitive behavioral therapy for insomnia)

Breethe (application)	• Hypnotherapy and soundscapes to wind down and ease stress and anxiety • Meditations • Can integrate with apple health to track progress
Sleep Cycle (application)	• Library of sounds to fall asleep to • Analyzes sleeping patterns • Gives recommendations throughout day to improve sleep • Alarm wakes users up gradually at the right moment • Journal and statistics to build sleeping habits

Table 3: Overview of Sleep wearables and applications and their features

However, critics of these applications say they do not help and sometimes have adverse effects. One criticism is that these apps do not provide information that is as accurate as they claim[5]. Critics state that using movement sensors on your phone cannot provide accurate results because they only measure movement from your bed. They also say that sensors in a smart device like a wristwatch do provide more accurate results about heart rate and respiration. However, they also claim that for very accurate information about sleep stadiums you would have to use polysomnography. Other experts also claim that the act of measuring your sleep can have adverse effects[6]. They tell that some people are worried if their app tells them they are not getting enough sleep even when waking up and feeling rested. Arguably, you could say this is a disconnect between their remembering self and their experiencing self. Their remembering self is searching for more information about how they are sleeping. This causes their experiencing self to have a worse nights rest because they are stressed about needing to have a good nights sleep.

To conclude, sleeping apps and wearables provide a lot of useful information about how we sleep. This information is now more then ever easy to gather because of the sensor quality provided in modern wearables. The participants indicated in the survey that is provided within these apps is part of what they use to consider the quality of their sleep. However, there is arguably a lack of focus on the mental well-being aspect of sleeping within the space of sleeping applications and

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[5]https://www.nu.nl/gezondheid/5932902/apps-die-bijhouden-hoe-je-slaapt-hebben-weinig-nut.html

[6]https://wnl.tv/2024/02/16/we-slaan-door-in-meetdrift-met-tracking-apps-waarschuwt-expert-mensen-liggen-wakker-door-slechte-slaapscore/

Figure 9: Screenshot from Oura sleep ring App

hardware. Many participants indicate this is an important aspect of evaluating how they slept. It would possibly be helpful to users to give them more ways to evaluate their mental well-being needs after sleeping. Like in the activities reading and eating there is perhaps a case for sleeping apps to be less focused on quantification. Instead giving users evaluate their sleep more qualitatively is perhaps an opportunity to let users get more grip on their sleep without making it a source of concern. Applications aimed at helping users fall asleep are more in line with the needs of the participants who indicated that they sometimes like to listen to something while falling asleep and help some participants in their considerations about falling asleep quickly.

6.5 Sports

It became clear that the largest consideration for sports were the physical well-being considerations. After it came the practical considerations which were mainly to prepare for the activity like what kind of things to bring, what it cost and if the participant had time. These considerations saw a large decrease because you could say they are no longer important once the activity is over, only considerations about time remained because people still find it important to consider how long they were busy for or if they were on time for a training. The most considerations were about physical well-being for the experiencing self. For the remembering self, they saw a decrease but still most considerations were about physical well-being. On the other hand, mental well-being considerations saw a large increase. This could indicate that, to the remembering self, it becomes more important how a sports activity makes you feel afterwards while the experiencing self is still mainly

concerned with performance. In the personal considerations it is also visible that to both the experiencing and remembering self it is important that the participants will enjoy the activity. So it could be said that that between the experiencing self and remembering self there is a change in considerations where they consider an increased importance on how they feel mentally as well as physically after a sports activity. Lastly, the participants indicate that to some a sports activity is also seen as a social activity. They indicated wanting to have pleasant company on the field and considering if there was good team play.

App/hardware	Features
Apple watch (wearable)	- Activity rings: - Movement: burn a self-set amount of calories - Train: Daily 30 minutes of intense movement - tanding: reminder to stand up for a minute to make a small walk - Tracks: steps, calories, activity distance, pace and elevation, heart rate, temperature, high and low heart rate notifications, blood oxygen
Garmin (wearable)	- Tracks: energy levels, sleep, naps, steps, calories, activity distance, pace and elevation, water intake, heart rate, abnormal heart rate alerts, respiratory rate, Vo2, blood oxygen, stress, menstrual cycle - Preloaded trainings for 30 different sports - Accurate GPS signal for running
Strava (application)	- App primarily for running and cycling - Tracks distance, average speed, top speed, elevation, length of activity - Tracks calories burned, heart rate - Running/cycling challenges (with groups) - Some data can only be tracked with a wearable
Nike training club (application)	- Personal training programs - Workout videos - Multiple types of workouts from yoga to core training - Monitors heart rate (in combination with wearable)

FitOn (application)	- High variety types of workout cardio, strength, high-intensity interval training (HIIT), dance, yoga, Pilates, Barre and more - Workouts led by celebrities - Live leaderboards during activities - heart rate tracking with apple watch - Tracking of progress and fitness goals - Personalized meal plans
Gymshark Training (application)	- Library of workouts and plans, specific to muscle groups or exercise types - Create your own custom workouts down to set and rep numbers - Can integrate with apple health to track progress

Table 4: Overview of Sports wearables and applications

In the market of sports there is mainly a focus on the physical aspects of sports. In table 4 there is an overview of various wearables and applications meant for sports and exercises based on two lists of popular apps from Forbes[7] and the Telegraph[8]. It shows that wearables like an Apple Watch or Garmin watch can keep track of a variety of performance indicators like how many steps you have taken and calories you have burned using sensors like a heart rate sensor and accelerometer. These wearables are particularly useful for sports like running and cycling because they can also make use of GPS sensors to accurately keep track of data like distance, speed, and elevation. Similarly, the other sports apps obtain this same data from either your wearable of a smart device like a phone. Other popular features most of these applications include are a large variety of training sessions for different kinds of sports that customized to your goals. You could say this aligns with the considerations from the participants who say they want, at least according to studies these plans help recreational athletes achieve a sense of competence and autonomy (Stragier, Vanden Abeele, and

Figure 10: Screenshot from Garmin app

[7]https://www.forbes.com/health/fitness/best-fitness-apps/
[8]https://www.telegraph.co.uk/recommended/leisure/best-fitness-trackers-watches/

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De Marez 2018; Bitrián, Buil, and Catalán 2020). The so-
cial features like those of Strava also aid in a sense of relatedness according to
these studies.

However, these social and reward functionalities of these apps can also behave
like a double-edged sword. This effect is particularly visible for people who show
a lack of self-efficacy (Rockmann 2019). People with a lack of self-efficacy can
feel demotivated by the social aspects and by rewards systems of the applications.
Another study also shows that these social aspects could also be argued to have
other adverse effects. You could also say that those social features are not adjusted
for different kinds of sports. Letting users compare themselves to others could
potentially be harmful to their self confidence (Bardel et al. 2010). The survey
showed that the remembering self of the participants evaluated more based on
mental-well-being outcomes. Meanwhile the feature overview and the mentioned
papers show that some features can have adverse effects for mental well-being. A
solution for this suggested by on of the papers is to shift focus in apps away from
these kinds of features if it is detected that a person is using the application less.
The participants also showed how they considered the social aspects of sports
like team play and pleasantness on the field. The feature overview shows how
there are not a lot of available features for these kinds of considerations. Similarly
the personal considerations mentioned by participants about want to enjoy the
activity are also less represented.

6.6   Social

Finally, let's discuss the final activity from the survey, social activity. The results
showed that the largest consideration for both the experiencing and remembering
self were the social considerations. These considerations experience a shift between
the experiencing self and remembering self from 'who is coming' to 'conversation
quality' respectively. It could be said that who is coming partially determines
the quality of a conversation at a social outing. There is also a drop in personal
and practical considerations, but this might be due to a overall drop in number of
considerations. Something interesting to note was that most considerations were
qualitative in nature. Quantitative considerations were about money which were
coded as practical considerations.

App	Features
Vrank (application)	- Provides conversation topics for a conversation starter - Based on composition of people (ex. colleagues, friends, date)

Bash (application)	• Discover social events in your area • Filter preferences for events • Follow friends and organizers • Organize your own party • Keep track of presence at activity
Meetup (application)	• Discover groups and events based on interests • Meet new people online or in person • Learn new skills
Fishbowl (application)	• Find a community based on your profession • Network by messaging with professionals in your industry • Live audio events and chat • Join groups which exchange interests, advice, etc.

Table 5: Overview of social applications and their features

Applications for social activity largely do not focus on evaluating social activity. Table 5 shows a number of applications meant for social activity. They focus on organizing social activity in various ways. Be it by giving interesting conversation topics, letting users host or find and visit parties, or getting in contact with people with a similar interest or profession. The apps do provide in some of the considerations mentioned by the participants. For instance, Bash fulfills considerations about who will be present at an activity. These apps are mostly focused on considerations for the experiencing self. They focus on preparing for some kind of social event. When users want to have a meaningful conversation they download Vrank for conversation starters, or they can download fishbowl to talk about work related topics.

For the remembering self the apps do not provide many features. Many of the social considerations for the remembering self are about if the participant thinks they had fun or interesting conversations, met someone new, or if they were inclusive of other attendees. This could indicate that there is an opportunity for an application which evaluates social activities. Being able to give evaluations for an event could not only let the self reflect on what they thought of a social activity but perhaps could also be useful for other to see. Being able to see if someone

liked the previous version of an event might be a useful application to have. The rating of personal social interaction might be less beneficial though, specifically when doing it quantitatively. In the novel "The Every", Dave Eggers depicts a dystopian world where an app gives a score to the quality of a friendship and trustworthiness based on facial expressions, eye contact, and vocal intonations (Herder et al. 2024). It would be imaginable that such a system would cause people to have a more negative experience even from small conversations. As Etkin 2016 shows how measuring for activities that are meant to be fun takes away from their enjoyment. Perhaps this could also be true for the social considerations of the participants in this paper.

6.7 Summary of Results and Overall Observations

In this discussion we analyzed the different considerations the participants had and how they varied for the different activities. They were then set in the context of available recommended applications for the associated activity and lastly, we examined the background literature which showed downsides and upside associated with the quantified self for the activities.

The considerations of the participants showed how for all activities, between the experiencing self and remembering self, there was a decrease in the practical considerations. It also shows how for the activities where quantification is easier, eating, sleeping and sports, there is often an associated consideration which in applications is quantified to a higher extent compared to the other activities. In the context of Maslow's hierarchy of needs, you could say these applications are mostly associated with the physiological needs of the users. They were mainly focused on health, be it health goals for sports, healthy eating, or healthy sleeping. These considerations are perhaps also more easily quantifiable from a objective list theory perspective. Although for some metrics there is disagreement whether they constitute health the metrics measure during the activities are clearly closely associated with health.

Measuring performance can be helpful for the correct activities. For sports, performance is very closely associated and obvious option to measure and measuring caloric intake could help people successfully lose weight. However, focus on quantification can also make users lose track of what is important for certain activities. One conclusion about measuring performance for these various activities is that the measurements and also the act of measuring should be appropriate for the activity. Activities that a person does for fun do not benefit from quantification and could even diminish enjoyment of such an activity.

Considerations that see less attention are those about enjoyment, social considerations, mental well-being considerations and personal considerations. These considerations are important to people their well-being but are more difficult to

quantify. Considerations about if you enjoyed reading a book, enjoyed conversation during a meal, had fun during a social outing or felt challenged during a football match are not objectively measurable but still might be useful to evaluate to the participants. In the hierarchy of needs they are more associated with needs like the love and belonging needs and esteem needs. Because these needs lend themselves less to quantitative needs this research recommends for more use of qualitative evaluation. In addition to how we saw that some activities are not easily quantified, there are also some activities that could benefit from less quantification in the place of qualitative measures. Particularly in the case of eating it was discussed how people with eating disorders could obsess over quantitative data and how they could benefit from more qualitative evaluation. The same could be true for other activities.

6.8   Limitations and Future Research

This paper attempts to show how the quantified self affects the experience of certain activities between the perspectives of the experiencing self and remembering self. By looking at what the considerations were for the participants, it shows various groups of considerations of the participants which vary in importance for the mentioned activities. Based on these considerations together with literature and app overviews this paper shows how in some ways the available applications support the various activities while in other ways it might hinder well-being of its users. This hindrance may stem in some part from what the purpose of the activity is. Where this research has its limits is in the population of its participants. This convenience sample is constricted to relations of the author mostly consisting of university educated friends and family members. Two thirds of the age groups fall within the age brackets 18-24 and 24-34. This might skew the considerations of the participants in some kind of way for instance an older age group might have more considerations about their health compared to younger participants(Deeks et al. 2009). The final limitation of this study is that it is not a quantitative study. Although the results are as objective as they can be by means of the open coding method they are not proven significantly and thus need to be further researched.

For future research this study recommends more investigation on the effects of self quantification for various activities. It shows how quantifying activities that are meant for our enjoyment can be made less enjoyable by measuring them. As a suggestion it might be interesting to research the effects of quantification on other considerations from this study. For instance, how quantifying affects our mental well-being or our physical well-being for the activities for which these considerations are relevant. The participants showed to have a varying importance for these considerations in the survey and it would be interesting to see if they are affected by self quantification. Another avenue for future research would be to investigate the effects of reflecting for the remembering self for various activities. This research showed that, although for many activities people indicated that they

considered afterwards how much they enjoyed the activity, there were no available applications to properly accompany their considerations for the activity.

7 Conclusion

Improving our well-being has been a pursuit since the start of civilization. Literature shows how earlier theories like hedonistic theories determine that well-being is a sum of all pleasure and pain and to maximize well-being one needs to maximize pleasure and minimize pain. The quantified self seems more rooted in objective list theories. It identifies metrics which a person should optimize in order to improve, for instance, their health, intelligence, mental state, or other factors, which in turn improves well-being. Research has shown how quantifying these factors makes people engage more with behavior that improves them. However, some literature also showed how there are some downsides to quantifying the self and this was a point of interest for this study.

To identify these downsides this research set out to view the quantifying self from different perspectives, that being the perspectives of bounded rationality. By dividing a group of participants and letting them answer from either the experiencing self perspective or the remembering self perspective this study wanted to find how these two perspectives differed. Then to connect these differences, more literature was searched and overviews of available apps and hardware were made to put these differences in the context of the current times.

The results section of this research shows where the differences lie between types of considerations within the various activities as well as how the different activities differed from each other in which kind considerations were dominant. It was shown how for the activities there was always a number of practical considerations which was higher for the experiencing self than the remembering self. Most activities also had one or more other frequently mentioned type of consideration. These considerations were summarized and shown which ones were most prominent.

Finally, the discussion divided each activity into a separate section again. Then, they discussed the differences between the experiencing self and remembering self. It showed how for various activities like sports and eating people showed social considerations which were not represented in the apps, potentially presenting an opportunity for improvement. Next it showed how most apps had a focus on quantifying performance in the activities. The extra literature showed how this is alright for some activities while other activities could benefit from less quantification and more focus on qualitative evaluation methods. It showed how activities like reading and eating could be hindered in their enjoyment by assigning to much focus on quantitative aspects of these activities. Overall the predominant conclusion of this research is to be mindful quantifying certain activities. Self-quantification can help with changing behavior but, needs to be treated with care to avoid unintended consequences.

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A   Appendix: Scenarios

A.1   Experiencing self: Movies example

Imagine this example scenario: You are at home and you want to watch a movie this evening. Of course, you have a couple of considerations and goals for deciding how this activity will be a night well spent. Some examples might be: You consider the length of the movie You consider what genre of movie you want to watch You check some reviews to see if a movie has a good score Ultimately your goal is to have a fun night.

These considerations and goals are important to decide whether watching a movie will be a good way to spend your time this evening.

In the following part of this survey the question will be about other activities. The question to you will be to determine which considerations and goals you have to decide if you think the activity will be time well spent.

A.2   Experiencing self: Cooking & Eating

Scenario 2: In this next scenario, you will be asked to think about cooking and eating. Imagine you are going to cook a meal for yourself. Please think about what your considerations and goals are when you are cooking this meal and what your considerations and goals are when eating it.

A.3   Experiencing self: Sleeping

Scenario 3: The next question will be about sleeping. Imagine the scenario that you are going to bed right now. Please try to think about considerations you have when you are going to sleep.

A.4   Experiencing self: Reading

Scenario 4: The next scenario will be about reading books. Imagine that you are going to spend your evening reading a book. Please try to think about your considerations or goals when you are going to read this book.

A.5   Experiencing self: Sports

The previous scenario about watching movies was an example question. The next couple of questions will be similar but about different types of activities. You will no longer get suggestions for considerations and goals.

Scenario 1: In this first scenario I ask you to imagine you are going to do sports. Think of a sport you (want to) practice regularly and think about the goals and considerations you have when you are going to practice this sport.

A.6   Experiencing self: Social

Scenario 5: This final scenario will be about social activities. Imagine you have are going to a group outing with colleagues/fellow students. Please try to think about your considerations and goals when you are going to this social activity.

A.7   Remembering self: Movies example

Imagine this example scenario: Last evening you watched a movie and you are evaluating if you have spent your evening well. To determine this we often evaluate various outcomes. Some examples of outcomes that we evaluate could be: You judge if the movie had a good story. You ask yourself if you liked the underlying message. You consider whether the actors played their role well. You judge if you learned anything from it.

All of these outcomes contribute to a complete evaluation of how satisfied you are with the activity of watching a movie.

In the next few questions you will be asked to come up with outcomes you would consider in various different activities.

A.8   Remembering self: Cooking & Eating

Scenario 2: In this scenario, I ask you to imagine that you are evaluating a meal that you previously cooked and then ate. Try to think about the outcomes that you would evaluate your meal on.

A.9   Remembering self: Sleeping

Scenario 3: In this scenario, I ask you to imagine that you are evaluating your sleep from last night. Try to think about the outcomes that you would evaluate your night of sleep on.

A.10   Remembering self: Reading

Scenario 4: In this scenario, I ask you to imagine that you just read a book and you are evaluating how you found the experience. Try to think about the outcomes that you would evaluate the experience of reading a book on.

A.11   Remembering self: Sports

The previous scenario about watching movies was an example question. The next couple of questions will be similar but about different types of activities. You will no longer get suggestions for outcomes.

Scenario 1: In this first scenario, we ask you to imagine you have just finished doing a sport you (would like to) practice regularly. Please, think about the outcomes you evaluate this activity on.

A.12   Remembering self: Social

Scenario 5: This last scenario will be about social activities. I ask you to imagine you had a group outing with colleagues/fellow students. Please try to think about outcomes you would evaluate the experience of this social activity on.

B   Appendix: Codes

Name	Files	References
Algehele ervaring	0	0
-Comfortabel	0	0
–Alcohol op	1	1
–Comfort	3	4
–Context	0	0
—Locatie	5	11

—Omgeving	1	1
—Reizen	2	3
—Vermaak tijdens eten	1	5
—Versiering	1	1
—Weersomstandigheden	3	14
—Zitplek	2	7
–Donker binnen	1	5
–Douchen	1	1
–Opgemaakt bed	2	3
–Pyjama	1	1
–Raam open	1	3
–Rustig water	1	1
–Schoon bed	1	1
–Temperatuur	2	2
–Veilig	1	1
–Vies Gevoel	1	1
–Warmte bed	1	1
-Fysieke welzijn	0	0
–Actiefheid	2	2
–Afstand	2	12
–Afvallen	1	1
–Balbezit	1	1
–Bewegen	1	1
–Brak	1	1
–Buiten	1	3
–Calorien	1	1
–Conditie	2	7
–Doel	1	4
–Doorzetten	2	2
–Fitheid	3	4
–Flexibiliteit	1	1
–Gezond	5	20
–Groentes	2	6
–Hoeveelheid alcohol	2	7
–Inspannen	2	3
–Opwarming	1	1
–Pijn	2	4
–Prestaties	2	7
–Proteinen	1	2
–Scoren	1	2
–Snelheid	2	7
–Spieren	1	2
–Techniek	1	1
–Vaardigheden	2	2
–Verbetering	2	5

–Vlees	1	1
–Voedingswaarden	3	3
–Voedzaam	1	2
–Zweten	2	2
-Genot food	0	0
–Aanbevelingen	2	2
–Eten	2	10
–Extra toevoegingen	3	9
–Gaar	2	2
–Geur	1	1
–Herhalen	3	8
–Muziek luisteren	1	1
–Nieuw	3	6
–Schrokken	1	1
–Smaak	4	48
–Speciale ingredienten	1	2
–Temperatuur eten	3	7
–Textuur	1	1
–Uiterlijk	3	8
–Verbeterd recept	2	3
–Vernieuwend	2	2
-Inhoud boek	0	0
–Auteur	2	6
–Boek Dikte	1	4
–Einde	1	4
–Genre	1	8
–Humor	2	3
–Karakterontwikkeling	1	1
–Kwaliteit	2	9
–Leesadvies	1	1
–Logisch	1	1
–Onderwerp	1	2
–Paginas	1	2
–Realisme	1	1
–Recensies	1	3
–Schrijfstijl	2	13
–Vermaakelijkheid	2	6
–Waargebeurd	1	1
-Mentaal welzijn	0	0
–Afleidende muziek	3	3
–Bidden	1	1
–Choreografie onthouden	1	1
–Concentratie	2	7
–Dag afsluiten	1	2
–Emoties	1	1

–Emotioneel	2	2
–Energie	6	13
–Gevoel	3	10
–Herkenning	1	3
–Hoe het valt	1	1
–Honger	2	6
–Hoofd legen	2	2
–Houdt aandacht	1	6
–Inspirerend	2	2
–Interessant	2	5
–Klaar met dag	1	6
–Lawaai	2	2
–Leerzaamheid	3	26
–Leraar	1	1
–Moeheid	3	16
–Moeilijkheidsgraad	2	19
–Nachtmerries	1	3
–Ontspannen	7	21
–Piekeren	1	2
–Rust	5	12
–Stemming	3	3
–Stressvol	1	1
–Uitgerust	1	22
—Gapen	1	1
–Verander perspectief	1	1
–Vervangend gedrag	1	1
–Vervelende dingen	2	4
–Voldoening	2	3
-Persoonlijke overwegingen	0	0
–Aan tafel	1	1
–Aantal paginas lezen	1	3
–Afwisselend	3	6
–Alcohol	2	6
–Andere boeken	1	1
–Best for last	1	1
–Competitie	1	1
–Dansen	1	1
–Dronken	2	5
–Drukte	4	4
–Fouten	1	3
–Gehouden aan recept	1	2
–Gewoonte ontwikkelen	1	1
–Goed spel	2	3
–Gratis	1	1
–Handgevoel	1	1

–Lachen	3	3
–Leessnelheid	1	3
–Milieu	1	1
–Moeite waard	1	2
–Plezier	5	21
–Prioriteiten	1	1
–Seizoensproducten	1	1
–Slaapplek	1	1
–Spannend	2	4
–Tegenstander	1	1
–Tevredenheid	2	7
–Uitgaan	1	2
–Van tevoren eten	1	1
–Vega	3	4
–Vermaak voor slapen	2	5
–Vertrektijd	1	2
–Vervolg	2	2
–Verwachtingen	3	4
–Vleesvervangers	1	1
–Vroeg vertrekken	1	1
–Winnen	2	3
–Zin in	2	9
-Slaap kwaliteit	0	0
–Bed uit in nacht	1	2
–Diepte slaap	2	3
–Dromen	1	4
–Duur van slaap	2	17
–Genoeg slapen	1	6
–Hoevaak wakker	1	16
–Makkelijk bed uit	1	2
–Niet wakker worden	1	1
–Schermen	1	4
–Snel in slaap	2	7
-Sociale overwegingen	0	0
–Aantal aanwezigen	1	1
–Afloop	1	1
–Baas aanwezig	1	1
–Bekenden	1	2
–Bijpraten	1	8
—Bijkletsen	1	1
–Communicatie	1	1
–Gesprekken	1	10
–Gespreksonderwerpen	1	2
–Gezellig	6	24
–Gezelschap	9	37

–Herinneringen	1	1
–Hoeveel kennen	1	1
–Kennismaken	2	7
–Luisteren	1	1
–Mening anderen	5	11
–Netwerken	1	1
–Populair	1	1
–Sfeer	2	3
–Sociaal	1	1
–Sociale batterij	2	2
–Sportiviteit	1	1
–Teamspel	1	1
–Verbinding	2	4
–Verjaardagen	1	1
–Verplicht	1	1
–Vrienden	1	1
Praktische overwegingen	0	0
-Aankomsttijd	1	1
-Afwas	2	3
-Bereidingstijd	1	19
-Bestek	2	6
-Deelbaar	1	1
-Drinken	3	8
-Eerdere borrels	1	1
-Eindtijd	1	4
-Geld	2	7
-Geleende boeken	1	1
-Genoeg	4	17
-Gerecht soort	1	2
-Hoeveelheid	2	3
-Hoeveelheid ingredienten	1	2
-In huis	2	13
-Ingredienten	1	1
-Keukengerei nodig	1	1
-Kinderen	1	3
-Kleding	2	6
-Korting	1	1
-Kosten	6	21
-Leeslijst	1	4
-Meenemen	1	1
-Onderzetters	1	1
-Opruimen	1	1
-Overhouden	2	2
-Portiegrote	1	4
-Restjes	1	1

-Route	1	2
-Slapen practisch	0	0
–Hoelaat wakker	3	8
–Morgen	3	9
–Neusspray	1	1
–Opstaan	2	2
–Partner wensen	1	2
–Uitslapen	2	2
–WC	1	1
–Wekker	1	5
-Specialistische uitrusting	1	1
-Tafel gedekt	1	4
-Tanden poetsen	1	3
-Tijd	7	38
-Tijd hebben	2	10
-Trainingschema	1	3
-Verstaanbaarheid	2	3
-Vervoersmiddel	1	2
-Voorbereiden	1	1
-Water	1	4
-Wedstrijden	1	2